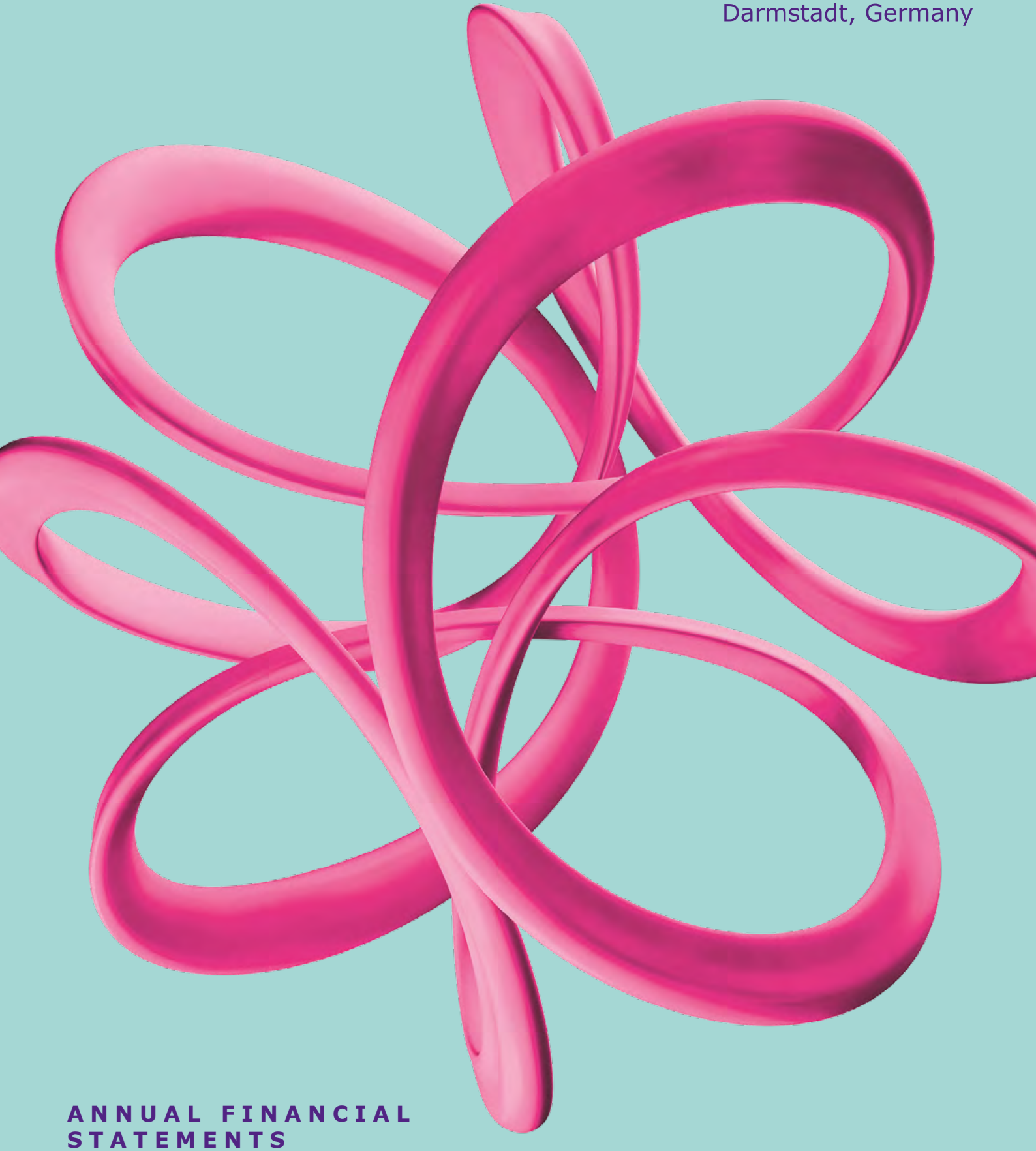
Merck KGaA
Darmstadt, Germany



ANNUAL FINANCIAL STATEMENTS 2019

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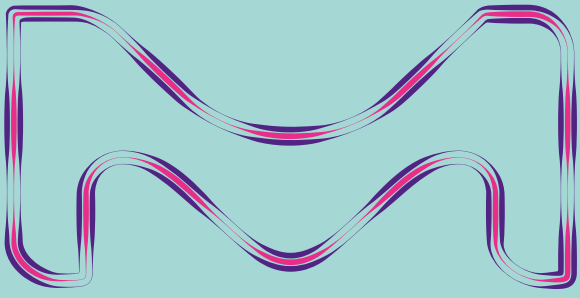

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COMBINED MANAGEMENT REPORT

Management Report

The management report of Merck KGaA, Darmstadt, Germany, has been combined with the Group management report. The combined management report is published in the 2019 Annual Report of the Group. The annual financial statements and the combined management report of the Group and Merck KGaA, Darmstadt, Germany, for 2019 are being filed with the electronic German Federal Gazette (elektronischer Bundesanzeiger) and are available on the website of the German company register.

Fundamental Information about the Group

The Group

We are a vibrant science and technology company. Science is at the heart of everything we do. It drives the discoveries we make and the technologies we create. We make a positive difference in the lives of millions of people every day.

In Healthcare, we discover unique ways to treat some of the most challenging diseases, such as multiple sclerosis (MS) and cancer. Our Life Science experts develop tools and solutions, which are aimed at enabling scientists achieve breakthroughs even faster. And in Performance Materials, we develop science that sits inside technologies and changes the way we access and display information.

Everything we do is fueled by our belief in science and technology as a force for good. A belief that has driven our work since 1668, and will continue to inspire us to find more joyful and sustainable ways to live. We are curious minds dedicated to human progress.

We operate globally under our corporate brand. The only exceptions are Canada and the United States. In these countries, we operate as EMD Serono in the biopharmaceutical business, as MilliporeSigma in the life science business, and as EMD Performance Materials in the high-tech materials business.

Apart from our three business sectors, our financial reporting presents five regions: Europe, North America, Asia-Pacific, Latin America, and the Middle East and Africa. As of December 31, 2019, we had 57,071 employees worldwide[1], which compares with 51,749 employees on December 31, 2018.

Healthcare

Our Healthcare business sector comprises the two businesses Biopharma and Allergopharma. In 2019, Healthcare generated 42%of Group sales and 40% of EBITDA pre (excluding Corporate and Other). Europe and North America generated 55% of Healthcare's net sales in 2019. In recent years, we have steadily expanded our presence in growth markets. In 2019, Asia-Pacific and Latin America accounted for 38% of sales.

Biopharma*

Our Biopharma business discovers, develops, manufactures and markets innovative pharmaceutical and biological prescription drugs to treat cancer, MS, infertility, growth disorders, and certain cardiovascular and metabolic diseases. Biopharma is the larger of our Healthcare businesses and operates in four franchises: Oncology, Neurology & Immunology, Fertility, and General Medicine & Endocrinology. Our R&D pipeline positions us with a clear focus on becoming a global specialty innovator in oncology, immuno-oncology, and immunology including multiple sclerosis (MS).

At the end of March 2019, Mavenclad® (cladribine tablets) was approved in the United States, the market with the greatest number of people living with MS. Mavenclad® was approved for the treatment of adults with relapsing-remitting MS (RRMS) and active secondary progressive MS (SPMS). Our cladribine tablets have been approved by the FDA as a treatment for RRMS and SPMS that provides two years of proven efficacy, with a maximum of 20 days of oral treatment during a two-year period. With U.S. approval, Mavenclad® is now approved in more than 70 countries, including those of the European Union, Australia, Canada, and Switzerland.

[1] The Group also has employees at sites that are not fully consolidated subsidiaries. These figures refer to all people directly employed by the Group and therefore may deviate from figures in the financial section of this report.

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We view Mavenclad® as a complementary oral treatment option in our MS product portfolio. Rebif® (interferon beta-1a), a disease-modifying drug used to treat relapsing forms of MS (RMS), is and remains a well-established therapy. Rebif® is registered in more than 90 countries worldwide. Interferon beta-1a has been proven to delay the progression of disability, reduce the frequency of relapses, and reduce magnetic resonance imaging (MRI) lesion activity and area.

In September, we initiated two global pivotal Phase III trials of evobrutinib, an oral, highly selective Bruton's tyrosine kinase (BTK) inhibitor in adult patients with RMS. Evobrutinib was developed within our own laboratories and further demonstrates our commitment to improving the lives of people with MS and other chronic progressive diseases (for further details see "Research & Development").

Erbitux® (cetuximab) remains the second best-selling drug in terms of revenue in the portfolio of our Biopharma business and is our flagship product in oncology. Treating more than 900,000 patients since authorization, the product is a standard of care for patients with epidermal growth factor receptor (EGFR)-expressing, RAS wildtype metastatic colorectal cancer (mCRC), as well as both recurrent and/or metastatic and locally advanced squamous cell carcinoma of the head and neck (SCCHN). We continue to invest in cetuximab and are committed to making it available to those patients it will benefit most. In September, Erbitux® obtained the approval of the National Medical Products Administration of China in mCRC.

Together with Pfizer Inc., we are developing much-needed new treatment options for patients with hard-to-treat cancers. We have made key progress in this area, with regulatory approvals in more than 50 countries for our anti-PD-L1 antibody avelumab under the brand name Bavencio®. In May, we and our alliance partner Pfizer announced that the FDA had approved Bavencio® in combination with axitinib for the first-line treatment of patients with advanced renal cell carcinoma (RCC). In October, we and Pfizer reported that the European Commission (EC) had also approved Bavencio® in combination with axitinib for the first-line treatment of adult patients with advanced RCC.

Bavencio® was initially granted two approvals in 2017 by the FDA for the treatment of adults and pediatric patients 12 years and older with metastatic Merkel cell carcinoma (mMCC) and previously treated patients with locally advanced or metastatic urothelial carcinoma (UC). These indications were granted accelerated approval based on tumor response rate and duration of response. Continued approval for these indications may be contingent upon verification and description of clinical benefit in confirmatory trials. The prognosis for both patient groups is very poor, so avelumab may represent a welcome new treatment option.

The Bavencio® approvals were based on data from our comprehensive clinical development program JAVELIN, which currently involves at least 30 clinical programs and more than 10,000 patients evaluated across more than 15 different tumor types.

We are continuing to explore all potential options and have entered into a number of strategic collaborations to evaluate avelumab in combination with a range of complementary oncology medicines (for further details see "Research & Development"). Key data from the JAVELIN program was presented at major medical congresses in 2019, including the European Society for Medical Oncology Congress (ESMO), where we shared new results from the Phase III JAVELIN Renal 101 study evaluating the efficacy of first-line treatment with avelumab in combination with axitinib compared with sunitinib in two clinically relevant subgroups of patients with advanced RCC.

Other highlights from our development pipeline included the presentation of new data for our investigational oral MET inhibitor, tepotinib, in advanced solid tumors. In September, we shared important milestones for two combination studies of tepotinib in locally advanced or metastatic non-small cell lung cancer (NSCLC) with epidermal growth factor receptor (EGFR) mutation and select MET dysregulations. In September, we announced that the FDA granted Breakthrough Therapy Designation (BTD) for tepotinib in patients with metastatic NSCLC harboring MET exon 14 skipping alterations who progressed following platinum-based cancer therapy. In November, we reported that the Japanese Ministry of Health, Labour and Welfare (MHLW) granted orphan drug designation (ODD) for tepotinib for patients with NSCLC-harboring MET gene alterations.

In February 2019, we entered a global strategic alliance with GlaxoSmithKline (GSK) to jointly develop and commercialize the investigational bifunctional fusion protein immunotherapy bintrafusp alfa, discovered as a result of our own research. In 2019, we achieved our alliance objective of eight trials ongoing or with protocol under development, including our most recent clinical trial initiations in October in 1L biliary tract cancer (BTC) (for further details see "Research & Development").

Being the global market leader in fertility drugs and treatments, with a unique and broad portfolio from therapeutics to lab technologies, our Fertility franchise is an important growth driver for our Biopharma business. Infertility represents an increasing challenge globally due to demographic changes and growing lifestyle adjustments like delayed childbearing. In this highly specialized market, the focus lies on quality, standardization, outcome improvements, and patient convenience. With our portfolio, we are well equipped to be the Fertility partner of choice for our customers and to further improve assisted reproductive technologies (ART) through innovative solutions across therapeutics, lab technologies, services, and digital health solutions.

The Pergoveris® Pen is the first product with a combination of recombinant follicle-stimulating hormone (FSH) and recombinant luteinizing hormone (LH) in a ready-to-use liquid version, eliminating the need for mixing. It thus provides an improved and convenient treatment option for women with severe deficiency of both FSH and LH, a group of patients that is difficult to treat. Launches will continue. The Pergoveris® Pen has now been launched in 23 countries and we will continue to provide patients with access to this innovative therapeutic.

On the occasion of the annual meeting of the European Society of Human Reproduction and Embryology (ESHRE), we launched the Medical Innovation Program (MIP) for human reproduction. This initiative strives to support early stage innovation in key areas highlighting our continued commitment to open innovation. The MIP will support collaboration and co-development, bringing together internal and external expertise, and serves as a platform for interdisciplinary, conceptual, and methodological debate on how to provide new solutions to boost innovation in human reproduction.

Every day, more than 72 million patients around the world use our trusted general medicine and endocrinology (GM&E) medications. Concor®, Euthyrox®, Glucophage®, and Saizen® are highly valued brands and market leaders in many key markets worldwide. As a result, GM&E is the largest business franchise of the Healthcare business sector in terms of sales, with strong growth in all major therapeutic areas of focus, contributing significantly to the overall profitability of Biopharma and Merck KGaA, Darmstadt, Germany. Although no longer patent-protected, the brand equity of our products, built up over decades, makes them cornerstones for the treatment of chronic cardiovascular, metabolic, and endocrine diseases.

Concor®, containing bisoprolol, is the leading beta-blocker for chronic cardiovascular diseases such as hypertension, coronary artery disease, and chronic heart failure. Euthyrox®, with the active ingredient levothyroxine, is the worldwide market leader with a market share of 28% in volume for the treatment of hypothyroidism, a disease with high prevalence but still low diagnosis rates in most emerging markets. Glucophage®, containing the active ingredient metformin, is the drug of choice for first-line treatment of type 2 diabetes. During 2019, multiple health authorities worldwide continued to approve Glucophage® in prediabetes when intensive lifestyle changes have failed. This indication for Glucophage® is now registered in 53 countries. Overall, considering the high prevalence of prediabetes and diabetes, we see great potential for Glucophage®.

We help to raise awareness and education in the areas we operate in, such as thyroid diseases and diabetes. This is well demonstrated by our active role in International Thyroid Awareness Week and our partnership with the International Diabetes Federation (IDF), which serves as a basis for implementation of education and communication activities that emphasize the importance of type 2 diabetes prevention.

Saizen®, with its active ingredient somatropin, is our main endocrinology product and is indicated for the treatment of growth hormone deficiency in children and adults. Saizen® is delivered with the Easypod® electromechanical injection device, the only growth hormone injection device of its kind. Easypod® is able to wirelessly transfer data such as injection times, dates, and doses to the web-based software system Easypod® connect, making it easier for healthcare practitioners and patients to ensure adherence and reach their treatment goals.

In endocrinology, we differentiate ourselves from competitors through leadership in the eHealth space, both by building evidence and by expanding our offerings with new services for patient engagement, partnership with healthcare practitioners, and better payer value proposition. In 2019, Aluetta® (the new Saizen® pen) was launched with the objective of expanding the reach of Saizen® by tapping strategic segments and expanding our devices portfolio.

Allergopharma*

Our allergy business Allergopharma is a leading company in the field of allergy immunotherapy (AIT) in Europe. In 2019, we celebrated our 50th anniversary. For high-precision, effective allergy therapy, we offer comprehensive diagnosis solutions as a basis for individual treatment concepts. Our AIT products concentrate on causal treatment of type 1 allergies such as allergic rhinitis and allergic asthma to meet patients' needs. For AIT, strong evidence of efficacy and an acceptable safety profile have been well-documented in allergy-induced allergic rhino-conjunctivitis in numerous clinical trials. Furthermore, there is a potential positive effect on the long-term course of the allergic disease. AIT is designed to induce tolerance in the immune system of the allergy patient to the allergy-triggering allergen, thus potentially inducing an immune modification.

We offer high dosage, hypoallergenic, standardized preparations for allergen-specific immunotherapy for pollen and house dust mite allergies, as well as a wide range of diagnostic allergy tests. Based on long-standing expertise, scientific excellence, and entrepreneurial responsibility, we provide physicians with first-class therapy options and help people with allergies lead more fulfilled lives. Products of Allergopharma are available in more than a dozen countries worldwide.

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Life Science

Our purpose is to solve the toughest challenges in the life science industry in collaboration with the global scientific community. With our Research Solutions, Process Solutions, and Applied Solutions business units, we are a leading worldwide supplier of tools, high-grade chemicals, and equipment for academic labs, biotech, and biopharmaceutical manufacturers, as well as the industrial sector. Research Solutions provides our academic customers with the chemicals and tools needed to make scientific discovery easier and faster. Process Solutions provides drug manufacturers with process development expertise and technologies, such as continuous bioprocessing. Applied Solutions offers both testing kits and services to ensure that our food is safe to eat and our water is clean to drink.

Since acquiring the chemical and technology company Sigma-Aldrich in 2015, our strategy includes strengthening our core business by delivering a broad and relevant portfolio as well as establishing new pillars of growth in scientific areas, such as cell and gene therapy and continuous bioprocessing. As determined by sales, our Life Science business sector has achieved a top-three ranking in the global life science industry.

In 2019, the Life Science business sector generated 42% of Group sales as well as 44% of EBITDA pre (excluding Corporate and Other).

Portfolio at a glance*

Our portfolio comprises more than 300,000 products, ranging from lab water systems to genome-editing tools, antibodies, and cell lines, as well as end-to-end bioprocessing systems to support the manufacturing needs of both emerging biotech and large pharma companies. For example, our ZooMAb® recombinant antibodies bring the next generation of polyclonal and monoclonal antibody technology and production to the industry, specifically engineered for greater specificity, higher consistency, and maximum stability.

Our e-commerce platform, www.sigmaaldrich.com, continues to grow and connect customers globally with the products needed to advance their research, development, and production efforts. To expand our e-commerce reach, in 2019, Life Science became the first in the industry to launch an official flagship store on Alibaba's 1688.com in China, providing easy access to high-quality products and solutions for our customers in that country. The launch reinforced our commitment to the scientific community in China and to enhancing e-commerce capabilities.

Another example is our BioReliance® End-to-End Solutions, a service offering for process development and manufacturing for emerging biotech companies. In 2019, Life Science agreed to provide Phanes Therapeutics Inc. of China with this full suite of products and services to accelerate the development and manufacturing of a bispecific antibody for the treatment of solid tumors. Responding to an increased demand for these process solutions, this collaboration represents our dedication to delivering innovative advancements for global clinical drug development and scaling processes. We also launched the new integrated Plug & Play Upstream Development Service to help emerging biotech and start-up companies optimize the cost and speed of advancing their molecules to the clinical stage.

Additionally, our Life Science business sector has built the expertise to further develop BrightLab™, our digital ecosystem for complete lab management.

In February 2019, Life Science made the first of several announcements regarding our CRISPR intellectual property portfolio for genome editing. CRISPR functions as a core competency for our business sector and we support research with genome editing under careful consideration of ethical and legal standards. In February, we received our first United States patent for proxy-CRISPR technology. This specific technique makes CRISPR more efficient, flexible, and specific by opening the genome for modification of DNA.

Our portfolio now includes 22 patents for CRISPR technology granted worldwide, including 10 additions throughout 2019 in Canada, Europe, Israel, South Korea, the United Kingdom, Japan, and Singapore.

In July, we simplified the path to licensing CRISPR technology for commercial research and product development through an agreement with the Broad Institute of MIT and Harvard in Massachusetts, United States. With this unique offering, Life Science collaborates to ease navigation of the complex intellectual property landscape of CRISPR patents, encouraging participation and innovation in this area. Additionally, in November, we licensed our foundational CRISPR intellectual property to Evotec SE, an international biotechnology company headquartered in Hamburg, Germany, again demonstrating our promise to accelerate discovery and research that may lead to new therapies.

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Our CRISPR Core Partnership Program continues to add more members each year. The program, which started in 2014, accelerates collaboration on cutting-edge, gene-editing techniques with diverse and advanced CRISPR workflow solutions. In March, we announced the addition of China's Zhejiang University to our Core Partnership Program, which will utilize our Arrayed CRISPR Library to assist in discovering the relevance of specific genes in biological functions. With more than 80 core partners in our global network, this addition demonstrates our dedicated collaboration to promote ethical scientific exploration in genome editing.

In March, we took a further step with regard to our Life Science expansion plans by opening a new M Lab™ Collaboration Center in Molsheim, France, to serve customers in Europe, the Middle East, and Africa. With 4,000 square meters of space, this M Lab™ Collaboration Center is the first in Europe — representing a € 10 million investment in the region — and ninth worldwide. It includes non-GMP pilot and bench scale labs. This allows our customers to engage in process development support, troubleshooting, demonstrations, and hands-on training to explore new ways of increasing productivity, improving processes, and mitigating risks.

We announced continued expansion in May with our approximately € 3.1 million (£ 2.7 million) investment in our biopharmaceutical production facility in Irvine, United Kingdom. The is our only location where we manufacture both liquid and powder cell culture media. As a result of its expansion, we will be able to supply an additional two million liters of specialized medicine to the global healthcare industry. Additionally, in November, we announced the completion of a 5,250-square meter expansion to our site in Gillingham, United Kingdom, which serves as the primary distribution center for the region in our global supply chain. The addition, valued at approximately € 10.5 million (£ 9 million), supplies the pharmaceutical industry, biotechnology companies, research institutes, and academic centers with biochemical and chemical reagents, laboratory supplies, and testing services. Both expansions demonstrate our commitment to the United Kingdom and to growing our global presence while providing employment opportunities.

In addition to the new expansion of these facilities, Life Science announced new product platforms for our biopharmaceutical customers in 2019. In April, we launched the BioContinuum™ Buffer Delivery Platform. A building block of our BioContinuum™ Platform, which addresses intensified bioprocessing and continuous manufacturing, this integrated solution is tailored to provide the highest levels of accuracy and precision in buffer preparation and management. The configurable platform supplies process buffers at a fraction of the resources and facility space, resulting in a more streamlined buffer suite and a more efficient manufacturing process. Its launch marked a key step in our strategy to deliver "contiguous" bioprocessing, which goes beyond connecting the individual unit operations to include the orchestration and management of all the processing steps — materials, production, testing, and analytics — with an industry-leading, streamlined, and optimized approach. Pilot studies suggest that conversion to such a manufacturing method may reduce manufacturing costs by up to 50%.

In August, we acquired all ownership rights to the ProcessPad™ platform from Simplyfeye Softwares Private Limited. Adding to our biopharmaceutical product portfolio, the web-based platform provides easy, on-demand access to data for aggregation, analysis, visualization, and management. It advances our BioContinuum™ Platform by adding a building block that connects across functions and with suppliers to deliver continuous manufacturing.

A key goal for our Life Science business sector is to help our customers that manufacture drugs, from small to large innovator companies, bring life-enhancing medicines and therapies to market — and to patients — faster. To facilitate reaching this target, in October, we became the first to make acoustic technology available for cell therapy manufacturing with the acquisition of FloDesign Sonics of Massachusetts, United States. The unique acoustic cell processing platform will industrialize the manufacturing of autologous cell therapy and provide revolutionary cancer treatment by way of chimeric antigen receptor T (CAR-T) cell therapies. A strategic fit with our goal of advancing cell-based therapies to patients, the acquisition will allow further advancement toward potentially life-saving treatments.

In October, we launched our ADC Express™ services to accelerate pre-clinical conjugation candidate selection. The portfolio addition uses established platform technology to reliably scale target molecules, providing rapid production of antibody drug conjugates (ADCs). Aligning with our goal to accelerate access to health, this innovation reduces time to clinic through comprehensive services spanning pre-clinical to commercial from a single source.

Working toward that same goal, we aim to optimize digitalization across Life Science to increase lab productivity, efficiency, and safety. In March, we announced the Milli-Q® Connect online service portal as a cloud-based, remote lab water service and monitoring capability. Available on all Milli-Q® CLX 7000 clinical water purification systems, this technology streamlines quality report production, allowing increased productivity, maximal uptime, easier data traceability, and saved time.

In August, we announced the acquisition of BSSN Software, a Darmstadt, Germany-based laboratory informatics company. The acquisition continues the acceleration of customers' digital transformation in the lab by giving scientists better, more efficient access to their lab data. We remain committed to building this ecosystem based on the AnIML standard and Standardization in Lab Automation, which the acquisition promotes by boosting our digital lab productivity business and commercial growth for Life Science.

Earlier this year, we completed the divesture of our flow cytometry business to Luminex Corporation of Texas, United States. A process begun in 2018, this included the portfolio's combined stock, asset, and inventory purchases.

Collaboration remains an important focus for Life Science as we work to drive innovation and solve the industry's toughest problems. While developing our own portfolio and capabilities, we also seek to unite with other key players in the industry to work toward our shared goal of bettering and increasing access to health globally. To extend the reach and accessibility of our work, we developed a fully-equipped Center for Microbiological Analysis Training (C-MAT) in Ghaziabad, India, and, in April, announced its handover to the Food Safety and Standards Authority of India (FSSAI). The C-MAT lab provides training to food safety scientists from government and FSSAI-ratified private laboratories on the latest technology in microbiological testing.

In November, we announced our intent to participate in a consortium comprised of academic healthcare, biotech, and biopharma industry leaders across Massachusetts, United States, that will come together and establish a new center for advanced biological innovation and manufacturing. Pooling our resources with industry partners like Harvard University and Massachusetts Institute of Technology (MIT), among others, the central facility will develop next-generation medicines and regenerative therapies. The purpose of the US$ 50 million investment is to explore and cultivate innovations in cell and gene therapy, advance biologic innovation and manufacturing, as well as advance developments in immunotherapy, cell therapies, gene editing, and other technologies. It is expected that the center will operate as an independent, non-profit organization. By fostering collaboration, this center holds the promise of speeding innovation and broadening the universe of patients that can be served by these emerging therapies.

Since 2018, 63% of drugs in the pipeline were being developed by biotech start-ups focused on innovative therapies, including those intended to treat niche diseases with small patient populations. Our global health commitment focuses on these companies and supports bringing their drugs to market through our grant programs. Grants provide selected companies with access to our products and services to help accelerate market entry for new therapies. Through our Advance Biotech Grant Program, which we run in North America, Europe, and Asia, we announced 12 grant recipients for 2019, selected based on the scientific and societal merit of their respective therapies in development, as well as process challenges and expertise gaps.

In addition to these grants, in May, we announced three winners of our new Retrosynthetic Reaction Prediction Contest. Retrosynthetic analysis plays a critical role in the development of new drugs, and its application has broad prospects in accelerating the speed of drug research and development, improving efficiency, and reducing costs. The contest, open to anyone in China, included a free training camp, online knowledge sharing, workshops, lab tours, and mentorship for participants. It attracted 1,150 contestants, including students, researchers, and practitioners from leading institutions.

Along with promoting scientific engagement and STEM disciplines within schools and universities, our business sector extends to the wider community through SPARK, our global volunteer program. In 2019, through this initiative, just under 2,300 employees volunteered nearly 19,400 hours to host thousands of events in 20 countries and engaged some 66,500 young minds. For the third year, our Curiosity Cube™ mobile science lab toured North America, celebrating the 150th anniversary of the Periodic Table of Elements and igniting youth interest in science. In 2019, the mobile lab traveled 48,000 kilometers (30,000 miles) and engaged with students at schools and city centers in 99 communities. 94% of the schools visited were classified as Title 1, indicating under-resourced areas.

Related to our work in the Asia-Pacific region, in June, Life Science held a national campus tour of our new mobile lab to promote protein research across China. Proteins are the fundamental building block in our research, and revealing the structure and function of thousands of proteins in organisms remains one of the industry's most challenging areas. The tour offered engaging learning experiences and scientific discovery through product displays, live demonstrations, speeches, online games, and digital interaction. It covered 20 colleges and biotech campuses in 13 cities across China.

Performance Materials

Our Performance Materials business sector comprises our specialty chemicals business and consits of three business units: Semiconductor Solutions, Display Solutions, and Surface Solutions. Comparing Performance Materials with a smartphone, Display Solutions represents the user interface, Semiconductor Solutions the intelligence, and Surface Solutions the aesthetics. In Performance Materials, we offer innovative solutions especially for the electronics industry — for microchips and displays — and for surfaces of every kind.

We are well on track in the execution of our five-year Bright Future transformation program announced in 2018, with which we are adapting to new market realities and customer requirements. Bright Future lays the foundation for returning to sustainable growth, attractive margins, and remaining competitive. Throughout 2019, we further streamlined our cost-base and processes. This included the reallocation of R&D resources. In this context, we closed our main R&D site in Chilworth, United Kingdom, in September 2019. The closure of our Atsugi site in Japan will follow by mid-2021. In addition, as announced in 2018, we will downsize by 400 positions in Germany by 2022.

With the completion of the acquisition of Intermolecular on September 20, 2019, and Versum Materials on October 7, 2019, we reached two major milestones on our Bright Future journey to transform Performance Materials into a strong solutions provider and leading player in the electronic materials market. Intermolecular has application-specific materials expertise and platforms for accelerated learning and experimentation with a powerful analytical infrastructure, all of which perfectly complement our portfolio. Together, we are well-positioned to deliver next-generation digital devices for a smarter, safer, and more connected world. Versum Materials is a leading global provider of innovative, high-purity process chemicals, gases, and equipment for semiconductor manufacturing. The merger should transform our company into a leading provider of electronic materials for the semiconductor and display industries. The Intermolecular and Versum Materials businesses are being integrated into the Semiconductor Solutions business unit. We are making good progress with the integration, ensuring a seamless transition and business continuity.

Performance Materials accounted for 16% of Group sales in 2019 and its share of EBITDA pre (excluding Corporate and Other) was 16%. The EBITDA pre margin was 31.2% of net sales.

Semiconductor Solutions*

With the acquisition of Versum Materials and Intermolecular, Semiconductor Solutions is now the largest business unit within Performance Materials. It consists of two dedicated units: Semiconductor Materials and Delivery Systems & Services. Our Semiconductor Materials unit supplies products for every major step in the wafer manufacturing process, including doping, lithography, patterning, deposition, planarization, etching, and cleaning. Specialty cleaners and conductive pastes for semiconductor packaging round off the portfolio. The Delivery Systems & Services (DS&S) business enables the safe and responsible handling of gases and liquid chemicals for electronic manufacturers. It focuses on the development and deployment of safe and reliable delivery equipment. This allows our materials to be handled with the highest quality and safety standards for our customers.

In the area of deposition materials, we are continuously looking for both new organosilanes and organometallic materials as well as liquid phase silicon formulations for processes with low resistance and various dielectric characteristics for faster and better processors, as well as higher data storage density. Our photoresists business is growing rapidly; throughout the year we have developed new photoresists to address the needs of the markets, for example, for 3D NAND memory, sensors, and radio frequency (RF) filters. Furthermore, interest in Directed Self Assembly (DSA) technology continues among our customers. Our advances in DSA technology have enabled customers to begin planning high volume manufacturing (HVM) qualifications. We have responded by developing exceedingly pure, high volume synthesis capabilities, which are key to meeting our customers performance and quality targets. In the 5G space, our transient liquid phase sintering (TLPS) conductive pastes are enabling highly efficient production of modern antenna applications. Our mid- to back-end photolithography resist materials used in electronic packaging applications continue to drive miniaturization and heterogeneous integration for small form factor devices.

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Display Solutions*

Our Display Solutions business unit comprises the liquid crystals, OLED (organic light-emitting diodes), photoresists, and liquid crystal windows businesses. Even though competition continues to intensify, we defended our position as the global market and technology leader in the display materials business in 2019. Modern, energy-efficient technologies such as UB-FFS (ultra-brightness fringe-field-switching) have further established themselves on the market. With our XtraBright™, XtraBrilliant™, and XtraBoost™ products, we secured new projects for large-area displays as well as high-resolution mobile devices. The OLED business continued to develop favorably and experience a high demand due to the increased production capacities of display customers. Our constantly enhanced OLED material portfolio secured successful qualifications in a number of upcoming technical devices. For liquid crystal window modules, four projects are in the installation phase. These innovative solar shading solution projects demonstrate superior design aesthetics. The ramp up of commercial manufacturing at our Veldhoven site is running as planned, with the integration of a new lamination unit further optimizing overall production yield. Our photoresists business for displays continued to perform well, thanks to proven technical success in high-performance product lines. This is evidenced by a strong position in new display production lines in the growing Chinese market.

Surface Solutions*

In the Surface Solutions business unit, we provide our customers with solutions that help them to create innovative surfaces of all kinds. Our materials enable more beautiful, more resistant, and more effective products. Our pearlescent pigments allow striking automotive coatings, fascinating cosmetics, extraordinary packaging, innovative product design, and even unique food creations. With a broad portfolio of active ingredients, we enable cosmetics manufacturers to enrich their skin care products with moisturizing, protecting, or anti-aging effects. Moreover, with our functional solutions we serve a large number of innovative applications, from dirt-repellent and easy-care surfaces to laser markings of plastic parts and cables. We continue to invest in our pigment production capabilities. In August 2019, we celebrated the topping-out ceremony for new production facilities for silica flakes in Gernsheim, Germany. This investment will significantly increase production capacities for this special substrate, which is the basis for a whole range of unique effect pigments. In February 2019, we implemented a new structure as announced in October 2018 to align even more closely with the needs of our customers. We strengthened our key account approach as well as our regional setup to even better serve the diverse needs of our regional markets. Furthermore, we are implementing measures to stabilize our business in a market environment that has become challenging, mainly due to weaker demand from the automotive industry.

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Strategy*

Purpose and Values

We are a vibrant science and technology company. Science is at the heart of everything we do. It drives the discoveries we make and the technologies we create. Our work makes a positive difference to millions of people's lives every day.

In Healthcare, we discover unique ways to treat the most challenging diseases such as multiple sclerosis and cancer. Our Life Science experts empower scientists by developing tools and solutions that help them to deliver breakthroughs more quickly. And the science of our Performance Materials business sector sits inside technologies that are changing the way we access and display information.

Everything we do is fueled by a belief in science and technology as a force for good. A belief that has driven our work since 1668, and will continue to inspire us to find more joyful and sustainable ways to live.

We are curious minds dedicated to human progress. We believe that scientific exploration and responsible entrepreneurship are key to technological advances that benefit us all. Our values – courage, achievement, responsibility, respect, integrity and transparency – guide us in every step we take and in every decision we make.

Strategy Fundamentals

As a company, we have a strong foundation. These fundamentals have been defined by the Merck Family. We always take them into consideration when discussing and deciding on our Group strategy.

- We follow a risk diversification strategy with three distinct business sectors, and we avoid overexposure to any single customer, industry, or geography.
- With our science and technology focus, we want to be leaders in our fields of expertise and markets, always pushing the boundaries to find new solutions and drive innovation.
- We continue to operate under our current ownership with the Merck Family as majority owner.
- We continue to deliver sustainable value, and we want to maintain an attractive financial profile (for example, a strong credit rating).
- Mergers and acquisitions (M&A) are an important driver of our long-term value creation strategy with a focus on innovation-driven technology.

* The contents of this chapter or section are voluntary and therefore not audited. However, our auditor has read the text critically.

Group Strategy

Our transformational journey since 2007

Over the past years, our company has grown significantly through a series of strategic moves that have enabled us to develop into a vibrant science and technology company. We have systematically and continuously strengthened and focused our portfolio of innovative science and technology throughout our business sectors.

In Healthcare, we divested our Generics business in 2007 to focus on highly specialized products and acquired Serono, also in 2007, to expand our pipeline. This focused approach has continued with the divestments of our Biosimilars business in 2017 and our Consumer Health business in 2018. We are now focusing our R&D efforts on the fields of oncology, immuno-oncology, and immunology (including multiple sclerosis).

Within Life Science, we have significantly transformed to become a diversified industry leader through the acquisition of Millipore in 2010 and Sigma-Aldrich in 2015. We continue to leverage our e-commerce platform to expand our reach and leadership in the industry as well as invest in strategic initiatives, such as Gene Editing & Novel Modalities, BioReliance® End-to-End Solutions, and BrightLab™, our digital solution for lab management.

Performance Materials has delivered profitable growth and a significant cash contribution over many years, strongly driven by liquid crystals. Over the past several years, we evolved this business sector into new areas such as semiconductor materials, for example through the acquisition of AZ Electronic Materials in 2014. Performance Materials is currently undergoing a major transformation by repositioning its overall business toward the highly attractive electronic materials market. With the acquisitions of Versum Materials and Intermolecular, both in 2019, we are expected to achieve a leading position in this market, with a focus on the electronics market.

Our ambition for 2022

With our Group strategy, we want to become **the** vibrant science and technology company. By 2022, we aim to have strong, innovative science- and technology-focused business sectors with leadership positions in our areas. We want to be a top-tier company in relation to our peers in terms of sales and margin growth and we aim to continue to deliver sustainable returns to our owners.

We are now in the growth and expansion phase of our strategy and are well on track. Following the closing of the Versum Materials acquisition on October 7, 2019, we are putting special emphasis on generating cash in order to quickly lower our post-acquisition debt. Going forward, we aim to deliver profitable growth while focusing on ensuring a high degree of cost discipline. In 2020, we expect all three business sectors to drive earnings growth and support the growth and expansion phase of our strategy.

In Healthcare, we intend to fully leverage our pipeline's potential. Our new product launches, Mavenclad® and Bavencio®, are increasingly contributing to earnings. We expect our core business with our established products to at least remain organically stable for the mid-term. By 2022, we aim to achieve additional annual sales of at least € 2 billion with new medicines.

Life Science growth is driven by our strong product portfolio, our e-commerce platform – www.sigmaaldrich.com, which generates more than € 1.5 billion in sales – and our strong track record of service and innovation excellence. The business sector plans to deliver annual growth of 5% to 8% per year in the mid-term, thus continuing to outpace market growth. Our high-growth Process Solutions business unit and our e-commerce platform are expected to remain meaningful drivers of this growth.

Performance Materials has made significant progress with the implementation of its Bright Future transformation program, which was initially announced in 2018. With the acquisition of Versum Materials and Intermolecular, we reached key milestones in our transformation journey to become a leading player in the electronic materials market. Performance Materials aims to benefit from sustainable growth trends, particularly from the trend toward increasing data volumes worldwide.

To achieve our strategic ambition of becoming **the** vibrant science and technology company, we focus on our three Group-wide priorities: Performance, People, and Technology.

Performance

Our priority Performance focuses on the financial aspects of our activities. It provides a clear definition and tangible targets of financial success. As we focus on organic growth, we aim to sustainably increase our profitability with a focus on cash generation, and on implementing strict financial discipline.

In Healthcare, a successful year 2019 included further launches of our innovative products Bavencio® and Mavenclad®. Our Healthcare business has grown consistently for many quarters, and we continue to diligently develop and manage our pipeline of innovative medicines. The scientific data we presented at various congresses in 2019 underscored the overall attractiveness of our pipeline with its highly innovative assets in key indications and various stages of the clinical development process.

Life Science continued along the path of science and technology leadership through our sustained investment and focus on our strategic initiatives. Those include Gene Editing & Novel Modalities, BioReliance® End-to-End Solutions for Bioprocessing, and BrightLab™, our digital solution for complete lab management. Additionally, we maintained our focus on our leading e-commerce platform, www.sigmaaldrich.com.

In Performance Materials we are well on track with the execution of our five-year Bright Future transformation program, which we are using to adapt to new market realities and customer requirements. Bright Future forms the foundation for returning to sustainable growth, ensuring attractive margins. In 2019, we further streamlined our cost-base and our processes. With the completion of the acquisition of Versum Materials and Intermolecular, we achieved major milestones of our Bright Future program to transform Performance Materials into a strong solutions provider and leading player in the electronic materials market.

People

To become the vibrant science and technology company, we need to focus on our people – their talent, their performance, their ideas. Our People strategy aims at building the capabilities we need to shape the future by attracting and retaining the right people as well as creating the right culture for them to collaborate and perform at their best. It addresses how we as a science and technology company can create a working environment that meets our employees' individual needs and allows curiosity to unfold. Our growth strategy calls for people with diverse experiences and backgrounds who work together on the basis of shared values to innovate new solutions and respond flexibly to changing demands.

It is crucial to be perceived as an attractive employer in the market in order to continue to capture the interest of potential employees. The fact that we rank among the world's best employers was also confirmed by our distinction as a "Global Top Employer 2019" by the Dutch Top Employers Institute. In addition, we were ranked fourth among employers worldwide in the field of biotechnology and pharmaceutics by Science Magazine, an international scientific publication.

Our leaders play a decisive role in our People strategy. We aim to place leaders who will develop employees for future requirements – not just current needs – and foster the unique strengths of diverse individuals within the organization. At the same time, we want the leadership style of our managers to enable strategic innovation. The right leaders will help us promote curious talents who can solve complex problems and are passionate about the work they do. We will also strengthen results-driven teams as well as networks that value collaboration and provide flexible frameworks within which teams and individuals can drive our business forward.

We want to make data-driven people decisions – both when hiring new members of staff as well as in the personal development of employees. Another element of this strategy is to promote diversity, with a special focus on women and talent in Asia, and to create the inclusive environment that enable these groups – and all employees – to bring in their unique strengths and understanding of key customers and markets. We need to value different perspectives and encourage constructive discussions.

We place great importance on continuous advanced training and further development of our managers. This is essential to address the diverse needs of team members and the changing requirements of the businesses, especially in the area of digitalization. Our leaders are responsible for pushing our strategy ahead by building up the right competencies, thereby fostering innovation. As part of this, they take calculated risks, give clear and inspiring direction to their employees, and provide the requisite structures and resources to achieve our goals. Based on our competency model, we have identified six leadership behaviors that define how we expect our leaders to act (for further details see People). Those leadership behaviors are being implemented into our existing processes and tools (for example, selection, assessment and feedback tools, leadership programs, etc.).

In the context of the People strategy, we also want to look at new forms of cooperation and experiment with methods that result in better decision-making. For example, pilot initiatives focus on further expanding our Science Network. Through this project, we are promoting the scientific community within the company to accelerate the exchange of innovative ideas and improve collaboration between all employees in the Research and Development sector.

Technology

Our approach to technology paves the way for discovering and scaling the most exciting technologies. The majority of our innovations come from within our existing business sectors, with approximately 7,800 scientists and researchers working for our company. These innovations include everything from incremental innovations to disruptive opportunities in the fields of Healthcare, Life Science, and Performance Materials.

Complementary to the business sectors, we are also looking into innovations that fall between our business sectors or beyond our company's current scope. With our Innovation Center in Darmstadt, Germany, and our Innovation Hubs in Menlo Park, California, United States, in Shanghai, China, and in Guangzhou, China, we are discovering new ideas and technologies, then scaling them up to build new businesses. We are focusing on our activities within three core innovation fields of interest: Liquid Biopsy, Clean Meat, and Biosensing & Interfaces. With liquid biopsies, a variety of diseases can be diagnosed through the detection of biomarkers in body fluids. This could be a key technology for early disease detection and expanding delivery of precision medicine to more patients. The innovation field Clean Meat comprises technological innovations to meet the world's growing demand for protein- and nutrient-dense foods made by means of ethical, eco-friendly methods. The innovation field of Biosensing & Interfaces focuses on the integration of electronics with the human body to create a digital human/biological interface. This could enable faster, more accurate (remote) health monitoring and treatment.

In addition to these global innovation fields, we have also introduced a China-focused innovation field through our China Innovation Hub: AI-enabled health solutions. Our focus within this field is the exploration of new AI-based technologies, products, and services that could impact the medical and healthcare industries across the value chain by, for example, increasing efficiency, saving costs, and improving customer experiences.

While our Innovation Center is operating on a global scale, the China Innovation Hub, with offices in Shanghai, China, and Guangzhou, China, will accelerate our innovation development by tapping into the China innovation ecosystem. Our objective is to advance innovation in China, for China and beyond – together with local partners, such as technology companies, start-ups, universities, and research institutes.

Through our Silicon Valley Innovation Hub in Menlo Park, California, United States, we aim to uncover new technological opportunities and establish partnerships and projects within our three global innovation fields, with a strong focus on Clean Meat.

Additionally, we focus on disruptive external innovation in emerging fields adjacent to, in between, and beyond our established business sectors. We strive for successful external innovation by transforming groundbreaking scientific ideas into businesses with the potential to improve patients' lives, disrupt industries, and transform the way we live. This includes M Ventures, our strategic corporate venture capital fund, with a total volume of € 300 million distributed across its Healthcare, Life Science, Performance Materials, and New Businesses evergreen funds. Since inception, M Ventures has invested in over 60 promising start-ups and companies that could impact our core business areas, while at the same time providing us with strategic and financial returns, such as the successful IPO of Progyny (on October 19, 2019). In addition to company creation initiatives and its incubator activities in Israel, M Ventures has set up a China seed fund worth RMB 100 million (€ 13 million) to further foster innovation in this market with strategic importance for us.

A major focus of our innovation efforts is digitalization. We are leveraging related opportunities through our Digital Organization in order to create value for patients, customers, and business associates. To us, digitalization means the digital integration of our entire value chain, the digitalization of our products, services, and communication interfaces to customers, as well as the development of new digital business models. All this is supported by state-of the-art methods to collect and analyze vast amounts of data. Syntropy, our planned joint venture with Palantir technologies to advance cancer research, has been evolving throughout 2019 as we continue to grow our pipeline of potential customers and collaborators who share our vision of creating a step change in oncology.

We are strengthening our company as a vibrant science and technology company. In this context, Darmstadt plays an important role as our headquarters and largest location, where all three business sectors are represented with their entire value chains and where we have invested around € 1 billion since 2015. We are in a phase of accelerated growth and will continue to make targeted investments in Darmstadt as one of our centers for science and technology. For instance, in 2020 we will open a new research and development facility for Performance Materials that is currently under construction. And with projects such as a production site for Life Science's membrane business and a new training center, we plan to invest another € 1 billion in Darmstadt by 2025. The physical proximity of the business sectors in Darmstadt promotes cross-sector cooperation. By developing a state-of-the-art digital infrastructure and digital solution approaches, such as those pursued in our Innovation Center, we support profitable growth and new innovation fields.

Business Strategies

Healthcare

Our Healthcare business sector specializes in key franchises and specific diseases. Global megatrends – such as a rising prevalence of chronic diseases and the increase in average life expectancy – continue to drive the demand for our products. To meet these demands and respond appropriately to the dynamics of our markets, we have significantly transformed our Healthcare business sector in recent years.

Following on from the successes over the past three years, we continue to drive pipeline projects with the aims of bringing groundbreaking medicines to patients, maximizing our existing portfolio and continuing our expansion in growth markets. Our ambition is to become a global specialty innovator, operating in franchises with significant unmet medical needs and bringing high value to patients. Therefore, we continue to invest in research and development to discover new treatment options and improve existing ones. Together with our stakeholders and partners, we want to ensure that people can access the medicines they need to stay healthy and live longer.

The first pillar of our strategy is to reinforce our global footprint, bringing the innovation of our pipeline to patients and growing our presence – in the United States and in China, for example. The emerging markets and China are expected to be the largest growth drivers for many of our established products in the future. Managing the balance between delivering innovative new medicines while expanding our reach and ensuring the profitable growth of the existing business will be one of the strategic challenges. Fertility and endocrinology offer significant opportunities to bring value to patients, given their high profitability and growth potential. Maximizing the commercial potential of these areas will remain important.

The second pillar of our strategy is the focus on specialty medicine franchises. Here, we expect the oncology, immuno-oncology, and immunology markets to remain highly attractive in terms of size, growth prospects, and profitability. Within each specialty franchise, our approach is to develop deep internal expertise and insight, from internal research to commercialization, augmented by external talent sourcing, strategic partnering, and asset acquisitions.

The third strategic pillar is innovation: We aim to develop high-quality, first-to-market, and best-in-class therapies and to build a portfolio in each of our franchises. We have streamlined our pipeline and expanded our innovation capabilities with strong investigational drug candidates and technologies. In order to maximize the output of our R&D investments and increase our chances of success in discovering and developing new therapies, we focus our expertise on specific franchises and are exploiting synergies in disease mechanisms and biological pathways. We are investing in digital technologies as well as personalized and translational medicine in order to drive continued pipeline success.

In this context, strategic collaborations are an integral part of delivering on our commitment to transform the lives of patients living with serious unmet medical needs. We recognize the value of collaboration in the research and development of breakthrough therapies, as well as in strengthening our current portfolio. Here, we focus on balancing the right blend of internal capabilities and external partnerships (for example, with Pfizer and GlaxoSmithKline) and on building strong collaborations with other leaders in the industry.

Life Science

Life Science continues to deliver on our strategic agenda by increasing profitability due to strong organic growth. In 2019, we maintained our status as a top-three player in the industry. Our organic sales growth exceeded that of the industry and has remained the highest among integrated peers - as it has since the acquisition of Sigma-Aldrich in November 2015.

To sustain our leadership into the future, Life Science has established a strategy based on three key pillars:

1. Ensure operational excellence by focusing on building our base business, creating value in a strong organization and implementing consistent processes
2. Strengthen the core organization by expanding our leadership in bioprocessing and e-commerce as well as advancing our robust offering of testing kits and services to ensure food and beverage safety and quality
3. Establish new growth pillars through our three strategic initiatives: Gene Editing & Novel Modalities, BioReliance® End-to-End Solutions, and BrightLab™.

We have completed the integration of Sigma-Aldrich, the largest in our history and of the industry, during which we consistently outperformed the market. Work toward harmonizing our Enterprise Resource Planning (ERP) systems continues. Our aspiration remains to reinforce our leadership position as an innovation-driven tools supplier and collaborator dedicated to solving the toughest problems in life science.

Looking ahead, we expect our strategy to continue delivering net sales growth ahead of the market and further expand our market-leading EBITDA pre margin. For 2020, we will prioritize the continued support of new growth pillars with our Gene Editing & Novel Modalities offerings as well as differentiated gene editing tools, drug safety systems and models, and clinical viral vector manufacturing. In addition, we will further develop our BioReliance® End-to-End Solutions, a service offering for process development and manufacturing for emerging biotech companies, alongside our BioContinuum™ Platform, which addresses intensified bioprocessing and continuous manufacturing. We will also focus on expanding the use of BrightLab™, our digital solution for lab management, as well as our food and beverage testing kits and services.

Performance Materials

Performance Materials is currently undergoing a major transformation by repositioning its overall business toward the electronic materials market. This market is very attractive due to its long-term growth potential. The electronic content of any product is increasing; electronics are now part of nearly every product, and diversification is securing the market's long-term stability. Megatrends like the Internet of things (IoT), AI (artificial intelligence), and autonomous driving lead to high innovation pressure and drive the growth of data from every side. The global data volume grows exponentially with more than 30% annually; the "data explosion" will transform electronics far beyond what today's systems can handle. Data needs to be generated, transferred, processed, stored, and made comprehensible for humans through smart interfaces. Our strategy is to cover all aspects of this data handling and to enable processes by providing customized solutions for the production of innovative electronic components. We are the company behind the companies advancing digital living. Performance Materials targets the electronic materials market with a focus on the semiconductor and display industries in order to participate in the growth of data-driven electronics.

The Bright Future program ensures the successful transformation of Performance Materials by driving the realization of our strategy. Main outcomes are the shift of our portfolio into growing electronics segments, safeguarding our margin ambition, and changes in the culture within Performance Materials. The absolute growth of Semiconductor Solutions and the ongoing growth in OLED are expected to outweigh the decline in liquid crystal sales. We assume to stabilize the EBITDA pre margins at around 30% in the long term, well above the industry average. From 2020 onward, Performance Materials expects to be back to organic growth. With Versum Materials and Intermolecular, we are able to obtain a leading position in the electronic materials market. Overall, strategy realization within the electronics market is well on track, and we are working on measures in Surface Solutions to stabilize the business.

Our strategic priorities going forward:

- Drive top-line growth especially in Semiconductor Solutions and OLED
- Transform into a leading enabler for data driven electronics with best-in-class capabilities and portfolio
- Accelerate the realization of our growth ambitions through the successful integration of both Versum Materials and Intermolecular

Strategic finance and dividend policy

We are pursuing a conservative financial policy characterized by the following:

Financial flexibility and a conservative funding strategy

We ensure that we meet our obligations at all times and adhere to a conservative and proactive funding strategy that involves the use of various financial instruments. Our diversified and profitable businesses form the basis for our strong and sustainable cash flow generation capacity. Moreover, we have several funding resources in place. A € 2 billion syndicated loan facility, renewed in 2018, is in place until 2024 to cover any unexpected cash needs. The facility is a pure backup credit facility and has not been drawn on so far. In addition, we have a commercial paper program with a volume of € 2 billion at our disposal. Within the scope of this program, we can issue short-term commercial paper with a maturity of up to one year. Furthermore, in 2019, we used bilateral bank loan agreements with first-class banks to optimize our funding structure and cost. For the acquisition of Versum Materials, we also agreed on a US$ 6.3 billion acquisition loan with our relationship banks, consisting of a US$ 4.0 billion bridge facility (which was never drawn and was canceled before the closing of the acquisition) and a US$ 2.3 billion term loan, which is partially drawn.

Additionally, as a general rule, the bond market represents a key element. The most recent bond issues took place in 2019 in connection with the acquisition of Versum Materials. Hybrid bonds (totaling € 1.5 billion) and euro bonds (totaling € 2.0 billion) were issued. The use of various instruments provides a broad financing basis and addresses different investor groups.

Maintaining sustainable and reliable business relations with a core group of banks

We mainly work with a well-diversified, financially stable and reliable group of banks. Due to our long-term-oriented business approach, bank relationships typically last for many years and are characterized by professionalism and trust. The banking group consists of banks with strong capabilities and expertise in various products and geographic regions. We regard these banks as strategic partners. Accordingly, we involve them in important financing transactions.

Strong investment grade rating

The rating of our creditworthiness by external rating agencies is an important indicator of the company’s financial stability. A strong investment grade rating is an important cornerstone of our financial policy, as it safeguards access to capital markets at attractive financial conditions. Our company currently has a Baa1 rating from Moody’s, an A rating from Standard & Poor’s (S&P), and an A– rating from Scope, each with a stable outlook. Continuing to reduce our debt after the Versum Materials acquisition is of utmost importance to us.

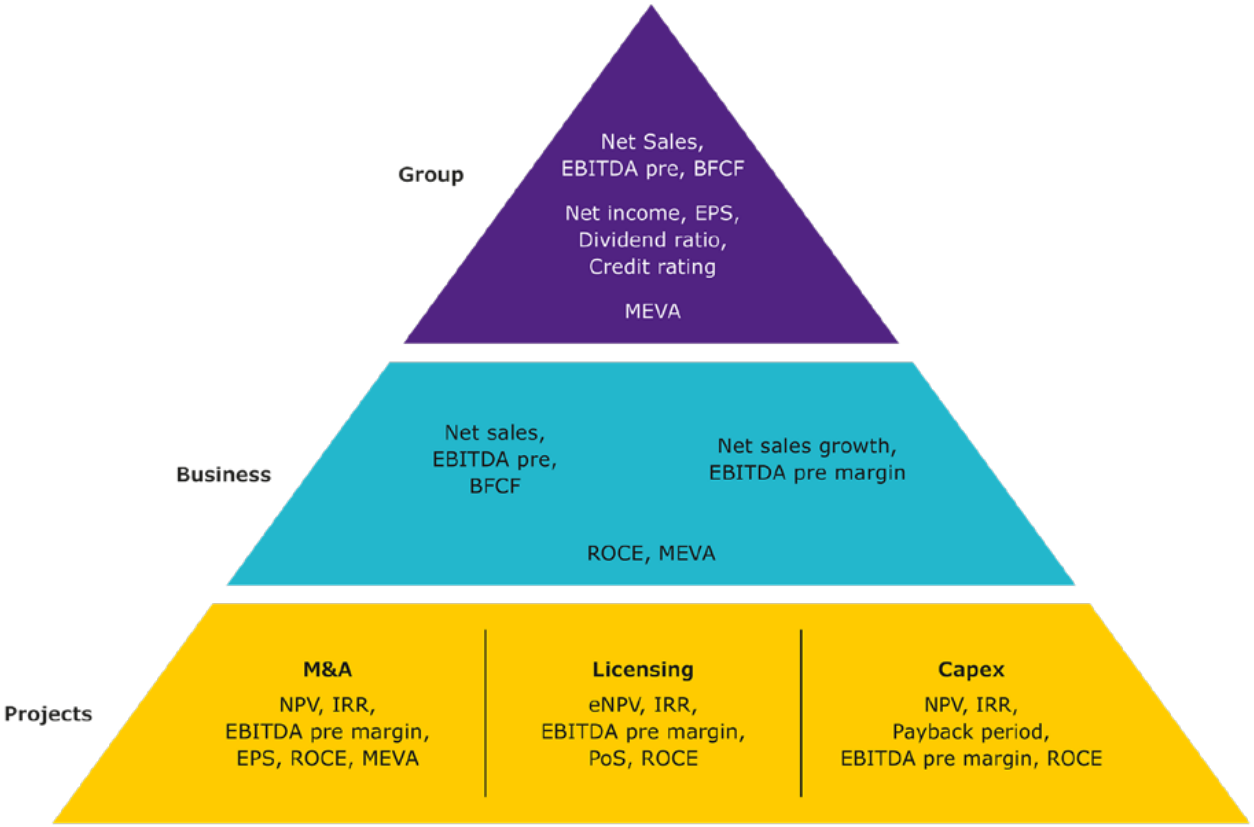
Sustainable dividend policy

We are pursuing a sustainable dividend policy. Provided the economic environment develops in a stable manner, the current dividend represents the minimum level for future dividend proposals. Our dividend policy will follow the business development and earnings increases over the coming years. However, dividend growth could deviate, for example, within the scope of restructuring or in the event of significant global economic developments. We aim for a target corridor of 20 – 25% of earnings per share pre.

Internal Management System

As a global company with a diverse portfolio of products and services, we use a comprehensive framework of indicators to manage performance. The most important key performance indicator (KPI) to measure performance is EBITDA pre[1].

The Value Creation and Financial KPI Pyramid, which summarizes the important financial performance measures of the Group, reflects the comprehensive framework of financial KPIs to steer the businesses and prioritize the allocation of cash resources. It consists of three managerial dimensions: Group, Business, and Projects, each of which require the use of different indicators.



Abbreviations
EBITDA pre[1] = earnings before interest, income tax, depreciation and amortization, as well as adjustments
EPS = earnings per share.
EPS pre[1] = earnings per share before adjustments.
MEVA[1] = Value added of Merck KGaA, Darmstadt, Germany.
BFCF[1] = business free cash flow.
ROCE[1] = return on capital employed.
NPV[1] = net present value.
IRR[1] = internal rate of return.
eNPV[1] = expected net present value.
PoS[1] = probability of success.
M&A = mergers and acquisitions.
[1] Not defined by International Financial Reporting Standards (IFRSs).

Key performance indicators of the Group and its businesses

The three key performance indicators of net sales, EBITDA pre, and business free cash flow are the most important factors for assessing operational performance. Therefore, we refer to these KPIs in the Report on Economic Position, the Report on Risks and Opportunities, and the Report on Expected Developments. As the most important indicators of financial business performance, the KPIs are key elements of our performance management system.

Net sales

Net sales are defined as the revenues from the sale of goods, services rendered to external customers, commission income and profit-sharing from collaborations, net of value added tax, and after sales deductions such as rebates or discounts. Net sales are the main indicator of our business growth and therefore an important parameter of external as well as internal performance measurement. In addition, organic sales growth is used for internal performance management. Organic sales growth shows the percentage change in net sales versus a comparative period, adjusted for exchange rate and portfolio effects. Exchange rate effects may arise as a result of foreign exchange fluctuation between the functional non-euro currency of a consolidated company and the reporting currency (euro). By contrast, portfolio effects reflect sales changes due to acquisitions and divestments of consolidated companies or businesses.

GROUP

Net sales

			Change	
€ million	**2019**	2018	€ million	%
Net sales	**16,152**	**14,836**	**1,315**	**8.9**

EBITDA pre

EBITDA pre is the main performance indicator measuring ongoing operational profitability and is used internally and externally. To provide an alternative understanding of the underlying operational performance, it excludes from the operating result depreciation and amortization, impairment losses and reversals of impairment losses, as well as adjustments. These adjustments are restricted to the following categories: integration expenses, IT expenses for selected projects, restructuring expenses, gains/losses on the divestment of businesses, acquisition expenses, and other adjustments. The classification of specific income and expenses as adjustments follows clear rules and underlies strict governance at Group level. Within the scope of internal performance management, EBITDA pre allows for necessary changes or restructuring without penalizing the performance of the operating business. The following table shows the composition of EBITDA pre in fiscal 2019 compared to the previous year. These figures were adjusted in accordance with IFRSs by the adjustments included in the functional costs.

GROUP

Reconciliation EBITDA pre[1]

€ million	2019 IFRSs	2019 Elimination of adjustments	2019 Pre[1]	**2018[2]** IFRSs	**2018[2]** Elimination of adjustments	**2018[2]** Pre[1]	**Change** Pre[1]
Net sales	**16,152**	**–**	**16,152**	**14,836**	**–**	**14,836**	**8.9%**
Cost of sales	-6,006	56	-5,950	-5,382	45	-5,337	11.5%
Gross profit	**10,145**	**56**	**10,202**	**9,454**	**45**	**9,499**	**7.4%**
Marketing and selling expenses	-4,576	10	-4,566	-4,396	13	-4,384	4.2%
Administration expenses	-1,154	109	-1,045	-1,183	190	-993	5.2%
Research and development costs	-2,268	29	-2,239	-2,227	2	-2,225	0.7%
Impairment losses and reversal of impairment losses on financial assets (net)	-8	–	-8	27	–	27	> 100.0%
Other operating income and expenses	-19	123	104	52	78	129	19.6%
Operating result (EBIT)[1]	**2,120**			**1,727**			
Depreciation/amortization/impairment losses/reversals of impairment losses	1,946	-9	1,937	1,801	-55	1,746	11.0%
EBITDA[1]	**4,066**			**3,528**			
Restructuring expenses	120	-120	–	46	-46	–	
Integration expenses/IT expenses	95	-95	–	142	-142	–	
Gains (-)/losses (+) on the divestment of businesses	6	-6	–	25	-25	–	
Acquisition-related adjustments	84	-84	–	2	-2	–	
Other adjustments	13	-13	–	58	-58	–	
EBITDA pre[1]	**4,385**	**–**	**4,385**	**3,800**	**–**	**3,800**	**15.4%**
thereof: organic growth[1]							11.3%
thereof: exchange rate effects							2.5%
thereof: acquisitions/divestments							1.6%

[1] Not defined by International Financial Reporting Standard (IFRSs).

[2] Previous year's figures have been adjusted, see Note "Effects from new accounting standards and other presentation changes" in the Notes to the Consolidated Financial Statements.

Business free cash flow (BFCF)

Business free cash flow comprises the major cash-relevant items that the operating businesses can influence and that are under their full control. It comprises EBITDA pre less investments in property, plant, equipment, software, advance payments for intangible assets, changes in inventories, trade accounts receivable, and receivables from royalties and licenses. To manage working capital on a regional and local level, the businesses use the two indicators "days sales outstanding" and "days in inventory".

GROUP

Business free cash flow[1]

€ million	2019	2018	Change € million	Change %
EBITDA pre[1]	**4,385**	**3,800**	**585**	**15.4%**
Investments in property, plant, equipment and software, as well as advance payments for intangible assets	-1,026	-932	-94	10.1%
Changes in inventories	-577	-214	-363	> 100.0%
Changes in trade accounts receivable as well as receivables from royalties and licenses	-259	-145	-114	78.6%
Lease payments[2]	-136			
Elimination of first-time consolidations	346			
Business free cash flow[1]	**2,732**	**2,508**	**224**	**8.9%**

[1] Not defined by International Financial Reporting Standard (IFRSs).
[2] Excluding payments for low-value leases and interest components included in lease payments.

Investments and value management

Sustainable value creation is essential to secure the long-term success of the company. To optimize the allocation of financial resources, we use a defined set of parameters as criteria for the prioritization of investment opportunities and portfolio decisions.

Net present value (NPV)

The main criterion for the prioritization of investment opportunities is the net present value. It is based on the discounted cash flow method and is calculated as the sum of the discounted free cash flows over the projection period of a project. The weighted average cost of capital (WACC), representing the weighted average of the cost of equity and cost of debt, is used as the discount rate. Depending on the type and location of a project, different markups are applied to the WACC.

Internal rate of return (IRR)

The internal rate of return is a further important criterion for the assessment of acquisition projects and investments in property, plant, and equipment, as well as intangible assets. It is the discount rate that makes the present value of all future free cash flows equal to the initial investment or the purchase price of an acquisition. A project adds value if the internal rate of return is higher than the weighted cost of capital including markups.

Return on capital employed (ROCE)

In addition to NPV and IRR, when looking at individual accounting periods, return on capital employed is an important metric for the assessment of investment projects. It is calculated as the adjusted operating result (EBIT) pre divided by the sum of property, plant, equipment, intangible assets, trade accounts receivable, trade accounts payable, and inventories.

Payback period

An additional parameter to prioritize investments in property, plant, equipment, and intangible assets is the payback period, which indicates the time in years after which an investment will generate positive net cash flow.

VALUE ADDED OF MERCK KGAA, DARMSTADT, GERMANY (MEVA)

MEVA gives information about the financial value created in a period. Value is created when the return on capital employed (ROCE) of the company or the business is higher than the weighted average cost of capital (WACC). MEVA metrics provide us with a powerful tool to weigh investment and spending decisions against capital requirements and investors' expectations.

Capital market-related parameters

Net income, earnings per share (EPS), and earnings per share pre (EPS pre)

Earnings per share are calculated by dividing profit after tax attributable to the shareholders of Merck KGaA, Darmstadt, Germany, (net income) by the weighted average number of theoretical shares outstanding. The use of a theoretical number of shares takes into account the fact that the general partner's capital is not represented by shares. To provide an alternative view, we also report earnings per share pre, in other words, after the elimination of the effects of integration expenses, IT expenses for selected projects, restructuring expenses, gains/losses on the divestment of businesses, acquisition expenses, and other adjustments. Moreover, amortization of acquired intangible assets as well as impairment losses on property, plant, equipment, and intangible assets are eliminated. The adjustment excludes impairment losses on intangible assets for acquired research and development (R&D) projects below a threshold value of € 50 million. Income tax is calculated on the basis of the company's underlying tax rate. The following table presents the reconciliation of net income to net income pre for the calculation of EPS pre.

GROUP

Reconciliation of net income to net income pre[1]

			Change	
€ million	**2019**	2018	€ million	%
Net income	1,320	3,374	-2,053	-60.9%
Non-controlling interests	3	22	-19	-85.1%
Profit after tax from discontinued operation	-28	-2,303	2,275	-98.8%
Income tax	440	368	72	19.7%
Amortization of acquired intangible assets	1,119	1,175	-55	-4.7%
Adjustments[1]	369	327	42	12.7%
Income taxes on the basis of the underlying tax rate[1]	-807	-741	-66	8.9%
Non-controlling interests to be adjusted		-3	3	100.0%
Net income pre[1]	2,417	2,219	198	8.9%
Earnings per share pre[1] (€)	5.56	5.10	0.46	9.0%

[1] Not defined by International Financial Reporting Standards (IFRSs).

Credit rating

The rating of our creditworthiness by external agencies is an important indicator with respect to our ability to raise debt capital at attractive market conditions. The capital market makes use of the assessments published by independent rating agencies in order to assist debt providers in estimating the risks associated with a financial instrument. We are currently assessed by Moody's, Standard & Poor's, and Scope. The most important factor for the credit rating is the ability to repay debt, which is determined in particular by the ratio of operating cash flow to net financial debt.

Dividend ratio

With the aim of ensuring an attractive return for our shareholders, we are pursuing a reliable dividend policy with a target payout ratio based on EPS pre (see definition above).

Other relevant/non-financial performance measures

Apart from the indicators of the financial performance of the businesses, non-financial measures also play an important role in furthering the success of the company. From a Group perspective, innovations in the businesses as well as the promotion of a diverse workforce, especially at the leadership level, and sustained planning for the filling of company-critical positions, are of particular importance.

Innovation

Innovations are the foundation of our business and will also be the prerequisite for future success in changing markets. We are continuously working to develop new products and service innovations for patients and customers. Indicators for the degree of innovation are defined individually depending on the specifics of the respective businesses.

Sustained employee development

We believe that a diverse workforce strengthens our ability to innovate. We actively promote diversity among our leaders to create an integrative culture that reflects our values and enables every employee to fulfill their potential. We ensure that our ambitious corporate goals can be realized through strategic succession planning for company-critical positions. To gauge the success of the related measures, we have introduced these two focus issues as non-financial indicators.

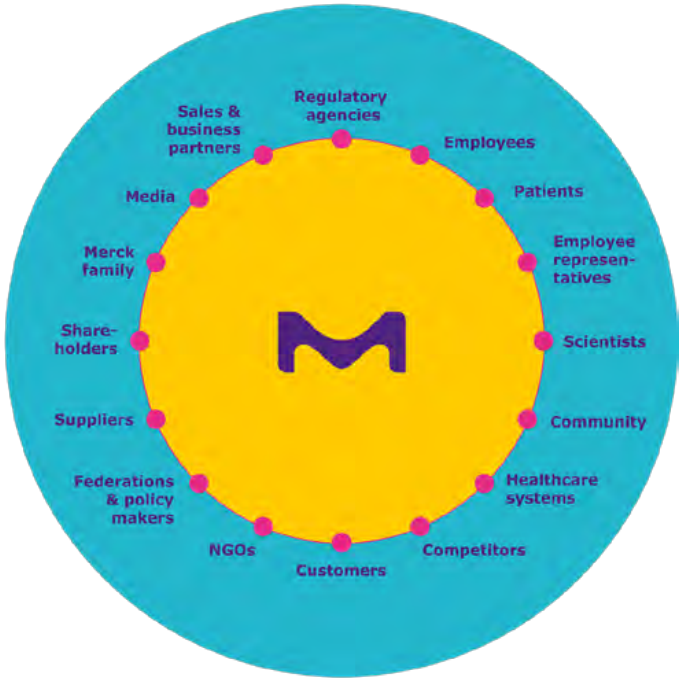
Corporate Responsibility*

We take responsibility every day – and have been doing so for over 350 years. This commitment is codified in our corporate strategy and values. Responsible conduct with respect to employees, products, the environment, and society is a fundamental prerequisite for our business success.

Strategy and management

Our corporate responsibility (CR) activities are steered by our CR Committee, which consists of representatives from our business sectors and relevant Group functions, such as Environment, Human Resources, Compliance, and Procurement. The Chairman of the Executive Board is responsible for the Committee, which is chaired by the head of the Group Corporate Responsibility unit.

Humankind is being confronted with global societal challenges such as climate change, resource scarcity, an increasing global population, rising life expectancy, and insufficient access to healthcare in low and middle-income countries. Responsible governance can help solve these global issues. We believe that in pursuing this approach, we can also strengthen our financial performance. In 2019, we continued the realignment of our CR strategy begun in 2018. We are increasingly pursuing a shared value approach and are working to make the value we create measurable for the company and for society. We have defined three strategic spheres of activity as the center of our CR strategy: Global Health, Sustainable Solutions, and Broad Minds. We focus our resources on those areas where we can have the greatest impact. Needless to say, we respect the interests of our employees, customers, investors, and communities in which we operate, and we work to minimize ethical, economic, and social risks, thereby sustainably contributing to our long-term corporate success.



* The contents of this chapter or section are voluntary and therefore not audited. However, our auditor has read the text critically.

Global Health: We are developing and producing medicine and intelligent devices that contribute to comprehensive healthcare. Awareness plays a key role in our approach to improving access to healthcare, which is why we regularly conduct campaigns to raise awareness of various diseases across the globe. We focus on those diseases that align with our core competencies, expertise and experience along the health value chain. In collaboration with our partners, we also support people in low and middle-income countries, for example by donating praziquantel tablets for the treatment of schistosomiasis. Through our Global Health Institute, we are developing diagnostics, therapies, and preventive solutions to fight malaria, schistosomiasis, and other infectious and tropical diseases.

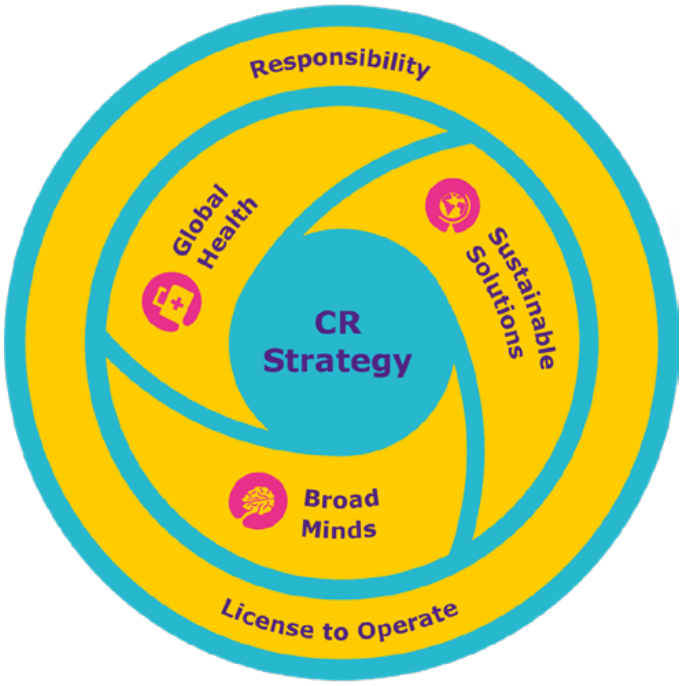
Sustainable Solutions: We are constantly working to improve the sustainability footprint of our products – even during their use phase – which also helps our customers achieve their own sustainability goals. For example, with our Design for Sustainability program in our Life Science business sector, we have developed a systematic approach for product development. This approach allows us to review the sustainability of products during the development process. This is achieved, for instance, by product developers using product lifecycle analyses.

Broad Minds: As a science and technology company, we endeavor to excite people about science, inspire curiosity, and help creativity to soar. Our goal is to strengthen our reputation in the field of science, especially in those areas where we have particular expertise. We not only support educational programs for schools, but also back pioneering research at universities. Reflecting the way that music and literature inspire people, we promote a range of cultural initiatives worldwide. Creativity and curiosity are the bedrock of science, culture, and art, and they also underpin our holistic approach.

Our corporate responsibility efforts are aligned with the United Nations (UN) Sustainable Development Goals (SDGs), and we are working to help achieve this ambitious agenda by 2030. However, our contribution toward achieving the SDGs does not limit itself to the strategic spheres of activity established in our Corporate Responsibility strategy. We report on which specific sub-goals of relevant SDGs we support through our management approaches, products, and projects, and we identify material goals based on these SDGs.

In addition to promoting the SDGs, we also support relevant responsible governance initiatives. Through our membership in the UN Global Compact, we are committed to upholding the Compact's principles on human rights, labor standards, environmental protection, and anticorruption. We ensure that we live our own corporate responsibility principles by following the guidelines of the Responsible Care Global Charter, which is an initiative of the International Council of Chemical Associations (ICCA). Responsible Care aims to help the chemical industry enhance its environmental, health, and safety performance. We are also a member of the Chemie^3 initiative in Germany, a collaboration between the German Chemical Industry Association (VCI), the German Employers' Federation of the Chemical Industry (BAVC), and the German Mining, Chemical, and Energy Industrial Union (IG BCE). This globally unique alliance seeks to make sustainability a core part of the chemical industry's guiding principles and to drive the sector's position within the German economy as a key contributor to sustainable development.

To us, corporate responsibility means listening and taking action, and so we place great importance on dialogue with our various stakeholders. These stakeholders include employees, business associates, the Merck family, investors, regulatory agencies, industry associations, and non-governmental organizations (NGOs). This continuous exchange creates transparency and clearly demonstrates how we live our values.



In recognition of our dedication to responsible and sustainable business practices, we were able to maintain our good position in sustainability evaluations in 2019 and are listed on numerous indices. We are included in the FTSE4Good index, the STOXX Global ESG Leaders index, the Euronext Vigeo Eurozone 120 index, and the Ethibel Sustainability Index (ESI) Excellence Europe. In early 2019, the independent rating agency EcoVadis granted us Gold status for our sustainability engagement. EcoVadis examines around 60,000 suppliers from 155 countries across four categories: environment, social affairs, ethics, and sustainable procurement.

Strategic sphere of activity: Global Health

Our aim is to create a healthier future for all, including individuals, communities, and countries. We want to use innovation in science and technology to improve the health of underserved populations in low and middle-income countries. To achieve this, we are leveraging our expertise from all business sectors and collaborating closely with a wide range of partners. We also participate in industry-wide initiatives and work closely with other businesses to develop new approaches.

Our Global Health strategy is designed to overcome access barriers for underserved populations and communities in low and middle-income countries in an economically viable and sustainable manner to create shared value for our business and for society. We want to develop a business model that increases the value and competitiveness of our company while solving unmet health needs and strengthening health systems. We want to be instrumental in curbing schistosomiasis and fighting malaria and other infectious diseases while helping to build local capacity across the value chain. In the Access to Medicine Index, which is published every two years, we continued to rank fourth in 2018. This index assesses the world's leading pharmaceutical companies on activities and initiatives they have implemented to promote access to medicine in low and middle-income countries.

Strengthening the availability of healthcare solutions

We research, develop and refine healthcare solutions that address unmet needs, tailoring them to local environments. With our Global Health Institute, we have defined a comprehensive portfolio of R&D projects to develop integrated health solutions. This includes treatments, diagnostics, preventive measures against infections, and approaches to strengthen health systems — targeting schistosomiasis, malaria, and bacterial infections. For schistosomiasis, the portfolio also includes the development of a new pediatric formulation of praziquantel to treat the worm disease schistosomiasis in children under the age of six, through the Pediatric Praziquantel Consortium, a public-private partnership. We started a Phase III study in September 2019 and expect the product to be ready to launch in the first affected countries in Africa in 2022.

As part of our We for Malaria program, we completed a Phase I/Ib clinical trial of our anti-malarial compound M5717. In the upcoming next phase of the program, we will examine options for developing the substance in combination with other anti-malarial compounds for single administration in combination therapy to treat or prevent malaria.

In the drug discovery area, our strategic collaboration with the University of Cape Town in South Africa and the Medicines for Malaria Venture has continued the screening of our almost 100,000 proprietary substances with the aim of identifying new drug candidates for treatment of malaria, while also expanding our research capacity in and for Africa. This program is co-funded by the German Federal Ministry of Education and Research.

Additionally, we are working toward making IR3535® available as a malaria prevention method in Africa. This insect repellent is already used for complementary prevention from vector-borne diseases such as dengue fever and ZIKA. Products containing this active ingredient stand out due to their particularly good tolerance in young children and pregnant women.

In 2019, we continued our collaboration to support the National Malaria Control Program in Ghana. Alongside an integrated approach of prevention and diagnosis of the disease, we aim to expand local research competencies.

Addressing affordability challenges

Through intellectual property initiatives and equitable pricing strategies, we can assist those people who are unable to pay for the health solutions they need. We refrain from filing or enforcing patents in many low and middle-income countries and use a publicly available database to be transparent about our patents and patent applications.

Through our Open Innovation Initiative, we are addressing affordability challenges around intellectual property (IP) with an initial focus on neglected disease areas where we do not have portfolio competencies or expertise. Under this platform, we are a member of WIPO Re:Search, an open innovation platform sponsored by the World Intellectual Property Organization (WIPO) to accelerate early discovery of active ingredients for compounds through the sharing of IP and know-how. Our newest collaboration is with the University of Yaoundé I in Cameroon, at which our compound library is being screened for a potential cure for Buruli ulcer. We are also a member of the Drugs for Neglected Diseases initiative (DNDi) NTD Drug Discovery Booster, which simultaneously searches the compound libraries of the eight partnering companies.

In 2019, we continued our long-term partnership with the World Health Organization (WHO), under which we undertake to donate praziquantel tablets every year. The tablets are distributed in 47 affected countries in Africa for the treatment of school children. In 2019, we donated over 233 million tablets for distribution in 35 countries. Since 2007 we have supplied more than one billion tablets free of charge, which is equivalent to the treatment of around 400 million school children. Latest numbers from WHO show that in 2017, 72% of all school-aged children in need of treatment in sub-Saharan Africa were treated. As a founding member of the Global Schistosomiasis Alliance, we are at the forefront of the campaign to eliminate schistosomiasis worldwide.

Raising awareness

Through access to the appropriate tools, knowledge, and skills, we help health professionals, communities, and patients make informed decisions about prevention, diagnostics, treatment, and care. Our regular campaigns help increase awareness of certain diseases globally, with a focus on those diseases where we have extensive expertise, such as cancer, thyroid disorders, diabetes, multiple sclerosis, and infertility. In addition, we have championed World Malaria Day with awareness campaigns and through engagement around the We for Malaria program.

Together with the NALA Foundation, we have been involved in a schistosomiasis health education project in rural southwestern Ethiopia since late 2017. The project helps to promote the long-term behavioral change that is needed to eliminate schistosomiasis. In 2019, we extended the project to two additional districts and reached around 188,000 people, of which nearly 40% were school children. In a survey, we learned that 58% of children had never heard of intestinal parasites. This demonstrates the importance of further health education.

Furthermore, Embracing Carers is a global initiative that we lead in collaboration with prominent caregiving organizations around the world. Embracing Carers is designed to heighten awareness of the often-overlooked needs of caring relatives and care staff as well as stimulating a public debate about this issue and any relevant measures. We believe that care in today’s healthcare policy is the issue that receives the least attention. In 2019, Embracing Carers backed up words with action and launched the global Time Counts campaign. The campaign calls for the support of caring relatives through gestures large and small and the offer of time.

Promoting accessibility and improving supply chains

We promote initiatives to strengthen supply chains and to develop localized health solutions in order to deliver and reach out efficiently at the point of care. We are a founding member of the Accessibility Platform, an informal, private-sector initiative that is working on a comprehensive approach to meeting supply chain and distribution challenges in countries with low or medium income. In a collective action, we are engaging in an Access Delivery mentorship program. A pilot was successfully launched and implemented in Tanzania with Bahari, a local private wholesaler, in collaboration with Business for Health Solutions (BHS).

NTDeliver is our digital information tool for improving transparency in medicine donation supply chains created through public-private partnerships. Deliveries from companies running donation programs are clearly displayed — from purchase orders made by WHO through delivery to the first warehouse in the destination country. This improves coordination and provides a more transparent overview of the in-country inventory. In Kenya, where schistosomiasis poses a significant risk to schoolchildren, we are collaborating with around 12,000 teachers across the country to support the de-worming program running with WHO. We deploy our NTDeliver tool to monitor volumes of medicines reaching schools, particularly "last mile" deliveries to remote, rural locations. In 2019, we further improved the tool and firmly established it as an essential part of the program. Building on this experience, we are reviewing the best way to retrieve unused medicines from the field and store them centrally for upcoming de-worming campaigns.

To realize our vision of achieving basic medical care everywhere and for everyone, we want to help eliminate inequality in access to healthcare in emerging economies. Our CURAFA™ stations serve as points of care for integrated primary healthcare. In these communities, local pharmacists and nurses provide pharmaceutical and clinical services, medicine, digital health solutions, health education, and insurance and financing schemes. In Kenya we have five facilities running that in 2019 served a total of more than 2,000 patients a month.

Falsified medicines pose a threat to millions of people. Latest figures refer to around one million deaths per year due to the use of ineffective or toxic products. We are fighting against falsified medicines — for instance through the Global Pharma Health Fund (GPHF), a non-profit organization funded by our company. Its mission is to combat falsified and poor-quality medicines in low and middle-income countries. The GPHF Minilab™ fits into a tropics-resistant flight case and enables scientists and clinical staff to verify some 100 active pharmaceutical ingredients in medicines for authenticity. More than 850 Minilabs are currently in use. 21 Minilabs were delivered in 2019. Of these, 15 went to the Philippines and the remaining six to Bangladesh, the Democratic Republic of the Congo, India, and Mongolia. Furthermore, we are collaborating with Boston University to explore new technologies against falsified medicines, particularly for antimalarials and antimicrobials. The objective is to test, validate, and optimize a new user-friendly technology to qualitatively and quantitatively assess the validity of drugs.

Strategic sphere of activity: Sustainable Solutions

Through our products, we are helping our customers reduce the impact of their own activities on sustainability and achieve their own sustainability goals.

Life Science: reducing environmental impact throughout the product life cycle

We aim to continuously improve the environmental impact of our products. This applies to the entire life cycle — from production and use through to the disposal of our products. To lower the environmental impact of our devices and instruments during use by customers, we apply our Design for Sustainability (DfS) program. This comprehensive approach keeps sustainability criteria in the foreground during product development or re-engineering and documents them in a scorecard. When developing a new product, our aim is to improve as many of these criteria scores as possible. Beginning with the concept stage, product teams identify potential environmental impacts and opportunities to make improvements. By the end of 2019, 32% of these product development projects met at least three or more sustainability criteria.

In addition, our researchers are developing innovative solutions in line with the 12 Principles of Green Chemistry developed by chemists Paul T. Anastas and John C. Warner. The objective is to enable research that is as environmentally conscious as possible and to minimize adverse effects on human health. More than 830 greener alternatives to conventional products are available so far. With DOZN®, we have developed a web-based quantitative Green Chemistry analysis tool. To date, we have used this matrix to assess and improve more than 45 products. In 2019, we launched a version of the tool for our customers. DOZN® 2.0 brings new possibilities for sustainable product design to our customers and empowers them with data to make more environmentally friendly choices in their development processes.

We are expanding our portfolio to include greener alternatives, such as the new bio-based solvent Cyrene™, which is derived from waste cellulose and is employed as an alternative to widely used solvents that are subject to increasing regulatory restrictions due to their associated toxicity. Cyrene™ was named Environmental Product of the Year at the Environmental Leader Awards in 2019.

The application of single-use products, many of which pose a challenge to recycle in the current infrastructure, is growing as life science markets are expanding and adopting new technologies. We have developed innovative recycling programs that led to the recycling of almost 4,200 metric tons of our customers' products from 2015 to 2019. The figure for 2019 alone was 1,500 metric tons, which means our target of recycling a total of 5,000 metric tons by 2020 is easily achievable.

In 2019, we launched a sustainable packaging strategy for Life Science called SMASH Packaging. The strategy is built on three pillars: optimizing resources, using more sustainable materials, and designing for a circular economy. We set specific 2022 targets, such as reducing air space in distribution packaging by 20%, demonstrating that our packaging materials do not contribute to deforestation, and reducing our use of expanded polystyrene (EPS) by 20%.

Performance Materials: increasing the sustainability of end products

Windows that can be darkened in a matter of seconds are now a reality, thanks to our liquid crystal window (LCW) technology. These darkened windows regulate the heat generated by direct sunlight. Based on initial estimates, this technology is capable of lowering the energy consumption caused by air conditioning in buildings, as well as replacing conventional sun protection systems. This helps save materials and costs during construction. The LC material is commercialized under our licrivision® and eyrise™ brands.

In the cosmetics industry, we are addressing the continuing trend towards ingredients that meet stringent sustainability criteria. Our portfolio of fillers eliminates the need for microplastic particles that are heavily criticized for polluting waters and damaging marine life. Our cosmetic formulations comply with strict criteria. By the end of 2019, 73 of our cosmetic pigments and active ingredients were certified according to Ecocert's COSMOS standard for organic and natural cosmetics. We also obtained halal certificates for our Eusolex T and UV-Titan product ranges.

Strategic sphere of activity: Broad Minds

The promotion of science, education, and culture in an integrated manner constitutes one of the central concerns of our engagement in society. In this way, we champion characteristics that are indispensable for our activities as a science and technology company: creativity, passion for new discoveries and curiosity, and the courage to transcend boundaries.

Boosting scientific education

We view education as a key component of culture — and vice versa. Education can help us understand culture. But culture can also build a bridge to education by stimulating curiosity and creativity. We therefore support educational projects at many of our sites. For instance, we grant scholarships and help to create interesting science classes in school through employee volunteering. We want to spark interest in science, particularly among young people. This is why we have been supporting the "Jugend forscht" (Young Researchers) competition for more than 35 years. Since 1996, we have been organizing the state-level competition for the German Federal State of Hesse. 72 future young scientists took part in the 2019 competition. In the reporting year, we awarded the Julius Adolph Stöckhardt prize for the first time. This award recognizes committed chemistry teachers who conduct innovative experiments to impart chemistry to students in captivating ways.

Through our Junior Labs, we want young people to enjoy conducting experiments. These learning labs at the Technical University of Darmstadt combine classroom instruction with trending topics and modern research methods. In 2019, around 2,500 school students used the chemistry laboratory and around 1,500 school students experimented in the biology laboratory.

As part of SPARK, our global volunteer program, employees from our Life Science business sector share their skills and experience with students and support our local communities. The program is intended to spark curiosity in science and inspire students to consider a STEM[1]-related career. In 2019, more than 2,300 employees invested more than 19,400 hours in the program, reaching over 66,500 young people. As part of SPARK, in 2019, we once again sent our Curiosity Cube™ on a journey through the United States and Canada. This is a freight container that has been transformed into a mobile laboratory and is equipped with state-of-the-art technology. Directed by our employees, school students can use it to carry out scientific experiments. In 2019, the Cube traveled approximately 48,000 kilometers across the United States and engaged students in 99 communities. 94% of schools visited fall under the Title 1 category, where students mainly come from low-income backgrounds.

The Deutsche Philharmonie, sponsored by Merck KGaA, Darmstadt, Germany

The Deutsche Philharmonie, sponsored by Merck KGaA, Darmstadt, Germany, is our musical ambassador. We consider classical music to be the universal language that brings people together; as such, it is an important part of our culture. The concerts of this professional ensemble represent an integral part of cultural life in the vicinity of our Group headquarters in Darmstadt and remain highly popular, with around 21,000 people having attended these concerts in 2019. In the orchestra workshop, children and teenagers gained their first experience in a professional orchestra. We also fostered enthusiasm for classical music among young people through cushion concerts for children aged four years and above, as well as through youth concerts. In addition, the orchestra again toured internationally. In 2019, one concert took place in Moscow.

1 Science, Technology, Engineering, and Mathematics

Promoting literature

Like music, literature is an important mediator between cultures. That is why we support five literary prizes in Germany, India, Italy, Japan, and Russia. The awards primarily recognize those authors who build bridges between cultures as well as between literature and science. We awarded two of the prizes in 2019: The Johann Heinrich Merck Award for Literary Critique and Essay of Merck KGaA, Darmstadt, Germany, in Germany went to author Daniela Strigl, and the winner of the Merck-Tagore Literature Award of Merck KGaA, Darmstadt, Germany, in India was Kris Manjapra.

Responsibility for our products

The safety of our products is at the core of our corporate responsibility. When used properly, they must pose no risk to customers, patients, consumers, or the environment. Our goal is to ensure a positive benefit/risk profile for our products, which is why we regularly examine safety across their entire life cycle and continuously take steps to minimize risks. We provide patients, consumers, and customers with extensive informational material so they can use our products in a safe, responsible, and proper manner.

In our pharmaceutical marketing activities, the focus is always on the health and well-being of patients because we want them to receive effective and high-quality treatment. All guidelines pertaining to marketing and advertising are part of our Group-wide compliance program, which is complemented by our internal guidelines and various voluntary commitments that, in many cases, far exceed the applicable statutory regulations.

Safety of our chemical products

Numerous regulations are in place to ensure that chemicals pose no risk to humans or the environment. Compliance with these regulatory requirements is an important part of our work. Our Group-wide Regulatory Affairs Governance Policy governs the processes with which we implement and manage product safety as well as the corresponding management structures. We incorporate all relevant national and international chemical regulations into our policies and guidelines. This includes the EU chemicals regulation REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) and CLP (Classification, Labelling and Packaging of Substances and Mixtures, EU GHS). We issue all chemicals classified as hazardous with safety data sheets, which contain information on the physicochemical, toxicological, and ecotoxicological properties of the agent and reflect the relevant regulatory requirements of the countries in which they are published. We have standardized and automated the majority of our Group-wide hazard communication processes. In the course of integrating the companies we acquired, Versum Materials and Intermolecular, we are examining compliance with the applicable regulatory requirements and our internal standards and making any necessary adjustments to the underlying processes.

Safety of our Healthcare products

Patient safety has a top priority in everything we do. During the entire life cycle of our medicines, we provide patients and physicians with up-to-date risk-benefit evaluations. To this end, company experts process safety-relevant information from various sources such as clinical trials, adverse reaction reports, and medical/scientific literature. Our Global Patient Safety unit continuously monitors and evaluates the safety and risk-benefit ratio of our pharmaceutical products worldwide (pharmacovigilance). Presided over by our Global Chief Medical Officer, our Medical Safety and Ethics Board examines and assesses, where necessary, significant medical safety risks and questions regarding risk-benefit evaluations. For products in our Allergopharma business, we have also developed comprehensive clinical efficacy and safety profiles that we continuously update. For the safety of patients, we have established a global pharmacovigilance system that we are always working to enhance.

Quality of our products

Our goal is to provide customers and patients with high-quality products at all times. Through our quality vision – "Quality is embedded in everything we do!" – we remind our employees of their responsibility across all business sectors, all Group functions, and all levels of the company.

Supplier management

We procure many raw materials, packaging materials, technical products, components, and services worldwide. We aim to promote supply chain stability while providing our customers with high-quality products and services. Our supplier management focuses on compliance with fundamental environmental and social standards in addition to high-quality, delivery reliability, and competitive prices. They are set out in our Responsible Sourcing Principles and primarily derived from the core labor standards of the ILO (International Labour Organisation) and the UN Global Compact.

Due to the global focus of our procurement, we are continuously working to ensure adherence to our supply chain standards. As a member of the industry initiative Together for Sustainability (TfS), we are able to use the supplier self-assessments and audit results shared among all member companies, who in turn abide by all restrictions stipulated within competition law.

In the course of integrating Versum Materials and Intermolecular, we are examining conformance with our policies and processes and will make any necessary adjustments.

Responsibility for our employees

Our employees contribute to groundbreaking progress in science and technology across the world. They are the basis of our success and therefore play a central role in the success of our business. In accordance with the our company values, we live a culture of mutual esteem and respect. To remain successful in the future, we want to attract people to our company who contribute their curiosity, courage, and spirit of invention. We therefore place a strategic focus on employee development, leadership, and performance management. Furthermore, we strive to foster diversity among our employees (more information can be found under "People").

Responsibility for the environment

We seek to impact the environment as little as possible while doing business. This is the reason we work to efficiently conserve resources such as energy, water, and raw materials, while also continuously reducing our emissions and waste.

Environmental management system

In our Corporate Environment, Health and Safety Policy, which is applicable Group-wide, we have defined our principles and strategies for environment, health, and safety. It is an integral component of our EHS management system, which is certified annually by external auditors in accordance with the international standard ISO 14001. At all our sites, local EHS managers oversee operational environmental protection measures. These employees continually receive training and obtain additional qualifications. Since our businesses are constantly changing, we carry out internal audits of our environmental management system and have this audited externally on a regular basis to ensure that the ISO 14001 requirements are still being met. In 2019, we obtained an ISO 14001 group certificate for the 11th consecutive year. This certificate covers 81 sites around the world. In the course of integrating Versum Materials and Intermolecular, we are examining compliance with our requirements and making any necessary adjustments to the underlying processes. The environmental KPIs reported do not yet include any data relating to these two acquired companies.

Focus areas: Energy efficiency, greenhouse gas emissions, water, waste, and recycling

Climate impact and resource scarcity are key challenges facing society. Seeking to make a positive contribution is for us a given. We have therefore set ourselves the goal of reducing total direct and indirect greenhouse gas emissions by 20% by 2020 (2006 baseline), irrespective of production growth. In total, we emitted 665,000 metric tons of CO_2 equivalents (CO_2eq) in 2019. We have thus reduced our greenhouse gas emissions by around 15% when compared with 2006, even though our operating business has grown.

In 2019, our company received a "C" rating from the CDP (formerly the Carbon Disclosure Project), thus maintaining the results achieved in 2018 (likewise "C"). The CDP analyzes companies in terms of their performance and transparency in climate impact and water management.

ENERGY CONSUMPTION[1]

In gigawatt hours	2016	2017	2018[2]	**2019[3]**
Total energy consumption	**2,117**	**2,194**	**2,227[4]**	**2,240**
Direct energy consumption	**1,330**	**1,319**	**1,323[4]**	**1,339**
Natural gas	1,260	1,254	1,257[4]	1,273
Liquid fossil fuels[5]	36	32	32	33
Biomass and self-generated renewable energy	34	33	34	33
Indirect energy consumption	**787**	**875**	**904[4]**	**901**
Electricity	692	729	755[4]	756
Steam, heat, cold	95	146	149	145
Total energy sold	**0.3**	**0.1**	**0.0**	**0.1**
Electricity	0.3	0.1	0.0	0.1
Steam, heat, cold	0.0	0.0	0.0	0.0

[1] In line with the Greenhouse Gas Protocol, for all previous years (up to the 2006 baseline) the energy consumption has been calculated based on the corporate structure as of December 31 of the reporting year and retroactively adjusted for acquisitions or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted).

[2] Since 2018, our reported figures have excluded the Consumer Health business, which was divested on December 1, 2018.

[3] Since 2019, our reported figures have included Intermolecular (acquired on September 20, 2019). Data on Versum Materials (acquired on October 8, 2019) are not yet available. We are presently reviewing the current process for collecting greenhouse gas and energy consumption-related indicators and are working to harmonize methodologies and timelines. Starting in 2020, we will be incorporating the environmental figures for Versum Materials into our reporting.

[4] Figure retroactively adjusted.

[5] Light and heavy fuel oil, liquefied petroleum gas (LPG), diesel and gasoline.

We have consolidated all our climate impact mitigation and energy efficiency activities in the Edison program. Overall, thanks to the Edison programm, we have saved approximately 89,000 megawatt hours of energy since 2012. Most of this is power. By deciding to purchase increasing quantities of energy from renewable sources, in 2019 we took a further big step toward reaching our climate protection target.

Energy management plays a key role in our efforts toward energy efficiency and climate impact mitigation. Our production sites in Darmstadt and Gernsheim account for 28% of our global energy consumption. Both sites meet the international energy management standard ISO 50001. Currently, 13 of our production sites have a certified energy management system.

TOTAL GREENHOUSE GAS EMISSIONS (SCOPE 1 AND 2 OF THE GHG PROTOCOL)[1]

In metric kilotons	2006[2]	2016	2017	2018[3]	**2019[4]**
Total CO_2eq[5] emissions	**782**	**681**	**689**	**666[6]**	**665**
Thereof:					
Direct CO_2eq emissions	378	384	373	353[6]	359
Indirect CO_2eq emissions	404	297	316	313[6]	306
Biogenic CO_2 emissions	**0**	**14**	**13**	**13**	**12**

[1] In line with the Greenhouse Gas Protocol, for all previous years (up to the 2006 baseline) the greenhouse gas emissions have been calculated based on the corporate structure as of December 31 of the reporting year and retroactively adjusted for acquisitions or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted).

[2] Baseline for our emission targets is 2006.

[3] Since 2018, our reported figures have excluded the Consumer Health business, which was divested on December 1, 2018.

[4] Since 2019, our reported figures have included Intermolecular (acquired on September 20, 2019). Data on Versum Materials (acquired on October 8, 2019) are not yet available. We are presently reviewing the current process for collecting greenhouse gas and energy consumption-related indicators and are working to harmonize methodologies and timelines. Starting in 2020, we will be incorporating the environmental figures for Versum Materials into our reporting.

[5] eq = equivalent.

[6] Figure retroactively adjusted.

Our acquisition of Versum Materials is expected to increase our reported greenhouse gas emissions in 2020 by around 1.3 million metric kilotons. This estimate is based on the figures reported by Versum Materials for 2017 and 2018. Most of these emissions are generated in manufacturing processes. In the course of the integration, we are investigating the specific causes of these high emissions and analyzing where they could be reduced. Since Versum Materials does not have any data going back to the 2006 baseline for our climate impact mitigation goal, we cannot include these additional emissions in our current goal. In 2019, we began to develop a new climate impact mitigation goal for the period through 2030. We will include Versum Materials' emissions in this.

Alongside energy efficiency and climate protection, we also focus on water. Since 2016, we have been pursuing the goal of implementing a sustainable water management system at sites with high consumption levels by 2020. At sites with relevant water use located in areas of high water stress, we are aiming to cut our water consumption by 10% by 2020 (2014 baseline). At the end of 2019, we had lowered our water consumption at the relevant sites by 21% in comparison with 2014. In 2019, the CDP gave our activities to conserve water a "B" rating (2018: B–). However, it is not just water that is becoming scarcer; other resources are too. This makes it imperative for us to use raw materials as efficiently as possible and reduce the waste generated from these. In 2016, we developed a company Waste Score, which allows us to compare the amount of waste our sites are producing and monitor the development of the amount of waste we produce. Based on this score, we have set ourselves the goal of reducing the environmental impact of our waste by 5% by 2025 (2016 baseline). For this purpose, we continuously analyze the improvement potential of our production processes and disposal routes.

Responsibility to society

We see ourselves as part of society – both at our individual sites and worldwide. Taking responsibility in society is an integral part of our entrepreneurial approach. We believe we can make an important contribution to the community through our knowledge, our skills, and our products.

Our social responsibility activities are primarily focused on those areas in which we have particular expertise stemming from our core businesses. We are thus engaged in health and culture projects and furthermore support education, especially in the natural sciences. Additionally, we provide disaster relief and support people in need in the areas in which we operate.

Our subsidiaries are engaged in a wide variety of local projects. We have defined a general set of criteria for selecting projects, and the decisions concerning the implementation of specific projects are made by our subsidiaries. In 2019, we spent a total of around € 46 million on community engagement activities. This figure also includes the activities of Versum Materials and Intermolecular since October 2019. It does not include contributions from the Group Foundation.

We carried out more than 300 charitable projects in 60 countries worldwide in 2019. In more than half of all initiatives, our colleagues joined us in our efforts, whether through donations in cash or in kind or through their active collaboration in projects.

Research and Development

Science is at the heart of everything we do. We conduct research and development (R&D) worldwide in order to develop new products and services designed to improve the quality of life of patients and satisfy the needs of our customers. Further optimizing the relevance and efficiency of our research and development activities – either on our own or in cooperation with third parties – is one of our top priorities.

In 2019, approximately 7,800 employees worked for our company researching innovations to serve long-term health and technology trends in both established and growth markets (2018: approximately 7,200).

Expenditure on research and development (R&D) incurred by our company amounted to € 2.3 billion in the year under review (2018: € 2.2 billion). In our R&D activities, we focus on both in-house research and external collaborations that enable us to increase the productivity of our research while simultaneously reducing financial outlay. The organizational setup of our R&D activities reflects the structure of our company with three business sectors. In Healthcare, we aspire with our research pipeline to make a positive difference for patients – always with the purpose to help create, improve, and prolong life. Our main research areas include oncology, immuno-oncology, and immunology including multiple sclerosis. In our Life Science business sector, our research activities focus in particular on technologies for laboratory and life science applications as well as the promotion of new developments. Improved test kits, chromatography methods, substrates for separating active substances, and innovations continue to be in focus in the fields of microbiology and hygiene monitoring. Research activities in our Performance Materials business sector include the development of new and improved basic materials and mixtures for LC displays, for innovative OLED applications, and for materials for the production of integrated circuits. To strengthen the Pigments business, new effect pigments for the automotive, cosmetics, and printing ink sectors are being developed.

RESEARCH AND DEVELOPMENT COSTS[1]

			Change	
€ million	**2019**	2018	€ million	%
Healthcare	1,666	1,687	-21	-1.3%
Life Science	276	251	25	10.1%
Performance Materials	267	242	25	10.5%
Corporate and Other[2]	59	47	12	24.7%
Total	**2,268**	**2,227**	**41**	**1.8%**

[1] Previous year's figures have been adjusted, see Note (45) "Effects from new accounting standards and other presentation changes" in the Notes to the Consolidated Financial Statements.

[2] R&D spending that cannot be allocated to individual business sectors.

The ratio of research spending to sales was 14.0% (2018: 15.0%). The decline is attributable to positive sales development.

Healthcare*

Biopharma

Oncology and immuno-oncology

Oncology and immuno-oncology are core focus areas in our R&D portfolio. With an emphasis on biology-driven research, we aim to deliver transformative treatments. Translational research is embedded into the whole R&D process, with several projects addressing unmet needs in hard-to-treat cancers through innovative treatment approaches and novel combinations. In 2019, we achieved a number of significant milestones across our oncology and immuno-oncology pipeline.

We continue to develop much-needed new treatment options for patients with hard-to-treat cancers and have made key progress in this area with avelumab, an anti-PD-L1 antibody we are co-developing and co-commercializing with Pfizer Inc. To date, avelumab has received approval in more than 50 countries across the world under the brand name Bavencio®. In May, we and Pfizer announced that the U.S. Food and Drug Administration (FDA) approved Bavencio® in combination with axitinib for the first-line treatment of patients with advanced renal cell carcinoma (RCC). As well, in October, we and Pfizer reported that the European Commission (EC) authorized Bavencio® in combination with axitinib for the first-line treatment of adult patients with advanced RCC. In December, the combination was approved in Japan for the treatment of unresectable or metastatic RCC.

The United States, EC and Japanese approvals in RCC were based on interim results from the pivotal Phase III JAVELIN Renal 101 trial, which were published in the New England Journal of Medicine in February. The combination of Bavencio® and axitinib significantly extended median progression-free survival (PFS) by more than five months compared with sunitinib as a first-line treatment for patients with advanced RCC.

Through our strategic alliance with Pfizer, we continue to explore the therapeutic potential of avelumab. Our clinical development program JAVELIN currently involves at least 30 clinical programs and more than 10,000 patients evaluated across more than 15 different tumor types. In addition to RCC, these tumor types include head and neck cancer, Merkel cell carcinoma (MCC), non-small cell lung cancer (NSCLC), and urothelial cancer (UC).

In March, we and Pfizer reported the discontinuation of the ongoing Phase III JAVELIN Ovarian PARP 100 study evaluating the efficacy and safety of avelumab in combination with chemotherapy followed by maintenance therapy of avelumab in combination with talazoparib, a poly (ADP-ribose) polymerase (PARP) inhibitor, versus an active comparator in treatment-naïve patients with locally advanced or metastatic ovarian cancer. The decision was based on several emerging factors since the trial's initiation, including the previously announced interim results from JAVELIN Ovarian 100 as well as the rapidly changing treatment landscape. The discontinuation of the trial was not based on safety results.

In November, we and Pfizer announced topline results of the Phase III JAVELIN Gastric 100 study evaluating avelumab as first-line maintenance therapy following induction chemotherapy in patients with unresectable, locally advanced or metastatic HER2-negative gastric or gastroesophageal junction cancer versus continuation of chemotherapy or best supportive care. While the study showed clinical activity for avelumab in this setting, it did not meet the primary endpoints of improved overall survival (OS) compared with the standard of care in the overall intent-to-treat population or the PD-L1–positive population.

At the 2019 American Society of Clinical Oncology (ASCO) Annual Meeting, May 31 – June 4 in Chicago, Illinois, United States, we presented new data:

- For avelumab, we shared data from five studies across tumor types including MCC, RCC, hepatocellular carcinoma and UC. These included an oral presentation of biomarker analyses of baseline tumor samples from the Phase III JAVELIN Renal 101 trial in previously untreated patients with advanced RCC.
- Erbitux® (cetuximab) data from a retrospective analysis of OS by subsequent therapy in patients with RAS wild-type metastatic colorectal cancer from the Phase III EPIC study were presented. The analysis evaluated the effect of post-study therapies (with cetuximab, without cetuximab, or no subsequent therapy) on OS following treatment with cetuximab plus chemotherapy or chemotherapy alone.
- For the investigational targeted therapy tepotinib, updated results from the potentially registrational Phase II VISION study showed promising activity in advanced NSCLC patients harboring MET exon 14 skipping mutations detected by liquid biopsy or tissue biopsy.
- Abstracts also showcased the scientific innovation and diversity of our pipeline, with results from a number of high-priority clinical development programs, including tepotinib, bintrafusp alfa and our comprehensive DNA Damage Response (DDR) portfolio.

* The contents of this chapter or section are voluntary and therefore not audited. However, our auditor has read the text critically.

In October, we and Pfizer shared three-year results from Part A of the pivotal Phase II JAVELIN Merkel 200 trial regarding long-term OS and durable responses in patients with previously treated metastatic MCC (mMCC) who received avelumab. In this exploratory analysis, the OS rate at three years was 32%; the median duration of response (DOR) was 40.5 months; and the objective response rate (ORR) was 33.0%, which was unchanged from the one-year analysis. These data were presented at the First International Symposium on Merkel Cell Carcinoma in Tampa, Florida, United States on October 21-22.

In September, we shared important milestones for two combination studies of tepotinib in locally advanced or metastatic NSCLC with epidermal growth factor receptor (EGFR) mutation and select MET dysregulations. These include PFS and OS data from the Phase Ib/II INSIGHT study of tepotinib plus the EGFR inhibitor gefitinib, along with an update stating that the Phase II INSIGHT 2 study of tepotinib plus the tyrosine kinase inhibitor (TKI) osimertinib is now open for enrollment. Tepotinib, discovered in-house at our company, is an investigational oral MET inhibitor that underscores our strategic focus on delivering innovative precision medicines to patients with cancer.

In September, we announced that the FDA granted Breakthrough Therapy Designation (BTD) for tepotinib in patients with metastatic NSCLC harboring MET exon 14 skipping alterations who progressed following platinum-based cancer therapy. This BTD is based on data from the ongoing VISION study (NCT02864992) showing preliminary clinical evidence that tepotinib may offer an improvement over available therapy in patients with metastatic NSCLC harboring MET exon 14 skipping alterations detected by liquid biopsy or tissue biopsy across different lines of treatment.

Also in September, the National Medical Products Administration (NMPA) of China approved Erbitux® for the first-line treatment for patients with RAS wild-type (wt) metastatic colorectal cancer (mCRC) in combination with Folfox or Folfiri, or in combination with irinotecan in patients who are refractory to irinotecan-based chemotherapy. The pivotal Phase III evidence from the TAILOR study, on which the approval was based, shows significant benefit in overall response rate, PFS and OS for patients treated with cetuximab in combination with Folfox, compared to Folfox alone, in the first-line setting for this challenging type of cancer.

At the 2019 European Society for Medical Oncology (ESMO) Congress, September 27 - October 1, in Barcelona, Spain, we presented new data representing several key therapeutic agents from our diverse oncology pipeline, including avelumab data in advanced RCC, cetuximab data in RAS wt mCRC, and our investigational oral MET inhibitor tepotinib in advanced solid tumors. In addition, a number of investigator-sponsored studies (ISS) and collaborative research studies (CRS) exploring our pipeline were also presented.

In early October, the first patient was enrolled in the bintrafusp alfa INTR@PID BTC 055 study (NCT04066491), a Phase II/III, multicenter, randomized, placebo-controlled study of gemcitabine plus cisplatin with or without bintrafusp alfa in patients with 1L biliary tract cancer (BTC). Bintrafusp alfa is our investigational bifunctional fusion protein immunotherapy and currently in clinical development. BTC is a collective term for a group of rare and aggressive gastrointestinal cancers with limited treatment options and poor patient outcomes.

In November, we reported that the Japanese Ministry of Health, Labour and Welfare (MHLW) granted orphan drug designation (ODD) for tepotinib for patients with NSCLC harboring MET gene alterations. The MHLW ODD program is designed to promote research and development of orphan drugs for diseases that affect fewer than 50,000 patients in Japan, and for which significant unmet medical need exists. An investigational drug can qualify for ODD if there is no approved alternative treatment option or if there is an expectation of high efficacy or safety compared to existing treatment options. Drugs receiving ODD qualify for several benefits intended to support development, such as guidance and subsidies for research and development activities from the MHLW, preferential tax treatment, priority consultation for clinical development, and priority review of applications.

In February, we announced a global strategic alliance with GlaxoSmithKline (GSK) to jointly develop and commercialize bintrafusp alfa, including potential registrational studies, for multiple difficult-to-treat cancers. During the year, we achieved our alliance objective of eight trials ongoing or with protocol under development. Our advanced clinical program includes three studies focused on NSCLC, two studies focused on BTC and a study focused on cervical cancer. Our lung cancer studies include a randomized, open-label controlled Phase II study of bintrafusp alfa compared with pembrolizumab as a first-line (1L) treatment in patients with PD-L1 expressing advanced NSCLC (INTR@PID LUNG 037); a Phase II study of bintrafusp alfa with concurrent chemoradiation therapy (cCRT) in unresectable Stage III NSCLC (INTR@PID LUNG 005), and a Phase Ib/II, open-label study of bintrafusp alfa in combination with chemotherapy in participants with Stage IV NSCLC regardless of PD-(L)1 expression status (INTR@PID LUNG 024). Our BTC studies include a phase II, open-label study to evaluate bintrafusp alfa monotherapy in participants with locally advanced or metastatic BTC who failed, or were intolerant to, first line platinum-based chemotherapy (INTR@PID BTC 047), and a phase II/III, multicenter, randomized, placebo-controlled study of gemcitabine plus cisplatin with or without bintrafusp alfa in patients with 1L BTC (INTR@PID BTC 055). In addition to use as a single agent, bintrafusp alfa is also being considered for use in combination with other assets from the pipelines of both companies.

In accordance with the agreement with GSK, we received an upfront payment of € 300 million and is eligible for potential development milestone payments of up to € 500 million triggered by data from the lung cancer program. Our company will also be eligible for further payments of up to € 2.9 billion upon successful achievement of future approval and commercial milestones. The total potential deal value is up to € 3.7 billion. Both companies will jointly conduct development and commercialization. In the event of regulatory approval, net sales will be realized by our company in the United States and by GSK in all other countries, whereas net profits from sales and defined expense components will be shared equally by the alliance partners.

In September, we signed a collaboration and license agreement with Y-Trap Inc. of Baltimore, Maryland, United States for the exclusive development of multiple specific antibody-ligand traps for cancer immunotherapy. The collaboration leverages Y-Trap's proprietary platform of multifunctional antibody-ligand traps for immuno-oncology. The Y-Trap platform exploits combinatorial protein engineering to counteract key determinants of immune dysfunction in the tumor microenvironment. Y-Trap and we will collaborate to explore the pharmacology of Y-Trap multifunctional proteins and we will be responsible for all development, manufacturing and commercialization activities. Under the agreement, we will provide Y-Trap with an upfront payment in addition to milestone payments and royalties based on the achievement of specific pre-clinical, clinical development, regulatory, and commercial milestones.

Neurology & Immunology

Multiple sclerosis (MS) is one of the world's most common neurological disorders. Despite the emergence of a number of therapies in the last two decades, there are still significant unmet needs for MS patients. At the end of March 2019, our MS therapy Mavenclad® (cladribine tablets) was approved in the United States for the treatment of adults with relapsing-remitting multiple sclerosis (RRMS) and active secondary progressive multiple sclerosis (SPMS).

Cladribine tablets have been approved by the FDA as a treatment for RRMS and SPMS that provides two years of proven efficacy with a maximum of 20 days of oral treatment, during a two-year period. Cladribine tablets have demonstrated clinical efficacy across key measures of disease activity, such as annualized relapse rate, disability progression, and magnetic resonance imaging (MRI) activity. We continue to receive regulatory approvals for Mavenclad® around the world. Mavenclad® is now approved in more than 70 countries, including those of the European Union, Australia, Canada and Switzerland.

At the American Academy of Neurology (AAN) 2019 Annual Meeting, May 4–10 in Philadelphia, Pennsylvania, United States, we presented a total of 20 abstracts (18 posters and two platform presentations), including data on Mavenclad®, Rebif® (interferon beta-1a) and evobrutinib.

Key Mavenclad® data included a post-hoc analysis of the CLARITY Extension study to examine the durability of no evidence of disease activity-3 (NEDA-3) in RMS patients receiving cladribine tablets, plus an integrated analysis of pooled long-term safety data of cladribine tablets in patients with MS collated from the CLARITY, CLARITY Extension, ORACLE-MS studies and the PREMIERE registry. We also presented abstracts from the ORACLE-MS study describing the effect of cladribine tablets on early MS, as well as results from studies investigating the biological effects of cladribine tablets to offer further insights on the mode of action.

Key Rebif® data included the results of an investigation into the prevalence of pregnancy outcomes in IFNβ-exposed women from the European Interferon Beta (IFNβ) pregnancy registry and Nordic health study. These data add to the wealth of pregnancy outcome data that have been collected over more than 20 years for Rebif® and other beta interferons.

Key evobrutinib data included new 48-week results of the double-blind, randomized, placebo-controlled, Phase II study in patients with RMS. The new data showed that the effect on T1 gadolinium-enhancing lesions reduction seen at week 12 was maintained through 48 weeks with evobrutinib 75 mg QD and 75 mg BID. The results were simultaneously published in the New England Journal of Medicine.

In July, we shared further new pregnancy outcomes data in women with MS treated with IFNβ, including Rebif®, at the European Academy of Neurology (EAN) 2019 Congress in Oslo, Norway. Results from the largest population-based observational study in women treated with IFNβ who became pregnant showed no increased risk of major congenital anomalies compared to those unexposed. The results are based on Finnish and Swedish health registry data collected between 1996 and 2014.

At the 35th Congress of the European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS) from September 11-13, 2019 in Stockholm, Sweden, we presented 39 abstracts highlighting key data with Mavenclad®, Rebif® and evobrutinib. The data we presented at ECTRIMS include key insights from real-world follow-up of patients from our clinical trials and the post-approval setting for Mavenclad®, further validating it as an important treatment option available to patients in more than 70 countries worldwide. Among the data presented on cladribine tablets were:

- Long-term efficacy data on our oral treatment for MS, showing that 75% of patients from the CLARITY and CLARITY Extension studies exhibited no disability progression at five years post-treatment.
- A retrospective analysis of real-world follow-up data from an Italian MS registry showed that five years after receiving the last dose of our oral treatment, nearly two-thirds of patients (64%) had no disability progression and more than half of the patients (57%) were free of relapse.
- Final results from the PREMIERE safety registry were presented, which allowed for a thorough characterization of the long-term safety profile of cladribine tablets and showed no new safety findings. Furthermore, post-marketing data in the first 8,419 patients treated with cladribine tablets worldwide were consistent with the safety profile seen in the clinical development program, with no increase in incidence of adverse events from original clinical program findings.

We also presented new long-term efficacy data for Rebif® showing no evidence that exposure to our injectable before and during pregnancy in women with MS affected infant birth weight for gestational age and head circumference. These data points expand on safety data presented at recent congresses that suggest exposure to IFNβ does not increase risk of spontaneous abortions or affect other pregnancy outcomes, such as ectopic pregnancies or fetal malformations.

New data on evobrutinib were also presented at ECTRIMS, further elucidating the proposed mechanism of action for this investigational MS therapy, which is the first oral, highly selective Bruton's Tyrosine Kinase (BTK) inhibitor to demonstrate clinical proof of concept in relapsing multiple sclerosis.

In early September, we reported the initiation of two global pivotal Phase III trials (EVOLUTION RMS 1 and 2) studying the efficacy and safety of evobrutinib in adult patients with RMS.

In late September, we announced that the Committee for Medicinal Products for Human Use (CHMP) of the European Medicines Agency (EMA) issued a positive opinion to update the product label of Rebif® to include that women with RMS may continue treatment with Rebif® during pregnancy if clinically needed and while breastfeeding. Treatment with Rebif® while breastfeeding is an important option as many patients experience a relapse in their MS during the first three months following childbirth.

In October, we gave notice that results from FORWARD, a five-year, multicenter Phase II study of sprifermin, a recombinant human fibroblast growth factor-18, in patients with symptomatic radiographic knee osteoarthritis (OA) were published online in the Journal of the American Medical Association (JAMA). Published results, based on the two-year primary outcome and the three-year follow-up analysis from the trial, show statistically significant, dose-dependent increases in total femorotibial joint cartilage thickness compared to both baseline and placebo comparator.

We also announced that we are evaluating external partnership opportunities for our OA portfolio, including sprifermin, with the goal of finding the right partner to advance the development of structurally-modifying treatments to change the course of OA. By pursuing alternative paths to internally driven development, our plan is to further focus our efforts in inflammatory neurology and immunology diseases with potentially overlapping inflammatory mechanisms like MS and systemic lupus erythematosus (SLE).

Fertility

To date, an estimated three million babies have been born with the help of our Fertility portfolio.

The Pergoveris® Pen, a convenient and ready-to-use fertility combination treatment option for women with severe follicle stimulating hormone and luteinizing hormone deficiency, was successfully launched in several countries in Europe, Asia-Pacific and Latin America in 2019. Additional launches in other countries are planned.

Fertility Lab Technologies continued to expand its footprint in Asia-Pacific, successfully launching the fertility lab devices Geri®, Gavi®, Gems®, and Gidget® in Korea and India.

In June, we announced we are working with the Leibniz Institute for Zoo and Wildlife Research (IZW), Berlin, Germany and other research partners to support efforts to save the northern white rhinoceros from extinction.

General Medicine & Endocrinology

Our new formulation of Euthyrox® (levothyroxine) for the treatment of hypothyroidism obtained further regulatory approvals in 2019, resulting in a total of 35 countries where this incremental innovation is registered, allowing for more precise dosing. New launches planned for the coming quarters include the remaining eight EU countries (Portugal and Spain, for example), China, Colombia and two countries in Asia-Pacific (Malaysia and Singapore).

Glucophage®, containing the active ingredient metformin, is now approved in 53 countries for prediabetes when lifestyle intervention is not enough to control the condition. At the 55th Annual Meeting of the European Association for the Study of Diabetes (EASD) in Barcelona, Spain in September, a first-of-its-kind Millennial Advisory Board was held with a new generation of healthcare professionals (HCPs) to discuss treatment paradigms for prediabetes. In Brazil, we successfully launched Glucophage XR 850 dedicated to the prediabetes condition.

We continued to execute our Branded Off-Patent Products (BOPPs) strategy. Toreza® (rosuvastatin) was approved in Chile in July. Toreza® is available in two strengths, 10 mg and 20 mg, offering HCPs an important choice for the treatment of dyslipidemia.

The number of patients taking Saizen® (somatropin) enrolled on Easypod® Connect continued to grow in 2019, reaching almost 21,000 at the end of Q4. Saizen® is our main endocrinology product and is indicated for the treatment of growth hormone deficiency in children and adults, while Easypod® Connect is a unique web-based platform that allows HCPs to monitor their patients' adherence to treatment with real-time injection data collected and transmitted from their Easypod® devices.

The launch of Aluetta®, our new pen for the injection of Saizen®, complements our device portfolio and supports the growth of Saizen® by expanding our business in key geographies like Germany. Aluetta® is currently approved in 20 countries.

Other collaborations

In January, we signed a strategic collaboration agreement with Tencent, a leading provider of Internet services. The collaboration will primarily focus on increasing public disease awareness and providing more accessible healthcare services via digital platforms in China.

In March, we entered a collaboration agreement with Iktos, a French start-up company specialized in the development of artificial intelligence (AI) solutions applied to chemical research. The collaboration will comprise the use of Iktos' generative modeling AI technology to facilitate rapid and cost-effective discovery and design of promising new compounds.

BIOPHARMA PIPELINE

As of: December 31, 2019

Therapeutic area Compound	Indication	Status
Neurology		
Evobrutinib (BTK inhibitor)	Multiple sclerosis	Phase III
Oncology		
Tepotinib (MET kinase inhibitor)	Non-small cell lung cancer, *MET*ex14 skipping[4]	Registration
Tepotinib (MET kinase inhibitor)	Non-small cell lung cancer	Phase II
Peposertib (M3814) (DNA-PK inhibitor)	Rectal cancer	Phase II
M3258 (LMP7 inhibitor)	Multiple myeloma	Phase I
Peposertib (M3814) (DNA-PK inhibitor)	Solid tumors[1]	Phase I
M4344 (ATR inhibitor)	Solid tumors	Phase I
M6620 (ATR inhibitor)	Solid tumors	Phase I
M8891 (MetAP2 inhibitor)	Solid tumors	Phase I
Immuno-Oncology		
Avelumab (anti-PD-L1 mAb)	Renal cell cancer, 1st line[5]	Registration
Avelumab (anti-PD-L1 mAb)	Non-small cell lung cancer, 1st line	Phase III
Avelumab (anti-PD-L1 mAb)	Urothelial cancer, 1st line maintenance	Phase III
Avelumab (anti-PD-L1 mAb)	Locally advanced head and neck cancer	Phase III
Abituzumab (pan-αv integrin inhibiting mAb)	Colorectal cancer, 1st line	Phase II
Avelumab (anti-PD-L1 mAb)	Merkel cell cancer, 1st line	Phase II
Avelumab (anti-PD-L1 mAb)	Solid tumors[2]	Phase II
Avelumab (anti-PD-L1 mAb)	Non-small cell lung cancer[2]	Phase II
Avelumab (anti-PD-L1 mAb)	Urothelial cancer[2]	Phase II
Bintrafusp alfa (TGFbeta trap / anti-PD-L1)	Non-small cell lung cancer, 1st line	Phase II
Bintrafusp alfa (TGFbeta trap / anti-PD-L1)	Non-small cell lung cancer, 1st and 2nd line	Phase II
Bintrafusp alfa (TGFbeta trap / anti-PD-L1)	Locally advanced non-small cell lung cancer	Phase II
Bintrafusp alfa (TGFbeta trap / anti-PD-L1)	Biliary tract cancer, 1st line	Phase II
Bintrafusp alfa (TGFbeta trap / anti-PD-L1)	Biliary tract cancer, 2nd line	Phase II
Avelumab (anti-PD-L1 mAb)	Solid tumors	Phase I
Bintrafusp alfa (TGFbeta trap / anti-PD-L1)	Solid tumors	Phase I
M9241 (NHS-IL12, cancer immunotherapy)	Solid tumors[1]	Phase I

Footnotes on next page

BIOPHARMA PIPELINE

As of: December 31, 2019

Therapeutic area Compound	Indication	Status
Immunology		
Atacicept (anti-BLyS / anti-APRIL fusion protein)	Systemic lupus erythematosus	Phase II
Atacicept (anti-BLyS / anti-APRIL fusion protein)	IgA nephropathy	Phase II
Evobrutinib (BTK inhibitor)	Rheumatoid arthritis	Phase II
Evobrutinib (BTK inhibitor)	Systemic lupus erythematosus	Phase II
Sprifermin (fibroblast growth factor 18)	Osteoarthritis	Phase II
M1095 (ALX-0761, anti-IL-17 A/F nanobody)[3]	Psoriasis	Phase II
M5049 (TLR7/8 antagonist)	Immunology	Phase I
M6495 (anti-ADAMTS-5 nanobody)	Osteoarthritis	Phase I
Global Health		
M5717 (PeEF2 inhibitor)	Malaria	Phase I

More information on the ongoing clinical trials can be found at www.clinicaltrials.gov. Pipeline products are under clinical investigation and have not been proven to be safe and effective. There is no guarantee any product will be approved in the sought-after indication.

[1] Includes studies in combination with avelumab.

[2] Avelumab combination studies with talazoparib, axitinib, ALK inhibitors, cetuximab or chemotherapy.

[3] As announced on March 30, 2017 in an agreement with Avillion, anti-IL-17 A/F nanobody will be developed by Avillion for plaque psoriasis and commercialized by our company.

[4] In Q4 2019, tepotinib was filed in Japan for the treatment of patients with non-small cell lung cancer harboring *MET*ex14 skipping.

[5] On December 20, 2019, avelumab in combination with axitinib was approved in Japan for treatment of patients with curatively unresectable or metastatic renal cell carcinoma.

ADAMTS-5: A disintegrin and metalloproteinase with thrombospondin motifs
APRIL: A proliferation-inducing ligand
ATR: Ataxia telangiectasia and Rad3-related kinase
BLyS: B-lymphocyte stimulator
BTK: Bruton's tyrosine kinase
IgA: Immunoglobulin A
IL: Interleukin
mAb: Monoclonal antibody
MetAP2: Methionine aminopeptidase 2
METex14: MET exon 14
MET: MET proto-oncogene, receptor tyrosine kinase
PD-L1: Programmed cell death ligand 1
PeEF2: Plasmodium eukaryotic elongation factor 2
PK: Protein kinase
TGFbeta: Transforming growth factor beta
TLR7/8: Toll-like receptors 7 and 8

Allergopharma

Allergopharma is a leading manufacturer of diagnostics and prescription drugs for allergen immunotherapy. As scientists, we are determined to fully understand allergies so as to be optimally positioned to discover new solutions and therapeutic concepts. In close cooperation with research institutions and other experts around the world, we are constantly acquiring valuable insights into the complex immunological mechanisms responsible for allergy development. Equipped with these insights, we pursue new pathways to innovative treatments to meet the needs of allergy patients now and in the future.

Life Science*

Across our three business units of Research Solutions, Process Solutions and Applied Solutions, our R&D teams of more than 2,000 employees continue to bring a diversified and relevant portfolio of products and services to our customers around the world. In 2019, our Life Science business sector focused on delivering the promise of accelerating access to health for people everywhere with investment in collaboration with the global scientific community.

As such, we launched more than 18,500 products, including those launched through our "faucet program" for antibodies, reference materials, chemicals and nanomaterials. These included innovations from all our business units, such as ZooMAb® recombinant antibodies, Sucrose Ultrafiltrated, a Millipak® Final Fill extension and a Stericup® extension of our Milli-Q® 7000 line.

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Advancing CRISPR technology globally

In early 2019, we received our first United States patent for proxy-CRISPR technology. The patent addresses a new genome-editing technique that makes CRISPR more efficient, flexible, and specific by opening the genome for modification of DNA. This technique helps scientists modify difficult-to-access regions on the genome.

In April, we were formally granted a Canadian patent for the use of paired CRISPR nickases in eukaryotic cells. Covering paired Cas9 nickase technology, the patent advances gene therapy and research as well as reducing off-target effects. It provides an important and specific solution for scientists who need accurate methods when developing treatments for difficult-to-treat diseases, improving the ability to fix diseased genes without affecting healthy ones. Similar patents were granted in Australia and Europe in late 2018.

Life Science was granted seven additional patents for genome-editing technology in August, adding CRISPR patents in Europe, Israel, South Korea and the United Kingdom. The European Patent Office allowed patents for vectors for CRISPR integration, proxy-CRISPR technology, and engineered Ribonucleic Acid (RNA)-guided endonuclease and protein-RNA complexes. The Israeli and South Korean IP Offices allowed patents for paired nickase technology, while the United Kingdom Office allowed patents for proxy-CRISPR technology.

In November, we again were granted patents covering paired Cas9 nickase CRISPR genome-editing technology, this time from the Japan Patent Office and the Intellectual Property Office of Singapore. This technology increases specificity, reducing off-target effects in gene editing through a highly flexible and efficient approach. In total, we have achieved 22 CRISPR patents across nine markets, including China and Europe.

Furthermore, we announced an agreement with the Massachusetts-based Broad Institute of MIT and Harvard to offer non-exclusive licenses to CRISPR intellectual property (IP) under our respective control for use in research and commercial product development. The offering streamlines access for scientists, contributing to our goal of allowing all entities to apply CRISPR technology with a wider range of tools.

To complete an active year advancing and licensing the IP of our CRISPR technology, in November, we executed an agreement to license our CRISPR IP to Evotec SE of Hamburg, Germany. The license accelerates research and enables testing and development of new drugs.

In addition to patent allowances, we expanded our global network of genome-editing experts by announcing a CRISPR core partnership with Zhejiang University in Hangzhou, China. The CRISPR Core Partnership Program provides researchers from leading institutions with a network of commercial and research scientists stemming from its 80-some partners.

Increasing collaboration with partnerships and agreements

Along with our CRISPR partnerships and agreements, we signed a Memorandum of Understanding (MoU) with Chinese biotech company GenScript in March of 2019. The planned alliance aims to accelerate cell and gene therapy industrialization in China by collaborating to build a global standard platform for plasmid and virus manufacturing. Today, more than 130 companies in China are developing cell and gene therapies. The confluence of demand, growth, and consequent need to scale the cell and gene therapy market is an important driver for us to deliver in this region.

We signed a non-binding MoU with Phanes Therapeutics Inc. of Shanghai, China to collaborate on the development of biologics for the treatment of solid tumors. This allows us to support Phanes in accelerating research and development as well as commercializing new therapies as their demand increases for process development solutions. Under the terms of the MoU, we plan on providing Phanes our BioReliance® End-to-End Solutions for cell line development, process development, and GMP manufacturing up to commercialization.

In April, we announced a partnership with India's Food Safety and Standards Authority (FSSAI) on food safety skill development, handing over a fully equipped microbiological testing lab. There, food safety scientists from government labs and FSSAI-ratified private labs will be trained by the Center for Microbiological Analysis Training on the latest microbiological testing technology.

In May, we joined the TRANSVAC2 Program to participate in the collaboration to accelerate vaccine development and manufacturing under the European Union's (EU) Horizon 2020 program. As part of our participation, we provided training sessions at our M Lab™ Collaboration Center in Molsheim, France, tapping into our internal manufacturing expertise and process knowledge in viral vaccines and vectors.

Expanding our portfolio and accessibility to benefit customers

Throughout 2019, we launched innovations across all segments of our portfolio from the Research Solutions, Process Solutions, and Applied Solutions business units. Those included Trehalose Emprove® Expert, a broadly used stabilizer in lyophilization (freeze drying) of biomolecules; recombinant Cas9 and eCas9 GFP fusion proteins, offering all the advantages of ribonucleoprotein-based (RNP) genome editing; and a new formulation of modified Tryptic Soy Broth (mTSB), an enrichment broth for the detection of Salmonella, E. coli O157 and non-O157 STEC from food and animal feed.

In March, we launched our new, cloud-based lab water service and monitoring capability: Milli-Q® Connect. The product combines deep water purification expertise with cloud-based digital technology to allow users to monitor lab performance remotely and securely. Available on all Milli-Q® CLX 7000 clinical water purification systems, the portfolio addition delivers the value of convenience to our customers via remote diagnostics and assistance features. In September, we again advanced the Milli-Q® product portfolio with the launch of Milli-Q® IQ Element. This portfolio addition is a water purification and dispensing unit that provides our customers with ultrapure water tailored for trace elemental analysis.

Additional novel digital offerings launched in 2019 include our Supelco® SmartTitrants and Supelco® SmartStandards. These tools leverage SmartChemicals Radio Frequency Identification (RFID) tags on our titration consumables, allowing seamless transfer of relevant product data to titration instruments. The technology saves time, reduces transcription errors and ensures maximum data integrity for our customers.

In April 2019, we launched our BioContinuum™ Buffer Delivery Platform, a first-of-its kind integrated solution for streamlined buffer management. Used for continuous processing and in batch mode, this configurable platform is comprised of four components: a selection of distinct buffer concentrates, reliably delivered in Mobius® Select single-use assemblies, and an automated, highly accurate, and precise buffer dilution system with tailored system services.

We also launched Cyrene™, a sustainable dipolar aprotic solvent produced in two steps from a renewable cellulose source. The bio-derived alternative reflects our focus on green chemistry and the need for solvents to meet stricter regulation requirements for both employee safety and environmental sustainability.

Over the course of 2019, we expanded our portfolio with acquisitions in addition to our own product launches, adding to our breadth of tools and technology. With the acquisition of BSSN Software of Darmstadt, Germany, which we announced in August, we added marketing data management and integrated software that unifies data from instruments and data systems to make it available for analyzing, processing, and sharing. The middleware offering collects and converts scientific data from a broad range of more than 200 lab instrument models into a single, unified format.

In October, we acquired FloDesign Sonics of Wilbraham, Massachusetts, United States, to leverage their acoustic cell processing platform. The addition allows enhanced cell washing and concentration for manufacturing cell therapies.

We remain conscious of ensuring ease of access to our broad product portfolio. In addition to our industry-leading e-commerce website, www.sigmaaldrich.com, we launched our official flagship store on Alibaba’s 1688.com in China. We became the first life science business to do so, improving the e-commerce experience for our customers in China. The launch also allows us to leverage Alibaba’s leading technology in big data, cloud services, and artificial intelligence, as well as its digitalized operations and offline channel capabilities.

Recognized for award-winning innovation

To begin the year, Life Science won BioInformatics LLC's 2018 Life Science Industry Award® for best use of social media. Recognized for our strategic use of social media platforms, we were selected for our engagement with scientific customers and industry peers as well as the satisfaction and loyalty of our customers. The award speaks to our dedication to our stakeholders and their experience with our company.

In April, our Pellicon® Capsule with Ultracel® Membrane, an innovation in next-generation bioprocessing, won an INTERPHEX Exhibitor Award for Best New Product. This first-of-its-kind product acts as a single-use tangential flow filtration capsule used in antibody drug conjugate (ADC) and monoclonal antibody (mAb) bioprocessing. That same month and coinciding with the launch of our new Supelco® products, Supelco® founders Dr. Walter Supina and Mr. Nicholas Pelick received the prestigious 2019 Pittcon Heritage Award for their contributions to the instrumentation and laboratory supplies community.

In November of 2019, Life Science won an R&D 100 Award for our Eshmuno® CP-FT Chromatography Resin. This first-to-market product used in biopharmaceutical manufacturing received the prestigious award to recognize its status as one of the 100 most innovative and significant technologies introduced in 2019. This tool removes aggregates, delivering capacities 10 times higher than traditional bind/elute chromatography. Part of our BioContinuum™ Polishing Platform, the significant reduction in resin and buffer volume results in a smaller manufacturing footprint as well as lower costs.

Through our Advance Biotech Grant Program, we announced 12 total grant recipients for 2019, selected based on the scientific and societal merit of their respective therapies in development, as well as process challenges and expertise gaps.

Performance Materials*

Within our Performance Materials business sector, we are the market and technology leader in most of our industries. As a science and technology company, we offer leading-edge products and solutions that in many cases set us apart from the competition. In order to bring our R&D closer to our businesses and reflect our new organizational structure after the acquisition of Intermolecular and Versum Materials, we transferred our research activities of Early Research & Business Development to our business units. We have also set up a Chief Technology Office (CTO) that bundles important technology competencies and technology scouting. As a dedicated technology organization, the CTO focuses on interacting with top-level customers and the electronics industry, managing research partnerships, shaping our technology roadmap and managing our long-term R&D portfolio.

Semiconductor Solutions

With the additions of Versum Materials and Intermolecular, we are now more capable than ever of addressing all our customers' critical material needs through every step of the wafer manufacturing process. The outstanding capabilities and competencies of the businesses are manifold and will enable us to bring game-changing innovations for our customers into the market faster.

Despite the market experiencing a flat year in the semiconductor space, our R&D teams were busier than ever, taking advantage of the increased bandwidth our customers had for their own product development activities – which is often the case during periods of reduced manufacturing demand. In the logic/foundry space we continue to focus on 3D transistor technology and to interconnect improvements to drive performance, size, and power efficiency. In the memory segment, there is a drive to increase the number of levels in vertical and 3D NAND architectures to enable even higher memory capacities, and in DRAM (dynamic random-access memory), continuing node shrinkage drives density, speed and reliability. This translates into adoption of more new materials and higher volume requirements for our products in the future. Enhanced technological competence in combination with a strengthened supply chain resulting from the acquisition of Versum Materials and Intermolecular will contribute to this growth.

We were successful this year in broadening our portfolio of high-value products for both advanced memory and logic applications. Our pathfinding teams are developing next-generation precursors and processes for flowable CVD (chemical vapor deposition) gap fill applications, high aspect ratio etching, and area selective deposition. In the patterning space, our R&D is expanding the DSA (directed self-assembly) pipeline with several customized solutions for additional applications. We continue to see a strong pull for our high-performance dielectric (HPD) series advanced colloidal ceria slurries for oxide/shallow trench isolation (STI) applications as a result of their demonstrated industry-leading low defectivity, extremely high uniformity, broad operating window, and polishing efficiency. Our conductive paste materials adopted a solutions-focused approach to create high-value products for our customers that go beyond just materials. The unique attributes of our conductive pastes plus novel packaging fabrication techniques, developed by our engineering team, enable packaging architectures needed for the enormous 5G infrastructure deployment.

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With respect to our Delivery Systems & Services (DS&S) business, we completed the manufacture and installation of ISO Bulk Specialty Gas Systems (ISO-BSGS) at two new fabs for a customer in Xi'an, China, and another project near Pyeongtaek, Korea. ISO-BSGS systems provide the safe and efficient factory-level distribution of bulk container specialty gases, such as NF_3, N_2O, NH_3, and SiH_4, and are key enablers of our Specialty Gases business.

To better support our customers in Asia, we opened a new manufacturing facility in Shanghai, China, to produce our latest specialty gas delivery equipment product line, GasSTAR®. Both the GasSTAR cabinet and BSGS enable semiconductor manufacturers in Asia to meet the rising demand for 200 and 300-mm memory and logic devices, flat panel displays, photovoltaics, LEDs, and other applications.

In 2019, we also introduced CHEMGUARD® CG350, which heats process molecules in a safe, process-stable manner and provides the reliable uptime needed for high-volume manufacturing.

Display Solutions

In our Display Solutions business unit, our liquid crystal technology UB-FFS (ultra-brightness fringe-field switching) continues its successful growth, thanks to new product qualifications and rising demand in the liquid crystal displays (LCD) sector for mobile devices, especially mobile phones and tablet PCs. The development of high-resolution 4K and 8K TV sets continues to pose a challenge, as the LCD backlight transmission and efficiency will be reduced due to higher pixel density. We are therefore actively working to expand our ultra-bright (UB) technology offering with our UBplus liquid crystal materials for the TV market. With such technologies, we increase the light transmission efficiency of applications for large-format TV sets and display panels by 10% to 15%.

Our VA (vertical alignment) liquid crystal platform including PS-VA (polymer-stabilized vertical alignment) technology remains predominant when it comes to large-format TV sets. Here, our latest materials provide additional performance benefits and improve processing efficiency in the production of TV sets. Moreover, we have successfully demonstrated our manufacturing expertise with respect to the new liquid crystal technology SA-VA (self-aligned vertical alignment). We are now focusing our attention on applications for specialized display products from the premium segment through to TV applications produced in large numbers, as this technology offers the high contrast and image quality of the PS-VA technology while also enabling improvements in display design and panel production, for example through the reduction of waste and energy consumption in the production of LCDs.

OLED technology continues to gain shares in the display market, particularly in the premium segment. Our R&D activities are covering a broad variety of OLED materials, targeting a wide range of applications from smartphones to TVs. We continue to be successfully qualified in a number of upcoming devices from leading consumer electronics players. In addition, we are supporting our customers in their ambition to establish inkjet printing as a new OLED display manufacturing process.

Surface Solutions

In our automotive pigments business, our focus on developing achromatic pigments continues. The latest example is Xirallic NXT Amur Black, a blue-black effect pigment with a silky-silvery fine texture and a wealth of Living Sparkle®. Another key topic in our development is fueled by the evolution of autonomous driving. In our pipeline, we address the special requirements that radar and lidar sensor applications demand of coating pigments.

Completing the Smart Effects initiative in our Cosmetics business, we are further driving the development of cosmetic pigments on matte effects (Allure series) and luster effects (Lights series). The newest additions will be the blue interference effect pigments Ronastar® Blue Lights and Ronastar® Dazzling Lights, a new gold pigment with a spectacular body color. In addition, we further drove the development of active ingredients of natural origin for new cosmetics solutions. We are currently in the process of preparing for the product launches in 2020.

People*

"Bring Your Curiosity to Life" – our promise as an employer describes how we collaborate, how we advance our business, how our employees can develop within the company, and who we are. Becoming a global science and technology company would not have been possible without the passion, creativity, and curiosity of our employees. And we are certain that our current and future employees ensure our economic success. They create innovations for patients and customers, and they secure our ability to compete. For this reason, the development of all our employees is very important to us. In short, we are working to create an environment where people are able to develop and reach their full potential.

A career with Merck KGaA, Darmstadt, Germany, is enriching – both professionally and personally. We offer conditions that meet the individual needs of our employees and encompass an exciting range of tasks and advanced training possibilities, furthering flexible forms of cooperation and a culture of mutual esteem and respect. The latter is particularly important, as our workforce represents a broad range of nationalities, cultures, religions, and age groups, as well as a variety of personal and professional backgrounds. We are convinced that this diversity, paired with a corporate culture based on mutual respect, strengthens our innovative potential and contributes to our success.

Overview of our headcount figures

As of December 31, 2019, we had 57,071 employees worldwide[1] (2018: 51,749). In 2019, we were represented by a total of 222 legal entities with employees in 66 countries[2].

DISTRIBUTION OF EMPLOYEES

by Region

[1] With the completion of the acquisition of Versum Materials on October 7, 2019, around 2,300 employees joined Merck KGaA, Darmstadt, Germany.

[2] The Group also has employees at sites that are not fully consolidated subsidiaries. These figures refer to all people directly employed by the Group and therefore may deviate from figures in the financial section of this report.

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Building empowered leaders

Good leaders are key to the success of not only our employees, but also our company. Because they provide our talent with the right framework to unleash their potential and generate new ideas, we highly value the continuing education and development of our managers.

Strategic competency development

A transparent competency model is the pillar of our personnel development efforts. Managers and employees should show strategic competence by being purposeful, future-oriented, innovative, results-driven, collaborative, and empowering. By demonstrating these qualities, our managers can build a strong culture of collaboration based on curiosity, creativity, and trust. In addition, our leaders are expected to set an example by living our company values and taking responsibility for their own decisions. Based on this competency model, we have defined six leadership behaviors that summarize the conduct we expect from our leaders. To assess the performance and potential of every individual and to establish an effective leadership culture, regular and differentiated feedback is also of great importance. In this way, employees and supervisors can develop a shared vision, execute the business strategy and further develop a unifying corporate culture.

Management programs for executives

In recent years, we have initiated three programs to enhance the skills of our people managers. The Managerial Foundation Program imparts the basics of leadership, such as communication techniques, leadership styles, conflict management, motivation, and emotional intelligence. The Advanced Management Program covers topics such as change management, self-reflection, and resilience. The third initiative is our Global Leadership program, which focuses on competencies needed to ensure successful international collaboration.

For the past 20 years, we have been partnering with top international universities to offer the our Company University program. Over a period of around a year, senior executives take classes on management techniques and strategic business development. To date, a total of 480 executives have completed this program.

Another initiative we have been offering our up-and-coming leaders since the 1990s is our International Management Program, where participants work on an interdisciplinary project over a period of eight months. The results are then presented to the Executive Board. In 2019, 25 of our employees took part in this program.

In addition to these various programs, we partner with universities across the globe to enable our employees to obtain qualifications such as an Executive MBA.

In growth markets, we offer management programs specifically for local people managers, which focus on business management and Group-specific topics. We have implemented Growth Markets Management Programs in China and the Middle East, for instance.

Diversity and management

In order to manage our global and diverse organization, we need managers who can build international teams and promote international collaboration so as to contribute to a productive and flexible working environment. We seek managers whose inclusive leadership style also reflects different employee and customer traits. This opens up career opportunities for talented employees from all areas of our company and ensures a broad experience base as well as differentiated decision-making.

At our company, many teams work across sites and internationally. The diversity of competencies and experiences among the team members offers tremendous potential that our leaders can use. Internationality and a global mindset characterize our company culture and are therefore mirrored by our international management team. In 2019, 64% of our executives were not German citizens. Altogether, 73 different nationalities are represented in such positions.

At the end of 2019, women occupied 33% of leadership roles Group-wide, which means that once again we exceeded our goal of maintaining the proportion of women leaders at a stable level of 30% by 2021. At the same time, we developed goals and measures to ensure a balance of men and women when filling vacancies at the different levels of our businesses. We already have a stronger female presence in leadership programs. In addition, we have introduced processes to reduce unconscious bias, thus supporting female candidates when vacancies are being filled. Our flexible working models and unconscious bias training are also helping to increase the percentage of women in the Group.

The report on stipulations to promote the proportion of women in leadership positions at Merck KGaA, Darmstadt, Germany, pursuant to section 76 (4) and section 111 (5) of the German Stock Corporation Act (AktG), can be found in the Corporate Governance section of this report.

Leveraging the opportunities of digitalization

The digital transformation has been leaving its mark on the world of work for a long time now. New, agile ways of working and artificial intelligence (AI) are thus increasingly gaining ground, a shift we are actively supporting. For example, since 2017 we have been developing an intelligent humanoid robot in collaboration with Darmstadt Technical University. We aim to find out how people respond to intelligent robots and AI in the workplace and in which areas they could be used. Another goal is to prepare our executives and staff for the introduction of AI in the working environment. Furthermore, the study is intended to make new technologies hands-on so as to create acceptance of them early on.

Using such big data applications developed by our People Analytics HR unit, leaders obtain rapid, specific answers to HR-related questions. Besides consolidating conventional master data, this software also collects information on compensation, performance, and potential, along with information on engagement and succession planning, interconnecting this data in meaningful ways and allowing trends to be identified at an early stage. Managers thus have access to an extensive trove of data that they may utilize as long as they comply with data privacy regulations.

Digitalization is also impacting our vocational training and continuing education programs, where IT skills are becoming increasingly crucial. At the same time, digital media is creating new ways of learning, which is why we are increasingly integrating 3D printing, big data, and artificial intelligence into our curricula. Moreover, we are testing out novel learning and innovation methods such as Scrum and Design Thinking. To learn how to operate plants and machinery, our apprentices also utilize virtual reality environments, initially learning how to operate the machinery through the virtual image before developing the corresponding expertise in real environments.

Furthering and asking more of talent

We believe that curiosity can make great things happen. We therefore seek to provide an environment that gives our employees plenty of scope for creativity and awakens their desire to innovate. In particular, training and career development plays a key role in attracting and retaining people. Focusing on their individual strengths, aspirations, and skills, we support their personal and professional development, thereby laying the groundwork for an enriching and challenging career with our company. We endeavor to discover qualified employees at an early stage in their career and develop their talents.

A holistic recruitment approach

When filling job vacancies, we pursue a holistic recruitment approach coupled with globally uniform and binding procedures. This starts with an internal job posting before external channels such as job portals and recruitment agencies are used. This process enables us to offer employees better development opportunities. For employees with leadership responsibility, we offer targeted interview coaching to support them in selecting candidates and to establish uniform quality standards.

A globally accessible welcome portal is available to new employees in order to help them prepare for their new job at Merck KGaA, Darmstadt, Germany, and to support their onboarding phase. To further improve the onboarding process, supervisors, Human Resources, and new employees can exchange information and documents before their first day of work. In addition, all new employees are assigned an experienced colleague who can help them familiarize themselves with the daily work routine. Our managers are also given detailed information such as onboarding plans and process descriptions to support them with this task.

Vocational training to recruit young people

In 2019, we again maintained a constant, high vocational training rate in Darmstadt, our largest site. A total of 552 young people were enrolled in vocational training in 25 different occupations at our headquarters in the reporting period. We give unlimited employment contracts to all employees in vocational training who work in occupations for which we have sustainable demand. On average, the post-vocational training hiring rate – taking voluntary terminations into account – was more than 90% over the past five years. We also offer vocational training at other sites in Germany, in which a total of 589 young employees participated. We promote the professional and social expertise of our employees in vocational training through numerous regional and global project activities.

In Darmstadt, through our "Start in die Ausbildung" (Starting Vocational Training) program, we help prepare young people who have a school-leaving qualification but have been searching for a vocational training position for at least one year without success. At our company, they complete an 11-month program, gain insights into working life, and become ready for vocational training. The number of interns remained stable year-on-year, with 20 participants aged between 16 and 25 years.

Since 2016, we have also been working on a specially developed program to help refugees enter the job market. As part of the Integrating Refugees through Training" program, a further group of ten young people who were forced to flee their home countries started language, technical, cultural, and career-related training in 2019 to prepare them for vocational training and thus for the labor market.

Targeted advanced training and maximizing performance capability

Our focus on systematic personnel development allows us to sustainably strengthen the performance potential within our company and to increase the motivation of our people. Only by expanding the abilities of each individual can we count on innovative and curious employees and managers in the future and flexibly respond to different requirements.

Employee development at our company is founded on regular exchanges and a culture in which employees aspire to high levels of performance and engagement. As the basis for internal strategic talent management, the performance and potential management process is globally aligned for all employees in accordance with the same principles and is part of a shared IT system. We systematically combine talent recognition with performance assessments based on employee target agreements, as we are convinced that ongoing feedback helps all employees to grow in terms of their performance and potential. Regular individual assessments permit us to more readily identify high-potential employees and to further them accordingly. Clear objectives, differentiated and open feedback, and individual development plans are thus important prerequisites for both the personal development of every individual and the success of the company.

Furthermore, we have continued "Our Science Network" project. Due to the broad positioning of our company, we do not have a central research and development organization that unites expertise across our businesses. Through this project, we are promoting the establishment of a science community within the company to accelerate the exchange of innovative ideas and facilitate collaboration among all our R&D employees. One element of this project are the Continuous Performance Dialogues between 1,300 employees and their supervisors to align performance and potential appraisals with research and development needs. Other aspects focus on the advanced training of experts and their career paths and on the transfer of knowledge within the network.

Global classroom training courses and workshops developed specifically for teams help our employees develop and build individual abilities in line with new requirements and perspectives. In 2019, more than 11,200 employees participated. Digital solutions in the form of more than 2,900 e-learning and language courses are available to our employees. To enable our employees and managers to realize their full potential, we also provide local business and function-related offers. All measures are documented in a globally standardized development plan. Individual development opportunities are also supported by our job architecture, which applies globally and enables us to harmonize all positions and simplify their classification. This job architecture defines three fundamental career types: managers, experts, and project managers. They are all equal. Employees who wish to advance in their careers and aim for a top position within the company can also do so via the expert and project manager career paths.

A transparent and flexible employee reward system

At our company, we reward the performance of every individual through appropriate and competitive total compensation. For years, we have been achieving this through global processes and programs that are supported by digital platforms. We also offer our managers flexible, market and needs-oriented compensation tools. These support well-informed decisions and thus provide comprehensible, performance and position-based compensation. Apart from monetary compensation components, we also offer our employees attractive fringe and social benefits. Our fringe benefits feature globally under the internal benefits4me brand. Its offerings comprise three pillars:

- Company benefits including a company pension
- Health and well-being
- Service offers

Specific benefit packages are in place at a national level to meet the different needs of our employees using well-established management mechanisms. Focusing more closely on individualized fringe and social benefits in the future will continue to enable our employees to individually choose those benefits that best meet their personal situation and stage of life.

Valuing diversity and dialogue

We are a global science and technology company. At our company people work together closely – regardless of their gender and gender identity, skin color, religion or creed, age, disability status, country of origin, ancestry, nationality, family situation or marital status, military or veteran status, genetic information, and sexual orientation. All bring their specialist backgrounds, individual life experiences, and outlook to the company. We firmly believe that a diverse workforce and a respectful corporate culture are indispensable for our Group's ability to innovate and contribute significantly to our business success.

Our diversity strategy

Our Chief Diversity Officer is responsible for overseeing our Group's diversity strategy. Consisting of executives from all our business sectors and select Group functions, our Diversity Council specifically works on the further implementation of our diversity strategy. This focuses on two areas. First, we aim to promote the advancement of women into leadership positions and give talented people from the Asian region greater opportunities. Second, we aim to develop a better understanding of this growth market. However, our other goals remain unchanged: We aim to recruit people representing a breadth of qualifications, skills, and experiences. In addition, we support specific employee networks in order to foster exchange among like-minded individuals. Apart from our women's networks in various countries, we also support networks that promote the interests of the LGBTQI (lesbian, gay, bisexual, trans, queer or questioning, intersex) community as well as African American and international employees. Our Carer network brings together employees from all over the world who care for a relative.

Furthermore, we create awareness of unconscious bias throughout the Group. We help executives to identify and reassess unconscious thought patterns in their daily encounters as well as in decision-making processes and to bring about long-term changes in their own behavior in this regard. We also use the Job Analyzer, an online tool that allows job advertisements to be checked for critical wordings prior to their publication, thus fostering gender-neutral communication with those applying for jobs.

In Germany, we signed the Charta der Vielfalt (Diversity Charter) in 2013, the Charta der Gleichstellung (Equal Opportunity Charter) in 2015, and the Inclusion Action Plan of the German Mining, Chemical, and Energy Industrial Union (IG BCE) in 2017. At the international level, we support the Women Empowerment Principles, an initiative of UN Women and the UN Global Compact aimed at empowering women in the workplace. In 2019, we also joined the Business Coalition for Equality Act, a group of leading U.S. employers that support the Equality Act. By joining these initiatives, we underscore our commitment to fairness and tolerance in the workplace.

Different aspects of diversity

As a global employer with intercultural expertise, people from a total of 139 nations work for our company; 22% of our employees are German citizens and 76% of our employees work outside Germany. At our headquarters in Darmstadt, 11% of staff are not German citizens.

Women currently make up 43% of our workforce. However, the ratio of women to men varies widely across the different regions, businesses, and functions. We are therefore working to raise the proportion of women wherever they are underrepresented, taking into account the situation typical for the industry as well as regional differences.

Demographic change is posing challenges to society in Germany as well as several other EU countries, the United States, China, and Japan. The average age of our employees is approximately 42. We assume that this figure will continue to rise in the coming years and are preparing for this situation. As part of our range of Health and Well-Being offerings, we specifically promote our employees' physical and psychological well-being throughout their entire career.

Understanding our employees

We want to create a working environment that empowers our employees to think outside of the box and find new solutions, opening the door to creative ideas and the discovery of new market opportunities. In order to promote this and to allow us to carry out even better comparisons both within the company and with our competitors, we conduct Group-wide employee engagement surveys every year. In this way, we ensure a regular exchange between employees, leaders, and senior management. The honest feedback we receive from staff shows us whether the measures and initiatives specified here are successful and highlights areas where we can improve further.

In October and November 2019, the global employee engagement survey was again conducted in 22 languages and the status of implementation reviewed. Around 47,000 employees (88%) took part. Our Group-wide score, which indicates how attached our employees feel to the company, was 74%. The survey methodology was fundamentally changed in 2019, which means that this year's result is not comparable with the results for previous years.

These surveys are supplemented by smaller snapshot surveys, where employees are asked about selected strategic issues or projects. The results are used to identify strategic focus areas, and they feed into the company-wide work on an ongoing basis.

Differentiated solutions to support employee well-being

As an employer, we take responsibility for the well-being of our people and offer a wide range of opportunities to optimize work-life balance and protect their health and safety.

Fostering work-life balance

We know that people's priorities in life can change and we take this into account, for example by offering flexible working time/location models, working time accounts for early retirement, and the possibility of taking an extended break from work. We also place great emphasis on family life. Here our commitment ranges from parental leave to childcare as well as support of employees caring for a relative.

Our employees can choose between different flexible working models. For instance, at our German sites in Darmstadt and Gernsheim as well as in Australia and many countries in Asia and Europe, we offer a model we developed ourselves. The Mywork at Merck KGaA, Darmstadt, Germany, working model allows employees to freely choose their working hours and location in agreement with their teams and supervisors. Employees agree with their direct supervisors on when and how often all team members are required to be in the office. Time tracking and time control are no longer required. The model reinforces our company's performance culture and culture of trust. Workplace permitting, the model can be taken up both by employees formally covered by collective agreements and employees exempt from them. Over the coming years, Mywork at Merck KGaA, Darmstadt, Germany, will be rolled out across the company. The model is currently being implemented in Brazil, China, Colombia, Ecuador, France, Guatemala, Italy, Korea, Mexico, Spain, Switzerland, the United Kingdom, and the United States. At the end of 2019, a total of 5,990 employees in Germany made use of this model. In 2019, 5% of our employees worldwide worked part-time, 17% of whom are men.

By offering information, advice, and assistance in finding childcare and nursing care as well as home and garden services, we help employees to reconcile the demands of their professional and personal lives. At various sites, employees benefit from childcare options that we subsidize. For example, for over 50 years, our headquarters in Darmstadt has featured a daycare center that offers 150 slots in crèche, kindergarten, and after-school care. The Parents at Merck KGaA, Darmstadt, Germany, program makes it easier for our employees to return to work following parental leave, giving mothers and fathers on parental leave the chance to talk and interact while also helping them keep in touch with the company. Moreover, they can make use of our various training and networking opportunities. We have established a similar program in the United States.

A constant focus on health and safety

The health and safety of our employees constitutes an important part of our daily responsibilities. We do everything to protect them against accidents and work-related illnesses, principally in the areas of stress prevention, nutrition, and exercise. We focus on preventive measures that can be easily incorporated into the daily work routine. They are designed to help our employees avoid short-term and protracted health problems.

At our Darmstadt and Gernsheim sites, our Health Management unit conducts an array of campaigns and programs to promote the health of our workforce. Our employees have access to a health catalog detailing our Health Management services in both English and German. Among other things, this contains information on ergonomics, nutrition, stress, and mental health issues.

Workplace safety and health protection are the highest priority at Merck KGaA, Darmstadt, Germany. It is especially important to us to do everything we can to prevent workplace-related illnesses and accidents. We apply the lost time injury rate (LTIR) as an indicator to determine the success of measures aimed at accident prevention as well as occupational health and safety. This key performance indicator describes the number of workplace accidents resulting in lost time of one day or more per one million working hours. After having reached the goal of 2.5 that we had set in 2010, in 2015 we set ourselves a new, ambitious goal: By 2020 we intend to sustainably lower the LTIR to 1.5. In 2019, our LTIR was 1.5.

Experience shows that most workplace accidents can be prevented by proper conduct. Through our BeSafe! safety culture initiative, we are working to educate our employees on dangers in the workplace and provide them with rules of conduct that help keep them safe. Uniform standards as well as local modules to meet specific safety requirements at individual sites can help achieve a steady improvement in the current situation. The program focuses on engaging managers in the safety culture and building their buy-in, aiming to make safety an intrinsic value and empower our employees to take responsibility for their own safety. In 2019, we continued to sensitize our employees to workplace hazards through numerous awareness campaigns.

OVERVIEW OF EMPLOYEE FIGURES[1]

			Group (overall) Dec. 31 2017	Group (overall) Dec. 31 2018[2]	**Group (overall) Dec. 31 2019[6]**
Number of employees	global, total		52,941	51,749	57,071
	by region	Asia-Pacific (APAC)	11,294	10,486	12,728
		Europe	25,980	25,792	26,715
		Latin America	4,050	3,340	3,433
		Middle East and Africa (MEA)	1,097	1,153	1,366
		North America	10,520	10,978	12,829
Number of employees in FTE (FTE = full-time equivalents)	global, total		52,223.5	51,039.8	56,204.6
	by region	Asia-Pacific (APAC)	11,272.1	10,462.9	12,694.2
		Europe	25,302.5	25,126.8	26,013.1
		Latin America	4,046.2	3,339.5	3,427.8
		Middle East and Africa (MEA)	1,096.1	1,151.1	1,365.2
		North America	10,506.7	10,959.6	12,704.4
Number of countries			66	66	66
Number of legal entities	global, total		217	207	222
Number of nationalities	global, total		131	136	139
Number of nationalities working in Germany			97	95	96
Percentage of employees with German citizenship			23.2%	24.1%	22.4%
Percentage of employees working outside Germany			74.9%	73.9%	75.8%
Percentage of employees with global managers			10.2%	10.6%	11%
Percentage of women in the workforce	global, total		43.1%	44.0%	43%
	In Germany		39.1%	38.9%	38.9%
Percentage of women in leadership positions (= role 4 or higher)	global, total		30.3%[3]	32.3%[5]	33.5%[7]
	In Germany		29.7%[3, 4]	30.9%[5]	31.6%[7]
Percentage of executives (= role 4 or higher)	global, total		6.0%[3, 4]	6.5%[5]	6.2%[7]
	Percentage of executives who are not German citizens		64.4%[3]	63.6%[5]	64%[7]
	Number of nationalities		65[3]	70[5]	73[7]
Number of employees in vocational training in Germany			588	604	589
Vocational training rate			4.4%	4.1%	4.3%
Number of employees in the" Mywork at Merck KGaA, Darmstadt, Germany, model (Germany)			5,267	5,698	5,990
Percentage of employees working part-time	global, total		4.6%	4.8%	4.9%
	Men		10.7%	12.5%	16.9%
Percentage of employees aged 17–29 years			14.5%	14.5%	15%
Percentage of employees aged 30–49 years			62.1%	61.1%	60.2%
Percentage of employees aged 50+			23.4%	24.4%	24.8%
Average age globally			41.4	41.7	41.7
Average age by region	Asia-Pacific (APAC)		36.9	36.9	36.8
	Europe		42.5	42.8	43
	Latin America		40.3	40.4	40.3
	Middle East and Africa (MEA)		39.4	39.2	38.6
	North America		44.1	44.1	44.4
	Germany		43.0	43.3	43.7
Average length of service	global, total		9.8	10.0	9.5
Average length of service in Germany			14.0	14.5	14.8

[1] The Group also has employees at sites that are not fully consolidated subsidiaries. These figures refer to all people directly employed by the Group and therefore may deviate from figures in the financial section of this report.

[2] The Consumer Health business was transferred to Procter & Gamble (P&G) as of December 1, 2018, and was already classified as a discontinued operation according to IFRS 5 in April 2018. With the completion of the sale, around 3,300 employees joined P&G.

[3] Not including Sigma-Aldrich legal entities in Germany or Allergopharma.

[4] Ratio adjusted retrospectively.

[5] Not including the Sigma-Aldrich legal entity in Steinheim, Germany, or Allergopharma.

[6] With the completion of the takeover of Versum Materials on October 7, 2019, around 2,300 employees joined Merck KGaA, Darmstadt, Germany.

[7] Not including the Versum Materials legal entities or Allergopharma.

Report on Economic Position

Macroeconomic and Sector-Specific Environment

In keeping with expectations, the global economy experienced weakening growth in 2019. According to the International Monetary Fund (IMF), however, projected growth for 2020 should be slightly above the 2019 level. The global economy is thus showing initial signs that its growth momentum is stabilizing.

According to the latest forecasts available from the IMF, the global gross domestic product (GDP) rose at a significantly lower growth rate of 2.9% in 2019 (2018: 3.6%). Despite strong differences between the various regions and between industrial nations and emerging economies, the trend toward weakening growth is visible. While growth in industrial nations fell to 1.7% (2018: 2.2%), the emerging markets and developing countries saw growth of 3.7% (2018: 4.5%). The United States, the world's largest economy, achieved slightly weaker growth of 2.3% (2018: 2.9%). The same trend is apparent in the eurozone, whose GDP growth weakened to 1.2% (2018: 1.9%), as well as in Asia's emerging economies, which reported growth of 5.6% (2018: 6.4%). The strongest drivers were again China with 6.1% (2018: 6.6%) and India with a year-on-year slowdown in growth to 4.8% (2018: 6.8%). Japan reported GDP growth of 1.0% (2018: 0.3%), Taiwan registered GDP growth of 2.0% (2018: 2.6%), and Korea of 2.0% (2018: 2.7%).

As in 2018, the organic sales growth of the Group was above the IMF's global growth expectations in 2019 and came to 5.3%. This growth was supported by all regions. The Asia-Pacific region accounted for the largest share of growth across the Group at 42.3%, followed by Europe at 22.6%, North America at 19.0%, Latin America at 12.5%, and the Middle East and Africa at 3.6%. Overall growth and growth in the Asia-Pacific, Europe, and Latin America regions was driven primarily by the Healthcare and Life Science business sectors, while Performance Materials was below the 2018 figure. Growth in North America was attributable in particular to the Life Science business sector.

	Change 2019[1]	Change 2018
Healthcare		
Global pharmaceutical market	5.7%	5.4%
Market for multiple sclerosis therapies[2]	1.0%	2.7%
Market for type 2 diabetes therapies[2]	12.8%	9.8%
Market for fertility treatment[2]	4.8%	9.2%
Market for the treatment of colorectal cancer[3]	7.7%	4.8%
Life Science		
Market for laboratory products	3.2%	3.6%
Share of biopharmaceuticals in the global pharmaceutical market[2]	30.1%	28.0%
Performance Materials		
Growth of wafer area for semiconductor chips	-6.3%	8.0%
Growth of LC display surface area[4]	0.9%	10.1%
Global sales of cosmetics and care products	3.6%	4.1%
Global automobile sales volumes	-5.4%	-1.2%

[1] Predicted development. Final development rates for 2019 were not available for all industries when this report was prepared.

[2] Growth rates based on market data in local currency, translated at a constant euro exchange rate. The IQVIA market data on the growth of indications are based on current figures, including the third quarter of 2019. Annual growth based on the values for the past 12 months. The type 2 diabetes market excludes the United States, since this market is insignificant to the Group.

[3] Growth rates based on market data stated in U.S. dollars. Market data from EvaluatePharma on the growth of indications are based on published company reports and are subject to exchange rate fluctuations.

[4] Growth of display area is a pure volume indicator, which is counteracted by a negative price momentum.

Healthcare

In its latest study (as of September 2019), the pharmaceutical market research firm IQVIA forecast an increased year-on-year growth for 2019 of 5.7% for the global pharmaceutical market (2018: 5.4%). The main contributors to growth were the Latin America and Asia-Pacific regions. Latin America reported significant growth of 12.0% (2018: 9.3%). The Asia-Pacific region also continued to expand and recorded growth of 5.6% in 2019 (2018: 3.8%). Growth in North America slowed slightly in comparison with 2018 but remains solid, especially in the United States at 5.3% (2018: 5.9%). The EMEA (Europe, the Middle East, and Africa) region recorded weaker growth of 5.2% compared to the previous year (2018: 5.5%).

Not only the growth of the pharmaceutical sector as a whole, but also in particular the development of the biopharmaceutical market, is relevant for our business. According to IQVIA, the market volume for biological pharmaceuticals was approximately € 295 billion in 2019, continuing the recent trend of a continuously increasing market share. These products accounted for 30.1% of the global pharmaceutical market in 2019 (2018: 28.0%). The most important market for biological pharmaceuticals is the United States with a 62.4% share of global market volume.

The developments in the therapeutic areas of relevance to the Group reflect robust growth, albeit with different trends. The global market for type 2 diabetes excluding the United States followed the positive trend of previous years and reached growth of 12.8% in 2019 (2018: 9.8%). In the therapeutic area of infertility, growth dropped to 4.8% (2018: 9.2%). After a strong upturn in 2018, the growth rate in the market for colorectal cancer reached 7.7% (2018: 4.8%). Growth in the market for multiple sclerosis patients continued the trend of previous years and declined to 1.0% in 2019 (2018: 2.7%).

Life Science

Our Life Science business sector is a leading supplier of products and services for both research and applied laboratory applications, as well as for formulating, purifying, manufacturing, and quality-assuring drug therapies of chemical and biological origin.

According to the market research firm Frost & Sullivan, growth in the laboratory product market relevant to Research Solutions and Applied Solutions businesses slowed to 3.2% in 2019 (2018: 3.6%). Growth moderated from a peak in 2018 due to negative impacts from macroeconomic and geopolitical factors, despite a positive impact from continued strong demand from customers in the biopharmaceutical industry, specifically emerging biotech.

Our Life Science business sector competes in markets all around the globe. The European market growth slowed to 2.0% (2018: 2.4%), attributable to continuing uncertainties, most notably surrounding the outcome of Brexit. The market in the United States softened, growing 3.5% (2018: 4.2%), also due to increased geopolitical uncertainty, despite solid National Institutes of Health (NIH) funding to academic research customers. The Chinese market growth decelerated to 6.5% (2018: 7.0%) due to slowing GDP growth, trade relations, and imposed tariffs that have led to uncertainties in procurement, though domestic stimulus policies in China are providing some buffer for scientific tools and product investments in the laboratory area. The Indian market grew 7.8% (2018: 8.2%), where increased government spending, recovery from currency reform, and implementation of the national Goods and Services Tax (GST) has contributed to elevated spending.

The demand for Process Solutions products depends heavily on the sales of biopharmaceutical companies with biologics, as well as on the productivity of their research and development activities. According to IQVIA, the market volume of biotechnological pharmaceuticals grew to € 295 billion in 2019 (equivalent to 30.1% of the global pharmaceutical market). This is equivalent to growth of around 13.6% (2018: 13.2%), which is supported by all regions.

Performance Materials

The semiconductor industry is the most important market for business with material for integrated circuits (Semiconductor Solutions). The growth in demand for semiconductor materials depends on the wafer area produced for semiconductors. The silicon wafers required as raw materials are used as an indicator to estimate the demand for semiconductor materials. According to the global industry association SEMI.org, the area of delivered silicon wafers decreased by approximately 6% in 2019. The semiconductor industry was in a correction phase in 2019. Demand for semiconductor chips weakened due to the high economic uncertainty in connection with trade restrictions between the United States and China, as well as between Japan and Korea, the export restrictions relating to Huawei, and Brexit. However, due to the expansion of capacity in recent years, this resulted in a significant increase in inventory levels within the entire semiconductor industry. Prices for semiconductor chips, in particular memory chips, thus came under strong pressure and only stabilized toward the end of the year. Semiconductor manufacturers countered this in the course of the year with production cutbacks and delayed further expansion of capacities. Toward the end of the year, however, there were increasing signs that the industry had navigated past the bottom and swung back to its long-term growth trajectory.

With its Liquid Crystals business, the Group is the leading producer of liquid crystal mixtures for the display industry. According to surveys by market researchers at IHS, the growth rate of display surfaces area was about 1% in 2019. This weak growth was mainly due to the low demand for televisions due to uncertainties caused by the trade conflict between the United States and China, as well as an overall weaker economic situation. In addition, inventories of display panels were carried over from 2018 into 2019. Liquid crystals will continue to play a key role in the display industry in the future. OLED technology, for which the Group also ranks among the leading material suppliers, is gaining importance in the high-quality display sector.

The markets for cosmetics and automotive coatings are crucial to our Pigments business. The market for cosmetics and care products grew by around 4% overall in 2019, a slightly slower rate than in 2018. The Asia-Pacific region, particularly China, was the main growth driver. The reasons for the slowdown in growth are the trade conflicts between the United States and China and uncertainties surrounding Brexit. Furthermore, the economic downturn in Europe is leading to a declining price structure.

Global automobile production fell by around 5% in 2019. Due to the major importance of China, the sharp decline in the production figures there was reflected globally. The declining figures in China are primarily due to the trade conflict between the United States and China, the implementation of new emission standards, and high inventories in 2018.

Review of Forecast against Actual Business Developments

The forecast of the Group for fiscal 2019 published in the Annual Report for fiscal 2018 comprised the forecast for the Group as well as the forecast for the three business sectors Healthcare, Life Science, and Performance Materials. On April 12, 2019, we signed a final agreement to acquire Versum Materials Inc. for US$ 53 per share. On October 7, 2019, the successful closing of the acquisition of Versum Materials for a purchase price of approximately € 5.3 billion was announced. Consequently, the acquisition was not included at the time the Annual Report for 2018 was prepared and the forecast at the time did not include the Versum Materials business.

Due to this portfolio change, the following analysis reflects the new structure of the Group and only includes the Versum Materials business from the date the acquisition was successfully closed.

Net sales

For 2019, we had forecast moderate organic net sales growth for the Group. In the course of the year the Group reported a more dynamic organic sales growth driven particularly by the strong organic growth of Life Science. This meant that we generated a solid organic net sales growth of +5.3%, all told, in fiscal 2019, thus slightly exceeding our forecast. Due to the unfavorable development of several currencies in emerging markets at the start of the year, we anticipated a slightly negative exchange rate effect on our net sales. Contrary to our original assessment, however, the trend of these currencies in the first half of 2019, especially in Latin America, was not as unfavorable as we had assumed at the start of the year. Furthermore, the depreciation of the euro against the U.S. dollar continued during this period. The exchange rate between the euro and the U.S. dollar remained supportive in the second half of the year compared with the previous year. The positive exchange rate effect in 2019 as a whole was +2.1% and thus slightly above our updated range. The portfolio effect due to the acquisition of Versum Materials was included in the forecast at the next possible date, following the successful completion of the acquisition. It was included in our reporting on the third quarter of 2019.

Healthcare

For our Healthcare business sector, we had forecast moderate organic sales growth at the start of the year. Sales growth of the business sector in 2019 as a whole was solid at +6.2% and thus slightly exceeded both our original forecast and our updated forecast in the first quarter, which provided for organic growth ranging between +4% and +6%. Growth was supported by the sales development of the base business and the significant growth contribution of our newly approved products, mainly Mavenclad® and, in particular, the successful market approval of Mavenclad® in the United States.

Life Science

Our Life Science business sector generated organic sales growth of +9.0% in 2019 and thus significantly exceeded our forecast of organic growth slightly above medium-term market growth in the amount of 4% per annum due to increased demand in our main customer industries. The forecast raised to between +8% and +9% in our reporting on the third quarter of 2019 was achieved. As expected, Process Solutions was the most dynamic business unit, delivering the largest contribution to organic sales growth within Life Science. Also as expected, Applied Solutions and Research Solutions contributed positively to the organic sales performance, albeit to a lesser extent than Process Solutions.

Performance Materials

For our Performance Materials business sector, we had forecast a moderate organic decline compared with the previous year. The main assumption was a continuing price decline in the Liquid Crystals business, which is only mitigated by a temporary rise in volume due to capacity expansions of customers in China. We also anticipated high growth momentum in Semiconductor Solutions, but this failed to materialize in fiscal 2019 due to weaker end markets. Against this backdrop, we updated our forecast of organic growth for the business in our reporting on the second quarter of 2019 to a range from -4% to -7%; we were within this range with a reported decline in growth of -6.5% for 2019. Following the successful completion of the acquisition of Versum Materials on October 7, 2019, this acquisition was also included in the forecast in our reporting on the third quarter of 2019 with an expected sales effect of around € 270 million. The reported acquisition-related increase in sales was slightly below this figure at € 250 million, which was due to phasing effects at Versum Materials in the second half of the year and a slight weakening on the relevant semiconductor end markets.

EBITDA pre

For 2019 we expected a strong organic growth of EBITDA pre amounting to a low teens percentage figure over the prior year for the Group. The assumption was based on growth driven by Healthcare and Life Science, which should be more than able to offset the decline of Performance Materials, and a positive contribution from the first-time application of IFRS 16 Leases. Furthermore, because of the unfavorable foreign exchange environment, we still expected negative exchange rate effects to burden EBITDA pre by between -3% and -4% over the prior year. In 2019, EBITDA pre came to € 4,385 million, equivalent to an increase of +15.4% compared with the prior year (2018: € 3,800 million). The organic growth of +11.3% entailed by this figure was in line with our forecast. By contrast, at +2.5% the foreign exchange effect on EBITDA pre in 2019 as a whole was substantially more positive than expected at the start of the year, although it was only slightly above the range of between 0% and +2% to which we had adjusted in the course of our reporting on the first quarter of 2019. The positive depreciation of the euro against the U.S. dollar in 2019 was more supportive than we expected at the start of the year. The portfolio effect of Versum Materials was included in the forecast at the next possible date, following the successful completion of the acquisition. It was included in our reporting on the third quarter of 2019.

Healthcare

For our Healthcare business sector, we were forecasting strong organic growth of EBITDA pre over the prior year due to substantial expected earnings contributions from our new products, particularly Mavenclad®, and a decline in development expenses in relation to sales as well as earnings contributions from the strategic alliance with GlaxoSmithKline plc. In addition to this, we had expected strongly negative exchange rate effects. In 2019, EBITDA pre in Healthcare amounted to € 1,922 million (2018: € 1,556 million). This is equivalent to an increase of +23.5% over 2018; the organic rise of +19.5% corresponded to the lower end of the forecast range we issued at the start of the year. The exchange rate effects had a substantially greater positive impact than expected at the start of the year, however. As a result, in our reporting over the course of the year, we ultimately narrowed our forecast range to between 0% and +2%. We closed out the year 2019 at +4.1%.

Life Science

For Life Science, we had expected a strong up to double-digit rise in organic EBITDA pre in percentage terms due to the expected organic sales growth. Thanks to a better-than-expected development of the main end markets, the forecast was raised in the course of the year. In our reporting on the third quarter of 2019, we forecast a range of between +12% and +14%. In fiscal 2019, the business sector generated organic growth of +14.4% to € 2,129 million and was thus at the top end of our forecast range. The exchange rate development supported EBITDA pre with +1.5% and was thus more positive than projected at the start of the year, when we forecast a moderately negative development.

Performance Materials

Owing to a price decline in liquid crystals, for which it was not expected that it would be able to be offset by growth in other businesses or active cost management, we forecast an organic decline of EBITDA pre in the Performance Materials business sector totaling a high single-digit to low teens percentage figure at the start of the year. For the exchange rate effects, we projected a roughly neutral impact on EBITDA pre over 2018. For 2019 as a whole, Performance Materials achieved an EBITDA pre of € 803 million (2018: € 786 million). This corresponded to an increase of +2.3% over 2018, of which -12.3% was attributable to the organic business performance and a further +6.1% to exchange rate developments. The forecast of organic growth was thus within the range we issued at the start of the year; however, the exchange rate trend ended up substantially more positive than we originally assumed. Our reporting on the third quarter of 2019, following the successful completion of the acquisition of Versum Materials on October 7, 2019, expected an earnings effect of around € 80 million to € 90 million from the acquisition for the year as a whole. The total reported portfolio effect of the Performance Materials business sector was +8.5% and slightly below this range. This is primarily attributable to phasing effects at Versum Materials in the second half of 2019, a weaker momentum in the relevant semiconductor end markets, and the negative portfolio contribution from the acquisition of Intermolecular.

Corporate and other

EBITDA pre of Corporate and Other, which reached a level of € –469 million in 2019, was within our forecast range of € -460 million to € -490 million that we specified in the reporting on the third quarter of 2019. Compared with the prior-year figure of € -381 million, this corresponded to a rise in costs of 23.0%. This development was mainly due to higher losses from currency hedging and resulted from exchange rate developments that were forecast differently. The rising organic costs from the further expansion of our innovation and digitalization initiatives corresponded to our original forecast.

Business free cash flow

For 2019, we expected business free cash flow of the Group to see a moderate increase. This forecast was exceeded with a rise of +8.9% to € 2,732 million (2018: € 2,508 million). In the Healthcare business sector, the increase of +22.1% over the prior year was in line with our forecast of growth in the low twenties percentage range, issued at the start of the year. The business free cash flow of the Life Science business sector was -1.3% below the prior year. We thus slightly exceeded our forecast of a moderate performance below the previous year. For the Performance Materials business sector, we anticipated a decline in the low teens range. With growth of 9.1% over the previous year, the business sector significantly exceeded the figure we forecast at the start of the year, mainly thanks to the acquisition of the Versum Materials business, which had not been included in the forecast issued at the start of the year but was included in our reporting on the third quarter of 2019 with an additional € 70 million to € 85 million.

GROUP

€ million	Net sales	EBITDA pre	Business free cash flow	EPS pre
Actual results 2018	14,836	3,800	2,508	€ 5.10
Forecast for 2019 in the 2018 Annual Report	Moderate organic growth Slightly negative foreign exchange effect of -1% to -2%	Strong organic percentage growth in the low teens range Negative foreign exchange effect of between -3% and -4%	Moderate increase	
Main comments	Growth driven by Life Science and Healthcare, which more than offsets the decline of Performance Materials Foreign exchange effect primarily resulting from several emerging market currencies	Growth driven by Healthcare and Life Science, which more than offsets the decline of Performance Materials First-time application of IFRS 16 with a positive contribution of around € 130 million Foreign exchange effect primarily resulting from several emerging market currencies	Higher EBITDA pre and positive effects in working capital offset higher investments in property, plant and equipment as well as digitalization initiatives	
Forecasts for 2019 in the interim report:				
Q1/2019	~15,300 to 15,900 Organic growth of +3% to +5% vs. 2018 Exchange rate effect of 0% to +2%	~4,150 to 4,350 Organic growth of +10% to +13% vs. 2018 Exchange rate effect of 0% to +2%	~2,500 to 2,750	€ 5.30 to € 5.65
Q2/2019	~15,300 to 15,900 Organic growth of +3% to +5% vs. 2018 Exchange rate effect of 0% to +2%	~4,150 to 4,350 Organic growth of +10% to +13% vs. 2018 Exchange rate effect of 0% to +2%	~2,550 to 2,800	€ 5.30 to € 5.65
Q3/2019	~15,700 to 16,300 Organic growth of +3% to +5% vs. 2018 Exchange rate effect of +1% to +2% Versum Materials included with approximately 270	~4,230 to 4,430 Organic growth of +10% to +13% vs. 2018 Exchange rate effect of 0% to +2% Versum Materials included with approximately 80 to 90	~2,600 to 2,850 Versum Materials included with 70 to 85	€ 5.30 to € 5.65
Results 2019 in € million	16,152 (+8.9%:+5.3% organic, +1.4% portfolio, +2.1% currency)	4,385 (+15.4%:+11.3% organic, +1.6% portfolio, +2.5% currency)	2,732 +8.9%	€ 5.56 +9.0%

HEALTHCARE

€ million	Net sales	EBITDA pre	Business free cash flow
Actual results 2018	6,246	1,556	1,025
Forecast for 2019 in the 2018 Annual Report	Moderate organic growth Moderately negative foreign exchange effect	Strong organic growth rate in the low to mid-twenties percentage range Strongly negative foreign exchange effect	Increase in the low teens percentage range
Main comments	At least stable sales development of the base business in organic terms Substantial growth contribution of our newly approved products, particularly Mavenclad® ; expected market approval in the United States has been taken into account Negative foreign exchange effect due to trend of exchange rates on several growth markets	Expected substantial earnings contributions from our new products, especially Mavenclad® , more than offset negative mix effects associated with the projected decline of Rebif® Moderate increase in research and development expenses due to the development of our pipeline, but down in relation to sales Earnings contributions from the strategic alliance with GlaxoSmithKline plc of approximately € 100 million and owing to license payments for Erbitux® that were lower than expected Negative foreign exchange effect due to trend of exchange rates on several growth markets	Rise in EBITDA pre Positive net working capital effects (including positive effects from the sale of the Consumer Health business)
Forecasts for 2019 in the interim report:			
Q1/2019	~6,450 to 6,750 Moderate organic growth of +4% to +6% Exchange rate effect of -1% to +2%	~1,820 to 1,950 Organic growth of +19% to +23% Exchange rate effect of -2% to +3%	~1,200 to 1,300
Q2/2019	~6,450 to 6,750 Solid organic growth of +4% to +6% Exchange rate effect of -1% to +2%	~1,830 to 1,940 Organic growth of +19% to +23% Exchange rate effect of -1% to +2%	~1,200 to 1,300
Q3/2019	~6,500 to 6,700 Solid organic growth of +4% to +6% Exchange rate effect 0% to +2%	~1,830 to 1,940 Organic growth of +19% to +23% Exchange rate effect 0% to +2%	~1,200 to 1,300
Results 2019 in € million	6,714(+7.5%: +6.2% organic, 0.0% portfolio, +1.3% currency)	1,922 (+23.5%:+19.5% organic, 0.0% portfolio, +4.1% currency)	1,252 +22.1%

LIFE SCIENCE

€ million	Net sales	EBITDA pre	Business free cash flow
Actual results 2018	6,185	1,840	1,393
Forecast for 2019 in the 2018 Annual Report	Organic growth slightly above medium-term market growth of 4% p.a. Slightly negative foreign exchange effect	Strong organic growth of up to a double-digit percentage rate Moderately negative foreign exchange effect	Moderately below 2018 levels
Main comments	Process Solutions is likely to remain the strongest growth driver, followed by Applied Solutions Research Solutions will also make a moderately positive contribution to the organic sales development No material portfolio effect as a result of the sale of the flow cytometry business Negative foreign exchange effect, particularly on account of the development of emerging market currencies	Organic earnings growth on account of the expected sales growth and slight margin expansion In addition, positive contribution to organic earnings growth from the switch to IFRS 16 Negative foreign exchange effect, particularly on account of the development of emerging market currencies	Improved EBITDA pre Increase in investments in property, plant, and equipment in strategic projects
Forecasts for 2019 in the interim report:			
Q1/2019	~6,550 to 6,750 Organic growth of +6% to +7% Exchange rate effect 0% to +3%	~2,000 to 2,100 with an operating margin expansion of 20 to 30 base points Organic growth of around +10% to +12% Exchange rate effect 0% to +3%	~1,300 to 1,400
Q2/2019	~6,620 to 6,820 Strong organic growth of +7% to +8% Exchange rate effect 0% to +3%	~2,020 to 2,120 with an operating margin expansion of 20 to 30 base points Organic growth of around +11% to +13% Exchange rate effect 0% to +2%	~1,350 to 1,450
Q3/2019	~6,700 to 6,900 Organic growth of +8% to +9% Exchange rate effect +1% to +3%	~2,040 to 2,140 with an operating margin expansion of 20 to 30 base points Organic growth of +12% to +14% Exchange rate effect 0% to +2%	~1,350 to 1,450
Results 2019 in € million	6,864 (+11.0%:+9.0% organic, -0.6% portfolio, +2.6% currency)	2,129 (+15.7%:+14.4% organic, -0.2% portfolio, +1.5% currency)	1,375 -1.3%

PERFORMANCE MATERIALS

€ million	Net sales	EBITDA pre	Business free cash flow
Actual results 2018	2,406	786	588
Forecast for 2019 in the 2018 Annual Report	Organically moderate decline from the prior year level Exchange rate effect roughly neutral	Organic high single-digit to low double-digit percentage decline Foreign exchange effect roughly neutral	Decline in the low teens
Main comments	Strong growth momentum in the Semiconductor Solutions business unit Continuing price decline in Liquid Crystals business, mitigated by a temporary rise in volume due to capacity expansions of customers in China Neutral foreign exchange effect due to the development of the exchange rate of the euro against the U.S. dollar	Drop in liquid crystal prices cannot be offset by growth in other businesses and active cost management Neutral foreign exchange effect due to the development of the exchange rate of the euro against the U.S. dollar	Decline in EBITDA pre
Forecasts for 2019 in the interim report:			
Q1/2019	~2,250 to 2,400 Moderate organic decline of -3% to -6% Exchange rate effect 0% to +2%	~700 to 760 Organic growth of -7% to -11% Exchange rate effect 0% to +4%	~500 to 600
Q2/2019	~2,230 to 2,380 Organic decline of -4 % to -7 % Exchange rate effect 0% to +2%	~685 to 745 Organic growth of -9% to -13% Exchange rate effect +1% to +4%	~500 to 600
Q3/2019	~2,250 to 2,400 Organic decline of -4 % to -7 %* Exchange rate effect +1% to +3% Additionally around 270 due to Versum Materials	~695 to 755 Organic growth of -9% to -13%* Exchange rate effect +3% to +5% Additionally around 80 to 90 due to Versum Materials	~500 to 600 Additionally around 70 to 85 due to Versum Materials
Results 2019 in € million	2,574 (+7.0%:-6.5% organic, +10.4% portfolio, +3.1% currency)	803 (+2.3%:-12.3% organic, +8.5% portfolio, +6.1% currency)	641 +9.1%

*Lower half of the corridor

CORPORATE AND OTHER

€ million	EBITDA pre	Business free cash flow
Actual results 2018	-381	-497
Forecast for 2019 in the 2018 Annual Report*	The expenses for Corporate and Other will, in our opinion, show an increase in the low to mid-teens range on an organic basis in 2019. This increase will be based on a further expansion of our innovation and digitalization initiatives. A greater focus on the costs of the administrative functions and substantially reduced burden from foreign exchange effects are likely to partly offset the increase.	
Main comments		
Forecasts for 2019 in the interim report:		
Q1/2019	~-420 to -480	~-500 to -580
Q2/2019	~-420 to -480	~-500 to -580
Q3/2019	~-460 to -490	~-500 to -580
Results 2019 in € million	-469 +23.0%	-536 +7.9%

Course of Business and Economic Position

Group

Overview of 2019

- Increase in Group net sales of 8.9% to € 16.2 billion; organic growth (5.3%) was supported by positive exchange rate effects (2.1%) and acquisition-related growth (1.4%)
- Organic sales growth was achieved by the Life Science (9.0%) and Healthcare (6.2%) business sectors
- EBITDA pre rose by 15.4% and amounted to € 4.4 billion (2018: € 3.8 billion)
- Profitable growth for the Group: increase in EBITDA pre margin to 27.1% (2018: 25.6%)
- Growth in earnings per share pre to € 5.56 (2018: € 5.10)
- Increase in business free cash flow to € 2.7 billion (2018: € 2.5 billion)
- Acquisition-related rise in net financial debt to € 12.4 billion (December 31, 2018: € 6.7 billion)

GROUP

Key figures

			Change	
€ million	**2019**	2018	€ million	%
Net sales	16,152	14,836	1,315	8.9%
Operating result (EBIT)[1]	2,120	1,727	393	22.8%
Margin (% of net sales)[1]	13.1%	11.6%		
EBITDA[1]	4,066	3,528	539	15.3%
Margin (% of net sales)[1]	25.2%	23.8%		
EBITDA pre[1]	4,385	3,800	585	15.4%
Margin (% of net sales)[1]	27.1%	25.6%		
Profit after tax	1,324	3,396	-2,072	-61.0%
Earnings per share (in €)	3.04	7.76	-4.72	-60.8%
Earnings per share pre (€)[1]	5.56	5.10	0.46	9.0%
Business free cash flow[1]	2,732	2,508	224	8.9%

[1] Not defined by International Financial Reporting Standards (IFRSs).

Development of sales and results of operations

In fiscal 2019, the Group generated net sales of € 16,152 million (2018: € 14,836 million). This represented a year-on-year increase of € 1,315 million or 8.9%, to which all business sectors contributed. Organic sales growth for the Group amounted to € 790 million or 5.3% and was attributable to the Life Science (9.0%) and Healthcare (6.2%) business sectors. Performance Materials reported a decline in organic sales of -6.5%. Sales growth attributable to foreign exchange rates came to € 312 million or 2.1% and was primarily due to the U.S. dollar, the Japanese yen, and the Chinese renminbi; exchange rate developments in particular in some South American countries, such as Argentina and Brazil, had the opposite effect. Because of portfolio changes,

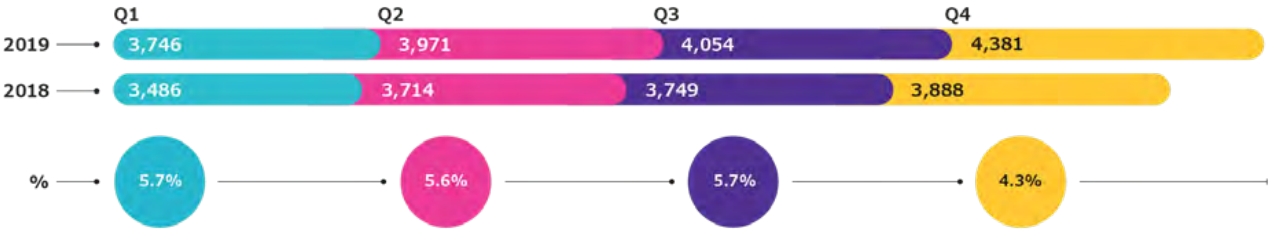
Group net sales rose by € 213 million or 1.4%. This was essentially due to the acquisition, completed on October 7, 2019, of Versum Materials, Inc., United States (Versum Materials), and the completed acquisition of Intermolecular, Inc., United States (Intermolecular), on September 20, 2019, both of which supplement the semiconductor business of the Performance Materials business sector. The divestment in December 2018 of the flow cytometry business that was allocated to the Life Science business sector diminished sales.

The net sales in the individual quarters as well as the respective organic growth rates in 2019 are presented in the following graph:

GROUP

Net sales and organic growth[1] by quarter[2]

€ million/organic growth in %



[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

Driven by the gratifying organic sales growth of 9.0%, net sales of the Life Science business sector rose by 11.0% to € 6,864 million overall (2018: € 6,185 million). Life Science therefore was the strongest business sector in terms of sales with a share of 42% (2018: 42%) of Group sales in fiscal 2019. With organic growth of 6.2% and an exchange rate-related increase in sales of 1.3%, the Healthcare business sector recorded an overall rise in net sales of 7.5% to € 6,714 million (2018: € 6,246 million). In 2019, net sales of the Performance Materials business sector rose by 7.0% to € 2,574 million (2018: € 2,406 million). This was primarily due to acquisition-related sales growth (10.4%) and positive exchange rate effects (3.1%), which more than offset the decline in organic sales (-6.5%). Performance Materials thus generated 16% (2018: 16%) of net sales of the Group.

GROUP

Net sales by business sector – 2019

€ million/% of net sales

GROUP

Net sales by business sector

€ million	2019	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2018	Share
Healthcare	6,714	42%	6.2%	1.3%	–	7.5%	6,246	42%
Life Science	6,864	42%	9.0%	2.6%	-0.6%	11.0%	6,185	42%
Performance Materials	2,574	16%	-6.5%	3.1%	10.4%	7.0%	2,406	16%
Group	16,152	100%	5.3%	2.1%	1.4%	8.9%	14,836	100%

[1] Not defined by International Financial Reporting Standards (IFRSs).

In fiscal 2019, the Group recorded the following regional sales performance:

GROUP

Net sales by region

€ million	2019	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2018	Share
Europe	4,735	29%	3.9%	–	–	3.9%	4,559	31%
North America	4,214	26%	3.9%	5.3%	1.1%	10.4%	3,818	26%
Asia-Pacific (APAC)	5,599	35%	6.7%	2.7%	3.3%	12.8%	4,965	33%
Latin America	1,012	6%	10.4%	-3.8%	–	6.5%	950	6%
Middle East and Africa (MEA)	591	4%	5.2%	2.4%	1.0%	8.6%	544	4%
Group	16,152	100%	5.3%	2.1%	1.4%	8.9%	14,836	100%

[1] Not defined by International Financial Reporting Standards (IFRSs).

The Consolidated Income Statement of the Group is as follows:

GROUP

Consolidated Income Statement[1]

					Change	
€ million	**2019**	**%**	2018	%	€ million	%
Net sales	**16,152**	**100.0%**	**14,836**	**100.0%**	**1,315**	**8.9%**
Cost of sales	-6,006	-37.2%	-5,382	-36.3%	-624	11.6%
Gross profit	**10,145**	**62.8%**	**9,454**	**63.7%**	**691**	**7.3%**
Marketing and selling expenses	-4,576	-28.3%	-4,396	-29.6%	-180	4.1%
Administration expenses	-1,154	-7.1%	-1,183	-8.0%	29	-2.5%
Research and development costs	-2,268	-14.0%	-2,227	-15.0%	-41	1.8%
Impairment losses and reversals of impairment losses on financial assets (net)	-8	-0.0%	27	0.2%	-35	100.0%
Other operating income and expenses	-19	-0.1%	52	0.3%	-71	100.0%
Operating result (EBIT)[2]	**2,120**	**13.1%**	**1,727**	**11.6%**	**393**	**22.8%**
Financial result	-385	-2.4%	-266	-1.8%	-119	44.6%
Profit before income tax	**1,735**	**10.7%**	**1,461**	**9.8%**	**275**	**18.8%**
Income tax	-440	-2.7%	-368	-2.5%	-72	19.7%
Profit after tax from continuing operations	**1,296**	**8.0%**	**1,093**	**7.4%**	**203**	**18.5%**
Profit after tax from discontinued operation	**28**	**0.2%**	**2,303**	**15.5%**	**-2,275**	**-98.8%**
Profit after tax	**1,324**	**8.2%**	**3,396**	**22.9%**	**-2,072**	**-61.0%**
Non-controlling interests	-3	-0.0%	-22	-0.2%	19	-85.1%
Net income	**1,320**	**8.2%**	**3,374**	**22.7%**	**-2,053**	**-60.9%**

[1] Previous year's figures have been adjusted, see Note (45) "Effects from new accounting standards and other presentation changes" in the Notes to the Consolidated Financial Statements.

[2] Not defined by International Financial Reporting Standards (IFRSs).

The positive development of net sales led to an increase of 7.3% in gross profit of the Group to € 10,145 million (2018: € 9,454 million). The resulting gross margin of the Group, i.e. gross profit as a percentage of net sales, amounted to 62.8% (2018: 63.7%). Group-wide research and development costs rose by 1.8% to € 2,268 million and led to a research spending ratio (research and development costs as a percentage of net sales) of 14.0% (2018: 15.0%). Accounting for 75% (2018: 77%) of Group R&D spending, Healthcare remained the most research-intensive business sector of the Group.

GROUP

Research and development costs by business sector[1] – 2019

€ million/%

[1] Not presented: research and development costs of € 59 million allocated to Corporate and Other

Other operating income and expenses showed an expense balance of € 19 million in 2019, after an income balance of € 52 million in 2018. Detailed information about the development and composition of other operating expenses and income can be found in Note (15) "Other operating income" and Note (16) "Other operating expenses" in the Notes to the Consolidated Financial Statements.

The further deterioration of the financial result of 44.6% to € –385 million (2018: € –266 million) resulted mainly from higher interest expenses due to new borrowings of financial liabilities to finance the acquisition of Versum Materials. Details with respect to the development of finance income and finance expenses of the Group are shown in Note (40) "Financial income and expenses/Net profit and losses from financial instruments" in the Notes to the Consolidated Financial Statements.

Income tax expense came to € 440 million in 2019 (2018: € 368 million) and resulted in a tax rate of 25.3% (2018: 25.2%). Further information on income taxes are included in Note (17) "Income taxes" in the Notes to the Consolidated Financial Statements.

Profit after tax from discontinued operations of € 28 million (2018: € 2,303 million) resulted from the sale of the Consumer Health business in December 2018 and arose from subsequent effects in connection with the transaction. This profit must be reported separately in the Consolidated Income Statement pursuant to IFRS 5. The high figure for 2018 essentially includes the profit from the sale of the Consumer Health business amounting to € 2,244 million. Further information on the divestment of the Consumer Health business can be found in Note (5) "Acquisitions and divestments" in the Notes to the Consolidated Financial Statements.

The decline in net income of -60.9% to € 1,320 million (2018: € 3,374 million) was mainly attributable to the profit from the sale of the Consumer Health business realized in 2018. Earnings per share accordingly decreased to € 3.04 (2018: € 7.76).

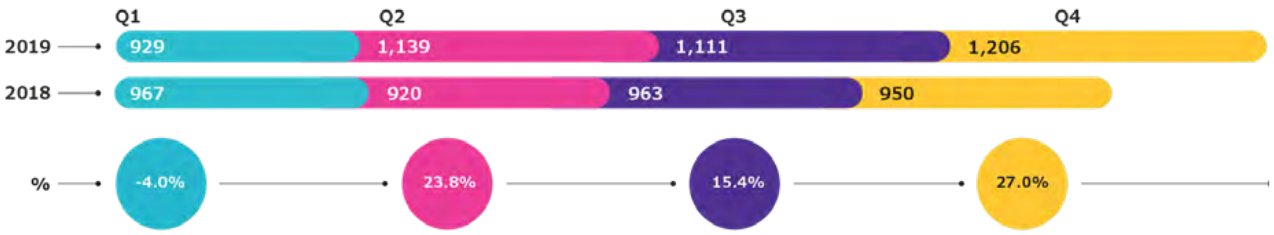
EBITDA pre, the key financial indicator used to steer operating business, rose by € 585 million, or 15.4%, to € 4,385 million (2018: € 3,800 million). The organic increase in this key performance indicator was 11.3%. It included favorable effects from the application of IFRS 16 "Leases" amounting to € 143 million. Furthermore, the development of EBITDA pre was positively influenced by foreign exchange effects and portfolio effects. Relative to net sales, the EBITDA pre margin was 27.1% in 2019 (2018: 25.6%). The reconciliation of the operating result (EBIT) to EBITDA pre is presented in the chapter entitled "Internal Management System."

The development of EBITDA pre in the individual quarters in comparison with 2018 as well as the respective growth rates are presented in the following overview:

GROUP

EBITDA pre[1] and change by quarter[2]

€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

All business sectors contributed to the growth in Group EBITDA pre. Life Science, the business sector with the highest EBITDA pre, generated a 15.7% increase to € 2,129 million (2018: € 1,840 million) in fiscal 2019. At the same time, the EBITDA pre margin of this business sector also rose to 31.0% (2018: 29.8%). EBITDA pre of Healthcare even increased by 23.5% to € 1,922 million in 2019 (2018: € 1,556 million). The resulting EBITDA pre margin improved substantially to 28.6% (2018: 24.9%). The share of Group EBITDA pre accounted for by Healthcare (not taking into account the € –469 million reduction due to Corporate and Other) rose by 3 percentage points to 40% (2018: 37%). With an EBITDA pre of € 803 million (2018: € 786 million), the share of this Group key performance indicator attributable to Performance Materials decreased to 16% (2018: 19%). The EBITDA pre margin declined slightly to 31.2% (2018: 32.7%).

GROUP

EBITDA pre[1] by business sector[2] – 2019

€ million/%

[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Not presented: Decline in Group EBITDA pre by €–469 million due to Corporate and Other.

GROUP

Balance sheet structure[1]

	Dec. 31, 2019		Dec. 31, 2018		Change	
	€ million	**%**	€ million	%	€ million	%
Non-current assets	**34,808**	**79.4%**	**27,652**	**75.0%**	**7,155**	**25.9%**
thereof:						
Goodwill	17,141		13,764		3,377	
Other intangible assets	9,175		7,237		1,938	
Property, plant and equipment[2]	6,213		4,811		1,402	
Other non-current assets	2,278		1,840		438	
Current assets	**9,003**	**20.6%**	**9,236**	**25.0%**	**-232**	**-2.5%**
thereof:						
Inventories	3,342		2,764		577	
Trade and other current receivables	3,488		3,226		262	
Other current financial assets	57		29		28	
Other current assets	1,336		1,048		289	
Cash and cash equivalents	781		2,170		-1,390	
Total assets	**43,811**	**100.0%**	**36,888**	**100.0%**	**6,923**	**18.8%**
Equity	**17,914**	**40.9%**	**17,233**	**46.7%**	**681**	**4.0%**
Non-current liabilities	**14,056**	**32.1%**	**11,138**	**30.2%**	**2,918**	**26.2%**
thereof:						
Provisions for pensions and other post-employment benefits	2,957		2,336		620	
Other non-current provisions	490		780		-290	
Non-current financial debt[2]	8,644		6,681		1,963	
Other non-current liabilities	1,965		1,340		624	
Current liabilities	**11,842**	**27.0%**	**8,517**	**23.1%**	**3,324**	**39.0%**
thereof:						
Current provisions	933		600		333	
Current financial debt[2]	4,550		2,215		2,336	
Trade and other current payables/refund liabilities	2,618		2,238		380	
Other current liabilities	3,740		3,464		276	
Total equity and liabilities	**43,811**	**100.0%**	**36,888**	**100.0%**	**6,923**	**18.8%**

[1] Previous year's figures have been adjusted, see Note (45) "Effects from new accounting standards and other presentation changes" in the Notes to the Consolidated Financial Statements.

[2] The first-time application of IFRS 16 led to an increase in property, plant and equipment as well as financial debt as of January 1, 2019; see Note (45) "Effects of new accounting standards and other presentation changes" in the Notes to the Consolidated Financial Statements.

The total assets of the Group amounted to € 43,811 million as of December 31, 2019 (December 31, 2018: € 36,888 million), representing an increase of 18.8% or € 6,923 million. The main reason for the strong increase in total assets and the development of the balance sheet items was the first-time consolidation of Versum Materials (see Note (5) "Acquisitions and divestments" in the Notes to the Consolidated Financial Statements). Due to exchange rate changes, total assets rose by around € 0.4 billion.

The growth in working capital of 13.2% to € 3,944 million (December 31, 2018: € 3,486 million) was largely attributable to the acquisition-related inventory build-up and increase in receivables.

GROUP

Working capital[1]

€ million	**Dec. 31, 2019**	Dec. 31, 2018	Change € million	Change %
Trade accounts receivable	3,174	2,931	243	8.3%
Receivables from royalties and licenses	45	29	17	57.9%
Inventories/right of return for goods already delivered	3,344	2,764	579	21.0%
Trade and other current payables/refund liabilities	-2,618	-2,238	-380	17.0%
Working capital[1]	**3,944**	**3,486**	**459**	**13.2%**

[1] Not defined by International Financial Reporting Standards (IFRSs).

The composition and the development of net financial debt were as follows:

GROUP

Net financial debt[1]

€ million	**Dec. 31, 2019**	Dec. 31, 2018	Change € million	Change %
Bonds and commercial paper	10,059	7,286	2,773	38.1%
Bank loans	1,587	620	967	>100.0%
Liabilities to related parties	809	824	-16	-1.9%
Loans from third parties and other financial debt	97	72	25	34.9%
Liabilities from derivatives (financial transactions)	76	90	-14	-15.2%
Lease liabilities[2]	567	4	563	>100.0%
Financial debt	**13,194**	**8,896**	**4,299**	**48.3%**
less:				
Cash and cash equivalents	781	2,170	-1,390	-64.0%
Other current financial assets[3]	50	24	26	>100.0%
Net financial debt[1]	**12,363**	**6,701**	**5,663**	**84.5%**

[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] The first-time application of IFRS 16 led to an increase of €465 million as of January 1, 2019.
[3] Excluding current derivatives (operational).

GROUP

Reconciliation of net financial debt[1]

€ million	**2019**	2018
Jan. 1	**6,701**	**10,144**
Currency translation difference	79	126
Change in lease liabilities[2]	663	–
Dividend payments[3]	689	768
Acquisitions[3]	5,020	–
Payments for/proceeds from the disposal of assets held for sale[3]	110	-3,129
Transfer of financial debt due to acquisitions	966	–
Free cash flow[1]	-1,889	-1,301
Other	24	93
Dec. 31	**12,363**	**6,701**

[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Thereof € 465 million due to the first-time application of IFRS 16 as of January 1, 2019.
[3] According to the Consolidated Cash Flow Statement.

In 2019, equity of the Group rose by 4.0% to €17,914 million (December 31, 2018: €17,233 million). The increase in equity was essentially due to profit after tax generated in fiscal 2019 (€1.3 billion). Opposing effects resulted from dividend payments and profit distribution (€0.7 billion) (see "Consolidated Statement of Changes in Net Equity" in the Consolidated Financial Statements). Despite the increase in equity, the equity ratio declined by around 6 percentage points to 40.9% (December 31, 2018: 46.7%) due to the aforementioned rise in total assets. The composition of free cash flow as well as the development of the relevant items are presented in the following table:

GROUP

Free cash flow[1]

			Change	
€ million	**2019**	2018	€ million	%
Cash flow from operating activities according to the consolidated cash flow statement	2,856	2,219	637	28.7%
Payments for investments in intangible assets	-208	-106	-102	95.8%
Proceeds from the disposal of intangible assets	23	67	-44	-65.6%
Payments for investments in property, plant and equipment	-813	-910	98	-10.7%
Proceeds from the disposal of property, plant and equipment	31	31	-1	-2.3%
Free cash flow[1]	**1,889**	**1,301**	**588**	**45.2%**

[1] Not defined by International Financial Reporting Standards (IFRSs).

For further information on the impact of the first-time application of IFRS 16 "Leases" on the consolidated cash flow statement, please refer to Note (41) "Net cash flows from financing activities" in the Notes to the Consolidated Financial Statements.

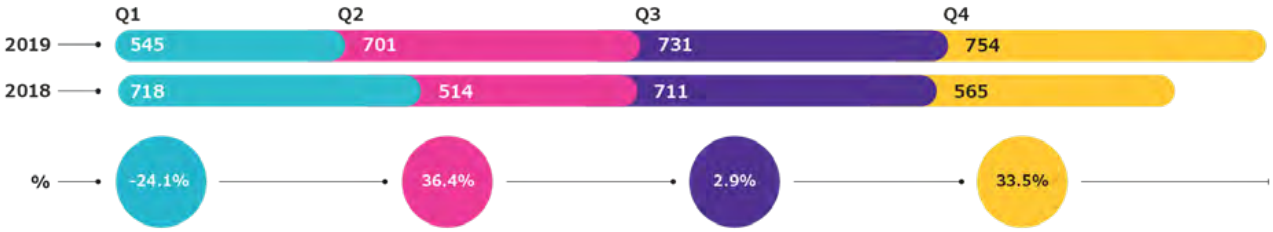
In fiscal 2019, the Group generated business free cash flow of € 2,732 million (2018: € 2,508 million). The increase was mainly attributable to a higher EBITDA pre. The composition of business free cash flow is presented in the chapter entitled "Internal Management System."

The distribution of business free cash flow across the individual quarters and the percentage changes in comparison with 2018 were as follows:

GROUP

Business free cash flow[1] and change by quarter[2]

€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

GROUP

Business free cash flow[1] by business sector[2] – 2019

€ million/%

[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Not presented: decline in Group business free cash flow by € –536 million due to Corporate and Other.

The contributions of the operating business sectors to business free cash flow of the Group in 2019 developed as follows: Life Science generated business free cash flow amounting to € 1,375 million (2018: € 1,393 million). Consequently, with a 42% share (2018: 46%) of Group business free cash flow (excluding the decline of € –536 million due to Corporate and Other), Life Science was the business sector with the highest cash inflows. In 2019, the Healthcare business sector showed a double-digit increase of 22.2% to € 1,252 million (2018: € 1,025 million), thus contributing a share of 38% to Group business free cash flow (2018: 34%). With business free cash flow of € 641 million (2018: € 588 million), Performance Materials contributed 20% (2018: 20%) to this Group key performance indicator.

Investments in property, plant, equipment, and software, as well as advance payments for intangible assets included in the calculation of business free cash flow, rose in 2019 by 10.1% to € 1,026 million (2018: € 932 million). The investments in property, plant, and equipment included therein amounted to € 1,104 million in 2019 (2018: € 890 million), of which € 497 million (2018: € 480 million) was attributable to strategic investment projects each with a project volume of more than € 2 million; the remainder was attributable to smaller investment projects.

In 2019, strategic investments of € 116 million (2018: € 161 million) were made to expand our site in Darmstadt, of which the Performance Materials business sector invested € 20 million in a new research center and € 15 million in a silica production facility. The Life Science business sector invested € 11 million in a new membrane production plant.

Outside Germany, high levels of strategic investments were made particularly in Switzerland (€ 105 million), China (€ 60 million), and the United States (€ 54 million). In Switzerland, the Healthcare business sector invested € 34 million in a new development center to produce biotechnological products and € 30 million in a new production building for bottling these products. In China, Life Science invested € 16 million in a production campus; Healthcare invested € 13 million in a logistics center. The United States saw a Healthcare investment of € 15 million in the expansion of the research and development center in Billerica, Massachusetts.

Our credit ratings from the independent rating agencies did not change in 2019. Our company is currently rated by Standard & Poor's, Moody's, and Scope. Standard & Poor's has issued a long-term credit rating of A with a stable outlook, Moody's a rating of Baa1 with a stable outlook, and Scope a rating of A–, likewise with a stable outlook. An overview of the development of our rating in recent years is presented in the Report on Risks and Opportunities.

The development of key balance sheet figures was as follows:

GROUP

Key balance sheet figures

%		Dec. 31, 2019	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2016	Dec. 31, 2015
Equity ratio[1]	Total equity / Total assets	40.9%	46.7%	39.5%	36.7%	33.8%
Asset ratio[1]	Non-current assets / Total assets	79.4%	75.0%	79.1%	80.0%	80.7%
Asset coverage[1]	Total equity / Non-current assets	51.5%	62.3%	49.9%	45.9%	41.8%
Finance structure[1]	Current liabilities / Liabilities (total)	45.7%	43.3%	40.1%	37.5%	37.2%

[1] Not defined by International Financial Reporting Standards (IFRSs).

Overall assessment of business performance and economic situation

In fiscal 2019 we continued to implement our strategy in a disciplined fashion and reached important milestones. The financial targets we had set ourselves for 2019 were reached or even exceeded. In particular, we were able to return to profitable growth. Group sales in fiscal 2019 rose by 8.9% to € 16,152 million and EBITDA pre, the key financial indicator used to measure operating business, grew by 15.4% to € 4,385 million. All business sectors contributed to this success.

We also realized important strategic milestones in respect of the Group's long-term orientation: following the takeovers of Versum Materials and Intermolecular, our Performance Materials business sector is in a very good position to become a leading provider on the market for electronic materials, and to push further ahead with future innovations in this field. Our research results in Healthcare are promising. The United States Food and Drug Administration (FDA) has approved our therapy Mavenclad® for the treatment of specific forms of multiple sclerosis in the United States. Our cancer immunotherapy Bavencio® was granted approval in the United States, Europe, Japan, and in other markets for the treatment of patients with locally advanced kidney cancer in combination with another medicine. We entered into a global strategic alliance with GlaxoSmithKline to push further ahead with the clinical development of new therapy bintrafusp alfa to fight cancers that are difficult to treat. In Life Science, we made progress with our genome editing technologies. Last year we received further patents in this important area. All told, we now hold more than 22 patents for CRISPR technologies worldwide.

The solid accounting and financing policies of the Group find expression in persistently good key balance sheet figures. The equity ratio as at December 31, 2019, was 40.9% (December 31, 2018: 46.7%) and thus remains at a very good level. Due to the acquisition of Versum Materials, net financial debt as of December 31, 2019, rose to € 12,363 million (December 31, 2018: € 6,701 million). To achieve a rapid reduction of financial liabilities we are focusing on generating organic growth and on high inflows of financial resources from operating business activities.

Based on our solid net assets and financial position, and our profitable operations, we view the economic situation of the Group as positive overall. Thanks to our leading position in science and technology we are able to look to the future with optimism.

Healthcare

HEALTHCARE

Key figures

€ million	2019	2018	Change € million	Change %
Net sales	6,714	6,246	468	7.5%
Operating result (EBIT)[1]	1,149	731	418	57.2%
Margin (% of net sales)[1]	17.1%	11.7%		
EBITDA[1]	1,896	1,492	404	27.1%
Margin (% of net sales)[1]	28.2%	23.9%		
EBITDA pre[1]	1,922	1,556	366	23.5%
Margin (% of net sales)[1]	28.6%	24.9%		
Business free cash flow[1]	1,252	1,025	227	22.1%

[1] Not defined by International Financial Reporting Standards (IFRSs).

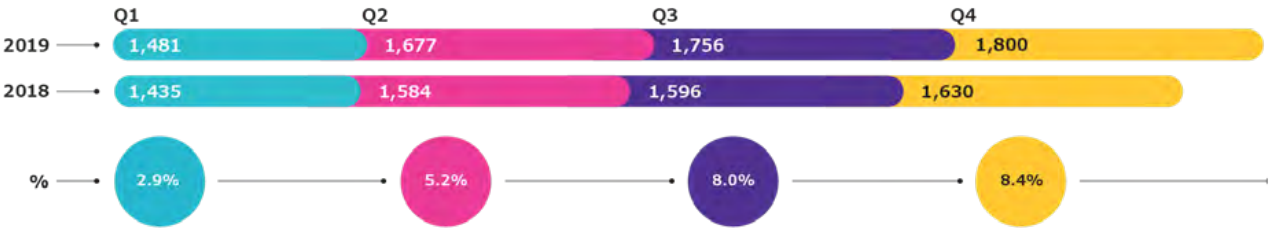
Development of sales and results of operations

In fiscal 2019, the Healthcare business sector recorded net sales of € 6,714 million (2018: € 6,246 million). Total growth of € 468 million or 7.5% was generated compared to the 2018 reporting period, consisting of organic growth amounting to 6.2% and positive exchange rate effects of 1.3%. The positive exchange rate effects resulted, in particular, from the trends of the U.S. dollar, the Chinese renminbi, and the Japanese yen.

The net sales in the individual quarters as well as the respective organic growth rates in 2019 are presented in the following graph:

Net sales and organic growth[1] by quarter[2]

€ million/organic growth in %



[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

Net sales of the key product lines and products developed as follows in 2019:

HEALTHCARE

Net sales by major product lines/products

€ million	2019	Share	Organic growth[1]	Exchange rate effects	Total change	2018	Share
Oncology	**1,030**	**15%**	**8.9%**	**0.2%**	**9.1%**	**944**	**15%**
thereof: Erbitux®	871	13%	6.7%	-0.1%	6.6%	816	13%
thereof: Bavencio®	103	2%	44.1%	3.9%	48.0%	69	1%
Neurology & Immunology	**1,594**	**24%**	**1.8%**	**2.5%**	**4.2%**	**1,529**	**24%**
thereof: Rebif®	1,273	19%	-13.9%	2.4%	-11.5%	1,438	23%
thereof: Mavenclad®	321	5%	>100.0%	3.7%	>100.0%	90	1%
Fertility	**1,247**	**19%**	**5.9%**	**1.4%**	**7.3%**	**1,162**	**19%**
thereof: Gonal-f®	743	11%	3.3%	1.6%	4.9%	708	11%
General Medicine & Endocrinology	**2,557**	**38%**	**8.3%**	**0.9%**	**9.2%**	**2,341**	**38%**
thereof: Glucophage®	877	13%	18.5%	1.1%	19.6%	733	12%
thereof: Concor®	530	8%	10.4%	1.2%	11.6%	475	8%
thereof: Euthyrox®	402	6%	10.4%	0.2%	10.6%	363	6%
thereof: Saizen®	238	4%	3.3%	-1.6%	1.7%	234	4%
Other	**287**	**4%**				**270**	**4%**
Healthcare	**6,714**	**100%**	**6.2%**	**1.3%**	**7.5%**	**6,246**	**100%**

[1] Not defined by International Financial Reporting Standards (IFRSs).

Oncology drug Erbitux® (cetuximab) showed a positive organic sales trend of 6.7%, with the addition of Erbitux® to the National Reimbursement Drug List (NRDL) in China being a major contributing factor. In addition, in September 2019, the National Medical Products Administration (NMPA) of China approved Erbitux® for the first-line treatment for patients with RAS wild-type metastatic colorectal cancer (mCRC) in combination with FOLFOX or FOLFIRI, or in combination with irinotecan in patients who are refractory to irinotecan-containing chemotherapy. As a result, the Asia-Pacific region generated organic sales growth of 31.1%. By contrast, the situation in Europe remained marked by a difficult competitive environment, which led to an organic sales decline of -6.8%. Global net sales of Erbitux® in fiscal 2019, taking into account slightly negative exchange rate effects, increased by 6.6% to € 871 million (2018: € 816 million).

In the field of immuno-oncology, sales of oncology drug Bavencio® (avelumab) rose organically by 44.1% and reached € 103 million (2018: € 69 million), supported by a positive exchange rate trend of 3.9%. The extension of approval in various regions contributed to this growth. In May 2019, for example, the United States Food and Drug Administration (FDA) issued approval for the combination of Bavencio® (avelumab) plus axitinib for patients with advanced renal cell carcinoma. The European Commission followed suit in October with the approval of Bavencio® (avelumab) in combination with axitinib as a first-line treatment in patients with advanced renal cell carcinoma. In Japan, too, approval was granted in December 2019.

A material contribution to the pleasing organic growth of the Healthcare business sector amounting to 6.2% came from Mavenclad®, a medicine for the oral short-course treatment of highly active relapsing multiple sclerosis. Mavenclad® generated net sales of € 321 million in fiscal 2019 (2018: € 90 million), a three and a half times increase on the prior-year figure. The sharp rise in sales of Mavenclad® was also thanks to the FDA approval in the United States in March 2019, where Mavenclad® was approved as the first and only oral short-course treatment of highly active relapsing and active secondary progredient multiple sclerosis. This means that the therapy is now available in more than 70 countries, including the countries of the European Union, Australia, Canada, and the United States.

HEALTHCARE

Sales and organic growth[1] of Rebif® and Erbitux® by region– 2019

		Total	Europe	North America	Asia-Pacific (APAC)	Latin America	Middle East and Africa (MEA)
Rebif®	€ million	1,273	340	809	12	43	70
	Organic growth[1] in %	-13.9%	-13.7%	-16.5%	-5.9%	0.1%	9.9%
	% of sales	100%	27%	64%	1%	3%	5%
Erbitux®	€ million	871	405	–	344	72	50
	Organic growth[1] in %	6.7%	-6.8%	–	31.1%	16.5%	-11.1%
	% of sales	100%	47%	–	39%	8%	6%

[1] Not defined by International Financial Reporting Standards (IFRSs).

Sales of the drug Rebif®, which is used to treat relapsing forms of multiple sclerosis, saw an organic decline in net sales of -13.9% in 2019. Including positive exchange rate effects, net sales of € 1,273 million were recorded in 2019 (2018: € 1,438 million). This trend resulted from an organic decline on the main sales market, North America, amounting to -16.5%, followed by Europe with -13.7%. The drop in sales was attributable to the persistently difficult competitive situation on the interferon market and the competition from alternative therapies, including oral dosage forms. Since October 2019, Rebif® has been approved as well in the European Union for use during pregnancy and breast-feeding if clinically needed. The use of Rebif® while breast-feeding is an important option because many patients experience a relapse in the first three months after birth.

Gonal-f®, the leading recombinant hormone used in the treatment of infertility, generated organic growth of 3.3%. Including positive exchange rate effects, global sales increased by 4.9% to € 743 million (2018: € 708 million). North America and China, in particular, contributed to the organic growth.

The General Medicine & Endocrinology franchise (including CardioMetabolic Care) generated organic growth of 8.3% in comparison with the prior-year period. The franchise includes medicines to treat cardiovascular diseases, thyroid disorders, diabetes, and growth disorders. In all, the franchise generated net sales of € 2,557 million in fiscal 2019 (2018: € 2,341 million), equivalent to growth of 9.2%, of which 8.3% was organic and 0.9% currency-related.

The diabetes drug Glucophage®, the best-selling product in this area, recorded organic growth of 18.5%. The main driver was the positive development in China. Taking into account positive exchange rate effects, global Glucophage® sales increased to € 877 million (2018: € 733 million).

Double-digit sales growth (10.4%) was also achieved with beta-blocker Concor®. Additional positive exchange rate effects prompted an increase in sales of 11.6% to € 530 million. Net sales in the previous year were € 475 million.

A positive performance was also recorded by Euthyrox®, a medicine to treat thyroid disorders, with organic sales growth of 10.4%. Net sales thus increased to € 402 million (2018: € 363 million), with exchange rate effects playing only a minor role.

The organic sales growth of 3.3% reported by growth hormone Saizen® was reduced to 1.7% due to a negative exchange rate effect; as a result, sales overall rose to € 238 million (2018: € 234 million).

Net sales of the Healthcare business sector by region in 2019 developed as follows:

HEALTHCARE

Net sales by region

€ million	2019	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2018	Share
Europe	2,241	33%	2.1%	-0.4%	–	1.7%	2,203	35%
North America	1,474	22%	-2.0%	4.9%	–	2.9%	1,432	23%
Asia-Pacific (APAC)	1,816	27%	19.0%	2.0%	–	21.0%	1,501	24%
Latin America	702	11%	9.8%	-3.6%	–	6.2%	661	11%
Middle East and Africa (MEA)	482	7%	4.4%	3.0%	–	7.4%	448	7%
Healthcare	**6,714**	**100%**	**6.2%**	**1.3%**	**–**	**7.5%**	**6,246**	**100%**

[1] Not defined by International Financial Reporting Standards (IFRSs).

The following table presents the composition of EBITDA pre in fiscal 2019 in comparison with 2018. The IFRS figures have been modified to reflect the elimination of adjustments included in the functional costs.

HEALTHCARE

Reconciliation EBITDA pre[1]

	2019			2018[2]			Change
€ million	IFRSs	Elimination of adjustments	Pre[1]	IFRSs	Elimination of adjustments	Pre[1]	Pre[1]
Net sales	**6,714**	**–**	**6,714**	**6,246**	**–**	**6,246**	**7.5%**
Cost of sales	-1,605	–	-1,605	-1,425	7	-1,419	13.1%
Gross profit	**5,109**	**–**	**5,109**	**4,820**	**7**	**4,827**	**5.8%**
Marketing and selling expenses	-2,305	3	-2,303	-2,349	10	-2,339	-1.5%
Administration expenses	-344	15	-329	-329	28	-301	9.2%
Research and development costs	-1,666	2	-1,663	-1,687	1	-1,686	-1.4%
Impairment losses and reversals of impairment losses on financial assets (net)	-1	–	-1	-3	–	-3	-61.7%
Other operating income and expenses	357	6	363	279	29	308	17.8%
Operating result (EBIT)[1]	**1,149**			**731**			
Depreciation/amortization/impairment losses/reversals of impairment losses	747	-1	746	761	-11	749	-0.5%
EBITDA[1]	1,896			1,492			
Restructuring expenses	17	-17	–	12	-12	–	
Integration expenses/IT expenses	13	-13	–	18	-18	–	
Gains (-)/losses (+) on the divestment of businesses	-5	5	–	26	-26	–	
Acquisition-related adjustments	–	–	–	–	–	–	
Other adjustments	–	–	–	8	-8	–	
EBITDA pre[1]	**1,922**	**–**	**1,922**	**1,556**	**–**	**1,556**	**23.5%**
thereof: organic growth[1]							19.5%
thereof: exchange rate effects							4.1%
thereof: acquisitions/divestments							–

[1] Not defined by International Financial Reporting Standard (IFRSs).

[2] Previous year's figures have been adjusted, see Note (45) "Effects from new accounting standards and other presentation changes" in the Notes to the Consolidated Financial Statements.

Gross profit of the Healthcare business sector after adjustments amounted to € 5,109 million and was 5.8% above the prior-year period (2018: € 4,827 million). The increase is essentially attributable to the strong organic development of net sales. The resulting gross margin declined slightly compared to the prior year, to 76.1% (2018: 77.2%). The 13.1% rise in the cost of sales also includes higher license expenses for Mavenclad®, which developed in line with the higher sales volume.

Marketing and selling expenses after adjustments amounted to € 2,303 million (2018: € 2,339 million) and showed a slight decline (-1.5%). At € 1,663 million (2018: € 1,686 million), research and development costs also remained at a comparable level to the prior year (-1.4%). This reflects continued investments in the development pipeline. The income balance of other operating expenses and income rose by 17.8% to € 357 million after adjustments (2018: € 308 million). Various lump sums recognized in fiscal 2019 made a material contribution to this increase. In connection with the sale of Palynziq™ rights to BioMarin Pharmaceutical Inc., United States, in 2016, a milestone payment of € 75 million was recognized in 2019 (2018: € 50 million). Following the extension of approval of Bavencio® for the treatment of advanced renal cell carcinoma in combination with axitinib in the United States, the EU, and Japan, milestone payments of € 90 million were generated from the partnership with Pfizer.

The upfront cash payment of € 300 million from the alliance with GlaxoSmithKline plc., United Kingdom, for the joint development and marketing of bintrafusp alfa is recognized in the income statement in accordance with the fulfillment of contractually promised goods and services, and had a positive effect of € 92 million in fiscal 2019. The increase in income was also accompanied by higher expenses. Among other things, an impairment loss was recognized in 2019 in connection with an intangible asset from the collaboration with F-star Delta Ltd. in the field of immuno-oncology (see Note (6) "Collaborations" in the Notes to the Consolidated Financial Statements).

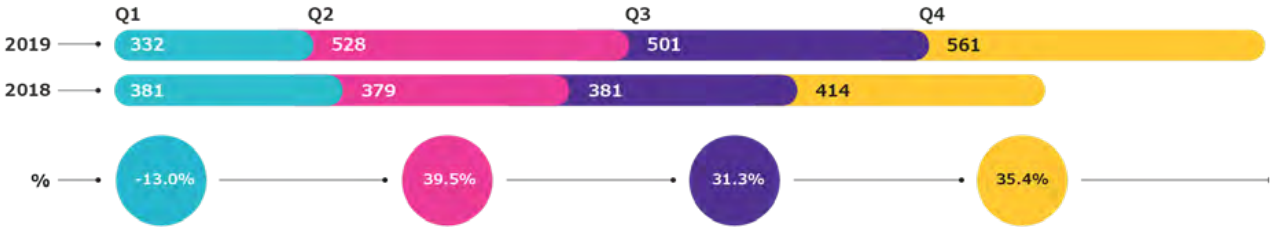
EBITDA pre recorded a highly gratifying development in 2019, rising by 23.5% to € 1,922 million (2018: € 1,556 million). Organic earnings growth was 19.5%; this figure includes the positive effects from the application of IFRS 16 "Leases" amounting to € 52 million. Overall, the EBITDA pre margin also showed growth of more than 3 percentage points to 28.6% (2018: 24.9%).

The development of EBITDA pre in the individual quarters in comparison with 2018 is presented in the following overview:

HEALTHCARE

EBITDA pre[1] and change by quarter[2]

€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

DEVELOPMENT OF BUSINESS FREE CASH FLOW

In 2019, the business free cash flow amounted to € 1,252 million (2018: € 1,025 million) and thus grew by 22.1%. This development was primarily attributable to the higher EBITDA pre, which more than offset the inventory build-up and increase in receivables.

HEALTHCARE

Business free cash flow[1]

€ million	2019	2018	Change € million	Change %
EBITDA pre[1]	1,922	1,556	366	23.5%
Investments in property, plant and equipment, software as well as advance payments for intangible assets	-427	-395	-32	8.1%
Changes in inventories	-94	-55	-38	69.3%
Changes in trade accounts receivable as well as receivables from royalties and licenses	-100	-81	-19	23.6%
Lease payments[2]	-50			
Business free cash flow[1]	**1,252**	**1,025**	**227**	**22.1%**

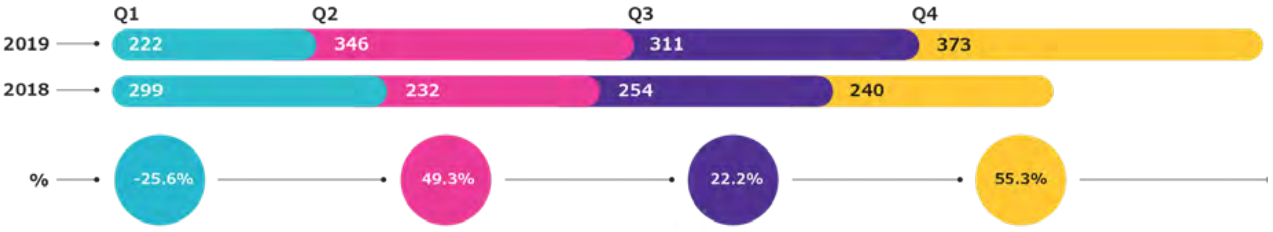
[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Excluding payments for low-value leases and interest components included in lease payments.

The development of business free cash flow items in the individual quarters in comparison with 2018 is presented in the following overview:

HEALTHCARE

Business free cash flow[1] and change by quarter[2]

€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

Life Science

LIFE SCIENCE

Key figures

€ million	**2019**	2018	Change € million	Change %
Net sales	6,864	6,185	679	11.0%
Operating result (EBIT)[1]	1,280	1,036	245	23.6%
Margin (% of net sales)[1]	18.7%	16.7%		
EBITDA[1]	2,070	1,755	315	17.9%
Margin (% of net sales)[1]	30.2%	28.4%		
EBITDA pre[1]	2,129	1,840	289	15.7%
Margin (% of net sales)[1]	31.0%	29.8%		
Business free cash flow[1]	1,375	1,393	-18	-1.3%

[1] Not defined by International Financial Reporting Standards (IFRSs).

Development of sales and results of operations

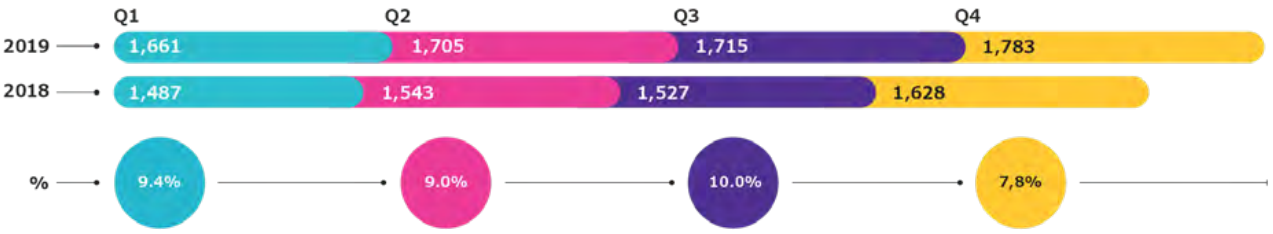
In fiscal 2019, Life Science posted a strong organic sales growth of 9.0%, assisted by a favorable foreign exchange impact of 2.6% and offset by a negative portfolio effect of -0.6%, resulting in a total growth of 11.0% compared to the previous year. All three business units contributed to organic growth, with the largest contribution coming from Process Solutions, followed by Applied Solutions. Taking these effects into account, Life Science net sales increased overall to € 6,864 million (2018: € 6,185 million).

The development of sales in the individual quarters in comparison with 2018 as well as the respective organic growth rates are presented in the following graph:

LIFE SCIENCE

Net sales and organic growth[1] by quarter[2]

€ million/organic growth in %



[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

LIFE SCIENCE

Net sales by business unit[1]

€ million	2019	Share	Organic growth[2]	Exchange rate effects	Acquisitions/divestments	Total change	2018	Share
Process Solutions	3,003	44%	15.1%	3.0%	–	18.1%	2,543	41%
Research Solutions	2,176	32%	3.9%	2.4%	–	6.3%	2,046	33%
Applied Solutions	1,685	24%	5.9%	2.0%	-2.3%	5.6%	1,596	26%
Life Science	**6,864**	**100%**	**9.0%**	**2.6%**	**-0.6%**	**11.0%**	**6,185**	**100%**

[1] Previous year's figures have been adjusted due to an internal realignment.
[2] Not defined by International Financial Reporting Standards (IFRSs).

The Process Solutions business unit, which markets products and services for the pharmaceutical production value chain, generated organic sales growth of 15.1%, which was the highest rate within the Life Science business sector. Assisted by a favorable foreign exchange effect of 3.0%, sales amounted to € 3,003 million in 2019 (2018: € 2,543 million). Therefore, Process Solutions accounted for 44% of total net sales in the Life Science business sector. Nearly all businesses contributed to the sales increase with double-digit growth rates. In regional terms, all regions except Middle East and Africa experienced double-digit growth within Process Solutions.

The Research Solutions business unit, which provides products and services to support research for pharmaceutical, biotechnology, and academic research laboratories, recorded an increase in organic sales of 3.9%. Supported by favorable exchange rate effects of 2.4%, sales totaled € 2,176 million in fiscal 2019 (2018: € 2,046 million). Organic growth was driven by all business fields. Research Solutions thus accounted for 32% of Life Science net sales. In regional terms, Asia-Pacific was the strongest organic growth driver for Research Solutions.

The Applied Solutions business unit, which accounted for a 24% share of Life Science net sales in 2019, delivered strong organic sales growth of 5.9% with its broad range of products for researchers as well as scientific and industrial laboratories. The negative portfolio impact was attributable to the divestment of the flow cytometry business. Assisted by favorable exchange rate effects of 2.0%, sales totaled € 1,685 million in 2019 (2018: € 1,596 million). The sales performance of Applied Solutions was driven by all business fields and in all regions.

Net sales of the business sector by region developed as follows:

LIFE SCIENCE

Net sales by region

€ million	2019	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2018	Share
Europe	2,277	33%	6.7%	0.4%	-0.5%	6.6%	2,136	35%
North America	2,474	36%	8.9%	5.6%	-0.6%	13.8%	2,173	35%
Asia-Pacific (APAC)	1,743	26%	11.8%	2.7%	-0.7%	13.8%	1,532	25%
Latin America	278	4%	13.6%	-4.9%	-0.2%	8.5%	256	4%
Middle East and Africa (MEA)	92	1%	5.7%	-0.4%	-0.4%	4.9%	88	1%
Life Science	**6,864**	**100%**	**9.0%**	**2.6%**	**-0.6%**	**11.0%**	**6,185**	**100%**

[1] Not defined by International Financial Reporting Standards (IFRSs).

The following table presents the composition of EBITDA pre for 2019 in comparison with 2018. The International Financial Reporting Standards (IFRS) figures have been modified to reflect the elimination of adjustments included in the respective functional costs.

LIFE SCIENCE

Reconciliation EBITDA pre[1]

	2019			2018[2]			Change
€ million	IFRSs	Elimination of adjustments	Pre[1]	IFRSs	Elimination of adjustments	Pre[1]	Pre[1]
Net sales	**6,864**	**–**	**6,864**	**6,185**	**–**	**6,185**	**11.0%**
Cost of sales	-2,962	5	-2,957	-2,723	38	-2,685	10.1%
Gross profit	**3,903**	**5**	**3,908**	**3,463**	**38**	**3,500**	**11.6%**
Marketing and selling expenses	-1,924	2	-1,922	-1,777	2	-1,775	8.3%
Administration expenses	-341	34	-307	-335	52	-282	8.9%
Research and development costs	-276	–	-276	-251	1	-249	10.7%
Impairment losses and reversals of impairment losses on financial assets (net)	-7	–	-7	-4	–	-4	56.1%
Other operating income and expenses	-75	19	-56	-60	14	-46	21.8%
Operating result (EBIT)[1]	**1,280**			**1,036**			
Depreciation/amortization/impairment losses/reversals of impairment losses	789	–	789	719	-23	696	13.3%
EBITDA[1]	**2,070**			**1,755**			
Restructuring expenses	13	-13	–	3	-3	–	
Integration expenses/IT expenses	36	-36	–	86	-86	–	
Gains (-)/losses (+) on the divestment of businesses	9	-9	–	-8	8	–	
Acquisition-related adjustments	2	-2	–	2	-2	–	
Other adjustments	–	–	–	3	-3	–	
EBITDA pre[1]	**2,129**	**–**	**2,129**	**1,840**	**–**	**1,840**	**15.7%**
thereof: organic growth[1]							14.4%
thereof: exchange rate effects							1.5%
thereof: acquisitions/divestments							-0.2%

[1] Not defined by International Financial Reporting Standard (IFRSs).

[2] Previous year's figures have been adjusted, see Note (45) "Effects from new accounting standards and other presentation changes" in the Notes to the Consolidated Financial Statements.

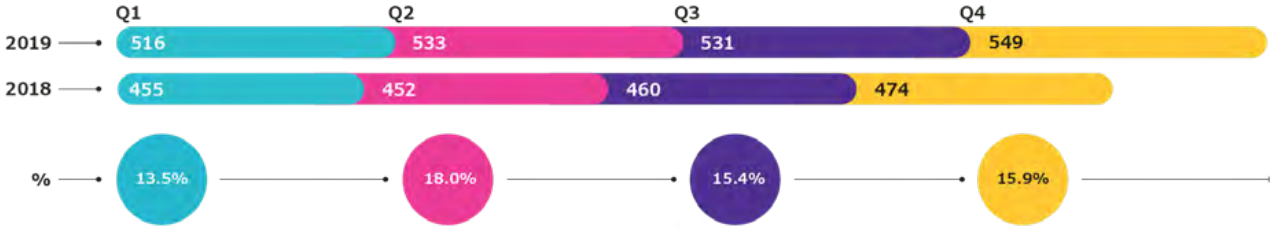
Adjusted gross profit increased by 11,6% to € 3,908 million (2018: € 3,500 million). The strong increase was driven by organic sales growth across all business units and production capacity utilization. The gross margin of Life Science, i.e. gross profit as a percentage of net sales, amounted to 56.9% (2018: 56.6%). Marketing and selling expenses increased by 8.3% to € 1,922 million (2018: € 1,775 million) while research and development costs increased by 10.7% to € 276 million (2018: € 249 million). Other operating expenses (net) increased by 21.8% to € 56 million (2018: € 46 million). After eliminating adjustments, amortization, and depreciation, EBITDA pre rose by 15.7% to € 2,129 million (2018: € 1,840 million). This double-digit increase in the most important key figure used to steer the operating business was mainly organic (14.4%) and included a positive earnings contribution of € 59 million due to the first-time application of IFRS 16 "Leases." The result margin, i.e. EBITDA pre as a percentage of net sales, increased in 2019 to 31.0% (2018: 29.8%). This reflects the strong performance of the combined Life Science businesses along with continued focus on driving sales and managing costs.

The development of EBITDA pre in the individual quarters in comparison with 2018 is presented in the following overview:

LIFE SCIENCE

EBITDA pre[1] and change by quarter[2]

€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

DEVELOPMENT OF BUSINESS FREE CASH FLOW

In 2019, business free cash flow amounted to € 1,375 million (2018: € 1,393 million). Higher EBITDA pre was primarily offset by the build-up of inventories supporting the sales growth, increased capital spending, and an increase in trade accounts receivable following the underlying sales development.

LIFE SCIENCE

Business free cash flow[1]

			Change	
€ million	**2019**	2018	€ million	%
EBITDA pre[1]	2,129	1,840	289	15.7%
Investments in property, plant and equipment, software as well as advance payments for intangible assets	-384	-315	-69	21.8%
Changes in inventories	-232	-116	-117	>100.0%
Changes in trade accounts receivable as well as receivables from royalties and licenses	-81	-17	-65	>100.0%
Lease payments[2]	-56			
Elimination first-time consolidation	1			
Business free cash flow[1]	**1,375**	**1,393**	**-18**	**-1.3%**

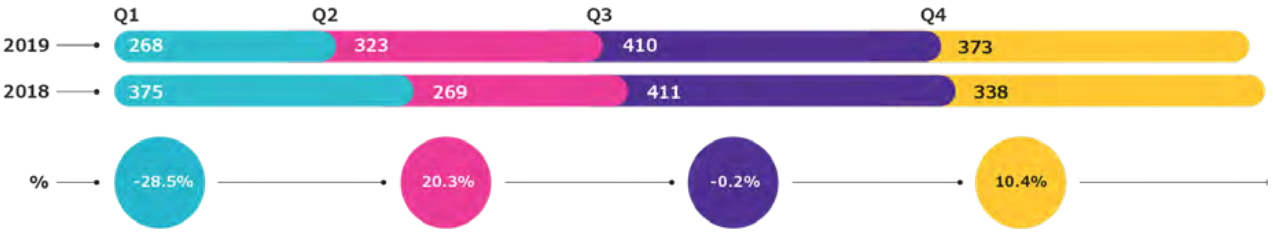
[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Excluding payments for low-value leases and interest components included in lease payments.

The development of business free cash flow items in the individual quarters in comparison with 2018 is presented in the following overview:

LIFE SCIENCE

Business free cash flow[1] and change by quarter[2]

€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

Performance Materials

PERFORMANCE MATERIALS

Key figures

			Change	
€ million	**2019**	2018	€ million	%
Net sales	2,574	2,406	168	7.0%
Operating result (EBIT)[1]	307	508	-200	-39.5%
Margin (% of net sales)[1]	11.9%	21.1%		
EBITDA[1]	637	769	-132	-17.1%
Margin (% of net sales)[1]	24.8%	32.0%		
EBITDA pre[1]	803	786	18	2.3%
Margin (% of net sales)[1]	31.2%	32.7%		
Business free cash flow[1]	641	588	54	9.1%

[1] Not defined by International Financial Reporting Standards (IFRSs).

Development of net sales and results of operations

In 2019, net sales of the Performance Materials business sector rose by 7.0% to € 2,574 million (2018: € 2,406 million). This growth was attributable to additional net sales from the acquisitions of Versum Materials and Intermolecular (10.4%) and positive exchange rate effects of 3.1%. Both of these positive effects more than offset a decline in net sales in the original franchises.

The net sales in the individual quarters as well as the respective organic growth rates in 2019 are presented in the following graph:

PERFORMANCE MATERIALS

Net sales and organic growth[1] by quarters[2]

€ million/organic growth in %

[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

Organic sales growth of the individual quarters developed from 3.2% in the first quarter of 2019 to -15.2% in the fourth quarter of 2019. The performance in the second half of 2019 was attributable, in particular, to the strong 2018 figures for Display Solutions.

As expected, the Display Solutions business unit, consisting mainly of the business with liquid crystals, photoresists for display applications, and OLED materials, recorded an organic decline in 2019. This organic decline of -8.6% was partly offset by positive

exchange rate effects of 2.8%. Capacity ramp-up projects for panel makers in China had shown a strong performance in the third quarter of 2018, peaking in the fourth quarter of 2018. Although net sales in the first two quarters of 2019 continued to benefit from this ramp-up of production capacity, they did so to a comparatively lesser extent.

Following the acquisitions of Versum Materials and Intermolecular, the Semiconductor Solutions business unit has been structured into two new franchises: Semiconductor Materials and Delivery Systems & Services. Semiconductor Materials will continue to concentrate on the distribution and development of materials-based solutions for the semiconductor industry. Delivery Systems & Services focuses on the development and use of delivery systems for semiconductor manufacturers. Furthermore, Delivery Systems & Services will provide services for the installation of systems and safe handling of the specialist materials they process.

Overall, in 2019, customer silicon wafer processing remained below expectations against the backdrop of continued weakness in the semiconductor market. Weighed down by weak market activity, net sales in the original Semiconductor Solutions business units declined organically by -3.6%. However, this was more than offset by positive exchange rate effects of 4.1%.

Driven by the acquisitions of Versum Materials and Intermolecular, overall growth in Semiconductor Solutions was 42.5%. The proportion of Performance Materials sales accounted for by this business unit thus rose from 25% to 33%.

Net sales of the Surface Solutions business unit in fiscal 2019 were down -1.9% overall. An organic decline of -4.2%, attributable to weaker demand from the automotive segment in particular, was partly offset by positive exchange rate effects of 2.3%.

PERFORMANCE MATERIALS

Net sales by business unit

€ million	**2019**	**Share**	**organic growth[1]**	**Exchange rate effects**	**Acquisitions/ divestments**	**Total change**	2018	Share
Display Solutions	1,256	49%	-8.6%	2.8%	–	-5.7%	1,332	55%
Semiconductor Solutions	848	33%	-3.6%	4.1%	42.0%	42.5%	596	25%
Surface Solutions	468	18%	-4.2%	2.3%	–	-1.9%	476	20%
Other	2	0%	8.7%	2.4%	–	11.1%	1	0%
Performance Materials	**2,574**	**100%**	**-6.5%**	**3.1%**	**10.4%**	**7.0%**	**2,406**	**100%**

[1] Not defined by International Financial Reporting Standards (IFRSs).

Net sales of the Performance Materials business sector by region developed as follows:

PERFORMANCE MATERIALS

Net sales by region

€ million	**2019**	**Share**	**organic growth[1]**	**Exchange rate effects**	**Acquisitions/ divestments**	**Total change**	2018	Share
Europe	217	9%	-5.5%	0.1%	4.2%	-1.2%	220	9%
North America	267	10%	-7.0%	4.9%	27.0%	24.9%	214	9%
Asia-Pacific (APAC)	2,041	79%	-6.8%	3.2%	9.2%	5.6%	1,932	80%
Latin America	32	1%	-2.0%	0.2%	0.9%	-0.9%	32	2%
Middle East and Africa (MEA)	17	1%	48.3%	2.0%	71.8%	> 100.0%	8	0%
Performance Materials	**2,574**	**100%**	**-6.5%**	**3.1%**	**10.4%**	**7.0%**	**2,406**	**100%**

[1] Not defined by International Financial Reporting Standards (IFRSs).

The following table presents the composition of EBITDA pre for 2019 in comparison with 2018. The IFRS figures have been modified to reflect the elimination of adjustments included in the respective functional costs.

PERFORMANCE MATERIALS

Reconciliation EBITDA pre[1]

	2019			2018[2]			Change
€ million	IFRSs	Elimination of adjustments	Pre[1]	IFRSs	Elimination of adjustments	Pre[1]	Pre[1]
Net sales	**2,574**	**–**	**2,574**	**2,406**	**–**	**2,406**	**7.0%**
Cost of sales	-1,437	51	-1,386	-1,231	–	-1,230	12.6%
Gross profit	**1,137**	**51**	**1,188**	**1,175**	**–**	**1,175**	**1.1%**
Marketing and selling expenses	-329	6	-323	-255	–	-255	26.8%
Administration expenses	-118	11	-107	-107	17	-90	18.8%
Research and development costs	-267	26	-241	-242	–	-242	-0.5%
Impairment losses and reversals of impairment losses on financial assets (net)	–	–	–	-1	–	-1	–
Other operating income and expenses	-116	80	-37	-64	21	-43	-14.6%
Operating result (EBIT)[1]	**307**			**508**			
Depreciation/amortization/impairment losses/reversals of impairment losses	330	-7	323	261	-21	241	34.1%
EBITDA[1]	**637**			**769**			
Restructuring expenses	61	-61	–	1	-1	–	
Integration expenses/IT expenses	23	-23	–	15	-15	–	
Gains (-)/losses (+) on the divestment of businesses	–	–	–	–	–	–	
Acquisition-related adjustments	82	-82	–	–	–	–	
Other adjustments	–	–	–	1	-1	–	
EBITDA pre[1]	**803**	**–**	**803**	**786**	**–**	**786**	**2.3%**
thereof: organic growth[1]							-12.3%
thereof: exchange rate effects							6.1%
thereof: acquisitions/divestments							8.5%

[1] Not defined by International Financial Reporting Standard (IFRSs).

[2] Previous year's figures have been adjusted; see Note (45) "Effects from new accounting standards and other presentation changes" in the Notes to the Consolidated Financial Statements.

Gross profit of the Performance Materials business sector after adjustments rose by 1.1% to € 1,188 million in fiscal 2019 (2018: € 1,175 million). A key driver of this increase was the contribution provided by the Versum Materials acquisition, which more than offset the lower absorption of fixed costs amid the organic decline in sales in the Semiconductor Solutions and Surface Solutions business units. At 46.2% (2018: 48.9%), the gross margin in 2019 was below the previous year's level. Not including adjustments, the operating result (EBIT) decreased by € 200 million to € 307 million in 2019 (2018: € 508 million). The main drivers here were the restructuring expenses for the Bright Future transformation program, the acquisition and integration expenses for Versum Materials and Intermolecular, and IT expenses for enterprise resource planning (ERP) systems. These effects were only partly offset by the additional EBIT contribution from acquisitions. The rise in marketing and selling expenses and in administrative expenses was due to the additional costs of the Versum Materials and Intermolecular organizations. The so far successful implementation of the Bright Future transformation program more than offset the additional expenses of the Versum Materials and Intermolecular organizations in the adjusted research and development costs. EBITDA pre of the business sector grew by 2.3% to € 803 million (2018: € 786 million). The additional EBITDA pre from the acquisitions (8.5%) and positive foreign exchange effects (6.1%) more than offset the expected decline in organic EBITDA pre (-12.3%). The organic EBITDA pre development included favorable effects from the application of IFRS 16 "Leases" amounting to € 12 million. At 31.2%, the EBITDA pre margin in 2019 was down on the prior-year figure (2018: 32.7%).

EBITDA pre developed roughly in line with net sales over the first three quarters of 2019. The highly positive development in the fourth quarter of 2019 is attributable to additional EBITDA pre from the acquired businesses.

PERFORMANCE MATERIALS

EBITDA pre[1] and change by quarter[2]

€ million/change in %

[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

DEVELOPMENT OF BUSINESS FREE CASH FLOW

The business free cash flow of the Performance Materials business sector rose by 9.1% to € 641 million in 2019 (2018: € 588 million). Higher EBITDA pre and the reduction in receivables in fiscal 2019 substantially offset higher investments.

PERFORMANCE MATERIALS

Business free cash flow[1]

			Change	
€ million	**2019**	2018	€ million	%
EBITDA pre[1]	803	786	18	2.3%
Investments in property, plant and equipment, software as well as advance payments for intangible assets	-158	-118	-40	33.9%
Changes in inventories	-251	-44	-207	>100.0%
Changes in trade accounts receivable as well as receivables from royalties and licenses	-88	-36	-51	>100.0%
Lease payments[2]	-11			
Elimination first-time consolidations of Versum/Intermolecular	346			
Business free cash flow[1]	**641**	**588**	**54**	**9.1%**

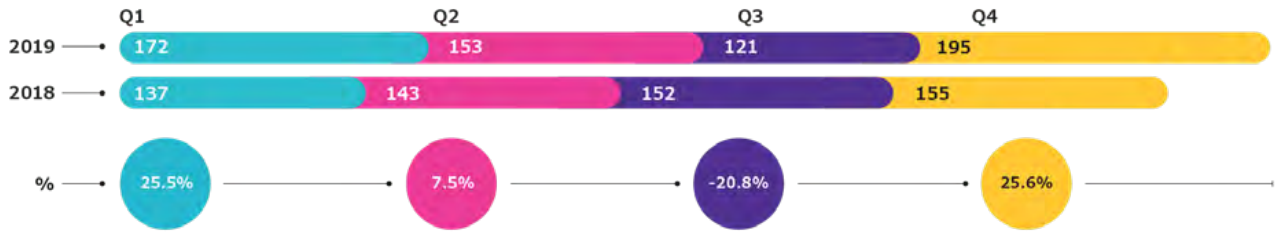
[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Excluding payments for low-value leases and interest components included in lease payments.

The development of business free cash flow items in the individual quarters in comparison with 2018 is presented in the following overview:

PERFORMANCE MATERIALS

Business free cash flow[1] and change by quarter[2]

€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRSs).
[2] Quarterly breakdown unaudited.

Corporate and Other

Corporate and Other comprises Group administration expenses for central Group functions that cannot be directly allocated to the business sectors, such as Finance, Procurement, Legal, Communications, and Human Resources. Corporate costs additionally encompass expenses for central, non-allocated IT functions, including expenses related to the expansion and harmonization of IT systems within the Group as well as research and development costs spanning business sectors.

CORPORATE AND OTHER

Key figures

			Change	
€ million	**2019**	2018	€ million	%
Operating result (EBIT)[1]	-617	-548	-69	12.6%
EBITDA[1]	-537	-488	-48	9.9%
EBITDA pre[1]	-469	-381	-88	23.0%
Business free cash flow[1]	-536	-497	-39	7.9%

[1] Not defined by International Financial Reporting Standards (IFRSs).

After eliminating adjustments, administrative costs declined to €302 million in fiscal 2019 (2018: €320 million). Cross-business research and development costs amounting to €59 million (2018: €47 million), such as operating expenses for the Innovation Center, were allocated to Corporate. Other operating expenses (net) rose to €–167 million (2018: € –90 million), due primarily to the development of the foreign exchange result. A reversal of an impairment loss (€ 37 million) for receivables in connection with contractual refund claims from the sale of the Generics business in 2007 had a positive effect on the operating result. After eliminating depreciation, amortization, and adjustments, EBITDA pre amounted to € –469 million in 2019 (2018: € –381 million). The increase in negative business free cash flow to € –536 million (2018: € –497 million) was largely the outcome of the development of EBITDA pre as well as lower investments.

Report on Risks and Opportunities[1]

Risks and opportunities are inherent to entrepreneurial activity. We have put systems and processes in place to identify risks at an early stage and to counteract them by taking appropriate action. Within the company, opportunity management is an integral component of internal decision-making processes such as short- and medium-term planning and intra-year business plans.

Risk and opportunity management

Merck KGaA, Darmstadt, Germany, is part of a complex, global business world and is therefore exposed to a multitude of external and internal influences. Every business decision is therefore based on the associated risks and opportunities.

In our internal risk reporting, risks are defined as potential future events or developments that could lead to a negative deviation from our (financial) targets. In parallel, opportunities are defined as potential events or developments that imply a positive deviation from our planned (financial) targets. Identified future events and expected developments are taken into account in internal planning, provided that it can be assumed that their occurrence is likely in the planning period. The risks and opportunities presented in the following risk and opportunities report are those potential future events that could respectively lead to a negative or positive deviation from the topics covered by planning.

Risk management process

The objective of our risk management activities is to recognize, assess, and manage risks early on and to implement appropriate measures to minimize them. The responsibilities, objectives, and processes of risk management are described in our internal risk management guidelines. The business heads, managing directors of our subsidiaries, and the heads of Group functions are specified as employees with responsibility for risks. The group of consolidated companies for risk reporting purposes is the same as the group of consolidated companies for the Consolidated Financial Statements. Every six months, the risk owners assess their risk status and report their risk portfolio to Risk Management. We use special risk management software in the context of these activities.

Likewise, risk-mitigating measures are reported and assessed. The effectiveness of these measures and the planned implementation time frame are monitored by Group Risk Management.

The residual risk after the implementation of these measures is presented in the internal risk report as net risk.

Group Controlling & Risk Management forms the organizational framework for risk management and reports directly to the Group Chief Financial Officer. Group Risk Management uses the information reported to determine the current risk portfolio for the Group, presenting this in a report to the Executive Board, the Supervisory Board, and the Finance Committee with detailed explanations twice per year. This also encompasses a probability-weighted aggregation of risks at the Group level using a Monte Carlo simulation. Furthermore, significant changes in the assessment of the risks already known and new significant risks can be reported at any time, and are communicated to the Executive Board on an ad hoc basis.

For reporting risks with a potential negative impact on our EBIT, a minimum threshold is set at a value of € 5 million in the standard process and at a value of € 25 million in the ad hoc process. Risks below these thresholds are steered independently within the business sectors. The relevant timeframe for internal risk reporting is five years. The effects of risks described in this report on risks and opportunities are presented as annual values. The assessment of the risks presented relates to December 31, 2019. There were no relevant changes after the balance sheet date that would have necessitated an amended presentation of the risk situation of the Group.

Within the scope of audits, Group Internal Auditing regularly reviews the performance of risk management processes within the units and, at the same time, the communication of relevant risks from the operating businesses to Group Risk Management.

[1] Owing to an altered risk assessment as regards the Covid-19 pandemic, the section entitled "Overall view of the risk and opportunity situation and management assessment" of this Report on Risks and Opportunities was correspondingly supplemented on May 12, 2020.

Opportunity management process

The risk management system described concentrates on business risks, and not on opportunities at the same time. The opportunity management process is integrated into our internal controlling processes and carried out in the operating units on the basis of the Group strategy. The businesses analyze and assess potential market opportunities as part of strategy and planning processes. In this context, investment opportunities are examined and prioritized primarily in terms of their potential value proposition in order to ensure an effective allocation of resources. We specifically invest in growth markets to leverage the opportunities of dynamic development and customer proximity at a local level.

If the occurrence of the identified opportunities is rated as likely, they are incorporated into the business plans and the short-term forecasts. Trends going beyond this, or events that could lead to a positive development in the net assets, financial position, and results of operations, are presented in the following report as opportunities. These could have a positive effect on our medium-term prospects.

Risk and opportunity assessment

Risks

The significance of risks is calculated on the basis of their potential negative impact on the forecast financial targets in conjunction with the probability of occurrence of the respective risk. In line with these two factors, risks are classified as "high," "medium" or "low."

The underlying scales for measuring these factors are shown below:

PROBABILITY OF OCCURRENCE

Probability of occurrence	Explanation
< 20%	Unlikely
20–50%	Possible
51–80%	Likely
> 80%	Very likely

DEGREE OF IMPACT

Degree of impact	Explanation
> € 50 million	Critical negative impact on the net assets, financial position, and results of operations
€ 20 – 50 million	Substantial negative impact on the net assets, financial position, and results of operations
€ 5 – < 20 million< /th>	Moderate negative impact on the net assets, financial position, and results of operations
< € 5 million	Immaterial negative impact on the net assets, financial position and results of operations

The combination of the two factors results in the risk matrix below, which shows the individual risks and their significance to the Group.

RISK MATRIX

> € 50 million	Medium	Medium	High	High
€ 20 – 50 million	Medium	Medium	Medium	High
€ 5 – < 20 million< /th>	Low	Medium	Medium	Medium
< € 5 million	Low	Low	Low	Low
Impact / Probability of occurrence	< 20%	20 – 50%	51 – 80%	> 80%

Opportunities

Opportunities are assessed in their respective specific business environment. General measures of the business functions are quantified during operational planning, usually in relation to sales, EBITDA pre, and business free cash flow. Net present value, internal rate of return, the return on capital employed (ROCE), and the amortization period of the investment are primarily used to assess and prioritize investment opportunities. Similarly, scenarios are frequently set up to simulate the influence of possible fluctuations and changes in the respective factors on results. There is no overarching, systematic classification of the probability of occurrence and impact of opportunities.

Internal control system for the Group accounting process

The objective of the internal control system for the accounting process is to implement controls that provide assurance that the financial statements are prepared in compliance with the relevant accounting laws and standards. This system covers measures designed to ensure the complete, correct, and timely conveyance and presentation of information that is relevant for the preparation of the Consolidated Financial Statements and the combined management report.

Key tools

The internal control system aims to ensure the accuracy of the consolidated accounting process through functioning internal controls with reasonable assurance. The Group Accounting function centrally steers the preparation of the Consolidated Financial Statements of Merck KGaA, Darmstadt, Germany, as the parent company of the Group. This Group function defines the reporting requirements that all our subsidiaries must meet. At the same time, this function steers and monitors the scheduling and process-related requirements of the Consolidated Financial Statements. Group Accounting centrally manages all changes to the equity holding structure and correspondingly adapts the Group's scope of consolidation. The proper elimination of intragroup transactions within the scope of the consolidation process is ensured. Group-wide accounting guidelines form the basis for the preparation of the statutory financial statements of the parent company and of the subsidiaries, which are reported to Group Accounting; the guidelines are adapted in a timely manner to reflect changes in the financial regulatory environment, and are updated in accordance with internal reporting requirements. For special issues, such as the accounting treatment of intangible assets within the scope of company acquisitions or pension obligations, external experts are additionally involved where necessary.

The individual companies have a local internal control system. Where financial processes are handled by a Shared Service Center, the internal control system of the Shared Service Center is additionally applied. Both ensure that accounting complies with IFRSs (International Financial Reporting Standards) and with the Group accounting guidelines.

Group Accounting provides support to the local contacts and ensures a consistently high quality of reporting throughout the entire reporting process.

For Group financial reporting purposes, most of our subsidiaries use standard SAP software. Consolidation software from SAP is also used for the elimination of intragroup transactions. A detailed authorization concept ensures the separation of duties with respect to both single-entity reporting and the Consolidated Financial Statements. In principle, the accounting process is designed to ensure that all units involved adhere to the principle of dual control.

The effectiveness of our internal control system with regard to accounting and the compliance with financial reporting by the individual companies is confirmed by both the local managing director and the local chief financial officer by signing the single-entity reporting. For the accounting treatment of balance sheet items, Group Accounting closely cooperates with Group Risk Management in order to correctly present potential risks in the balance sheet. All the structures and processes described are subject to regular review by Group Internal Auditing based on an annual audit plan set out by the Executive Board. The results of these audits are dealt with by the Executive Board, the Supervisory Board, and the Finance Committee. The internal control system at our company makes it possible to lower the risk of material misstatements in accounting to a minimum. However, no internal control system – regardless of its design – can entirely rule out a residual risk.

Business-related risks and opportunities

Political and regulatory risks and opportunities

As a global company, we face political and regulatory changes in a large number of countries and markets.

Risk of more restrictive regulatory requirements regarding drug pricing and reimbursement

In the Healthcare business sector, the known trend towards increasingly restrictive requirements in terms of drug pricing, reimbursement, and expansion of high-rebate groups is continuing. An important example here is the volume-based procurement initiative in the People's Republic of China. These requirements can negatively influence the profitability of our products, as can market referencing between countries, and the success of market launches. Foreseeable effects are taken into account as far as possible in the business sector's plans. Close communication with health and regulatory authorities serves as a preventive measure to avert risks.

Remaining risks beyond the current plans resulting from restrictive regulatory requirements are classified as a medium risk owing to the possible critical negative impact.

Risk of stricter regulations for the manufacturing, testing, and marketing of products

Likewise, in our Life Science and Performance Materials business sectors, we must adhere to a multitude of regulatory specifications regarding the manufacturing, testing, and marketing of many of our products. Specifically in the European Union, we are subject to the European chemicals regulation REACH. It demands comprehensive tests for chemical products. Moreover, the use of chemicals in production could be restricted, which would make it impossible to continue manufacturing certain products. We are constantly pursuing research and development in substance characterization and the possible substitution of critical substances so as to reduce the occurrence of this risk, and therefore view it as unlikely. Nevertheless, it is classified as a medium risk given its critical negative impact on the net assets, financial position, and results of operations.

Risk of negative political and macroeconomic developments

The destabilization of political systems, and the possible establishment of trade barriers, sanctions, and foreign exchange policy changes, can lead to declines in sales in certain countries and regions. These risks are taken into account as far as possible in the business plans of the affected countries and regions, and mitigated through product, industry, and regional diversification.

Potential negative macroeconomic developments can also impact our business. To minimize these impacts, corresponding measures pertaining to the sales strategy have been initiated in these countries.

The spread of the Corona virus since the beginning of 2020 is associated with risks in global macroeconomic developments, likewise with the potential for negative effects on our businesses.

The United Kingdom's exit from the European Union ("Brexit") gives rise to risks for our existing business in that country, including the devaluation of the pound sterling, a weakening of the United Kingdom's economy, regulatory changes, the creation of trade barriers such as tariffs, and in particular operational risks due to, for example, delays in the supply chain that could have an impact on our profitability. To analyze these risks and in order to counteract them early in a targeted manner, we established Group-internal working groups that considered various scenarios. Mitigation measures exist for these scenarios, which shall ensure market access and the stability of the supply chain in the best possible way. They also include, for example, a relocation of the marketing authorization holder for drugs currently registered via the United Kingdom; and changes to supply routes and the planned build-up of inventories of critical products, which are also designed to cushion the risk of delays in cross-border traffic, which is difficult to predict.

The net risk of negative political and macroeconomic developments is seen as possible and has critical negative effects on the net assets, financial position, and results of operations. We thus rate this as a medium risk.

Market risks and opportunities

We compete with numerous companies in the pharmaceutical, chemical, and life science sectors. Rising competitive pressure can have a significant impact on the quantities that can be sold and prices attainable for our products.

Opportunities due to new technologies in the manufacturing of displays

We see major opportunities in significant market growth of organic light-emitting diode (OLED) materials in high-quality display applications. We are building on more than ten years of experience in manufacturing OLED materials as well as a strong portfolio of worldwide patents in order to develop ultrapure and extremely stable materials that are precisely tailored to customer requirements. Development in the OLED market is being driven by the diversification of applications for small and large-area OLED displays.

According to industry estimates, the overall market volume for OLED materials will exceed that for liquid crystal materials as of 2022. In particular, the cooperation with Universal Display Corporation (UDC) announced in August will contribute to the joint further development of OLED technology and the accelerated development of new products. To further strengthen our OLED presence in Asia, we opened an OLED technology center in Shanghai in 2018 in addition to our existing centers in Southeast Asia. As local partner, we want to work with our customers to advance innovations and bring them to market faster.

Opportunities due to new application possibilities for liquid crystals

We are pursuing a strategy of leveraging our expertise as the global market leader in liquid crystals in order to develop new fields of application for innovative liquid crystal technologies. For instance, we are pressing ahead to capture the future markets for liquid crystal windows (LCWs) and mobile antennas. Thanks to licrivision™ technology, LCWs create new architectural possibilities. Through continuously variable brightness control, they can for example increase a building's energy efficiency. Moreover, the dynamic solar shading product eyrise™ s350 launched in the EU and North America allows solar shading to be managed while the windows remain transparent and color-neutral. Due to growing demand for dynamic glass, we see great potential for the new eyrise™ product brand. Antennas that can receive signals transmitted in the high frequency range can also be realized with the aid of corresponding liquid crystal mixtures. As a result, mobile data exchange could improve significantly in a wide variety of fields of application. Since novel liquid crystal materials for antennas are currently being developed, the market launch of liquid crystal antennas could take a few years.

Opportunities in the semiconductor industry

We see huge opportunities with our innovative Directed Self Assembly (DSA) technique for advanced lithography processing in Semiconductor Solutions. As semiconductor manufacturers continue to advance their device technologies, the processing steps are becoming more complex and significantly costlier to enable device performance. Our novel DSA platform and recent material advancements enable improved device performance and reduce the cost of sales and operating costs for our customers. This has resulted in our company securing a leading position as qualified standard supplier with several key semiconductor customers. Adoption of this disruptive lithography platform is expected to completely change how semiconductor manufacturing is conducted and could lead to a market leadership position for advanced lithography over the next few years. We are developing new dielectric platforms in cooperation with our key customers for 3D NAND applications. There has been a change in 3D NAND device architecture and some of our customers are moving away from floating gate to replacement gate. Therefore, we are currently working with those customers on this new device architecture.

In addition, we reached important milestones in our Bright Future transformation program in 2019 in the Performance Materials business sector, through which we are focusing more strongly on the electronic materials market. These milestones include the acquisitions of Versum Materials and Intermolecular in the area of semiconductor technologies. Intermolecular has application-specific materials expertise and platforms for accelerated learning and experimentation with a powerful analytical infrastructure that complements our Performance Materials business and technology portfolio. Intermolecular's manufacturing and testing capabilities allow material combinations to be tested directly in the specific application environment. Compared to conventional methods, this means enormous time savings in the development process, considerably faster learning cycles, and findings on new material combinations, providing a unique service for customers. Versum Materials is a leading global provider of innovative, high-purity process chemicals, gases, and equipment for semiconductor manufacturing. The expertise in our combined business will enable us to offer our customers in the electronics industry state-of-the-art technological innovations. They also benefit from our expanded portfolio of products and services as well as our broader global footprint. We are thus excellently positioned to benefit from long-term growth trends in the electrical materials industry.

Going forward, our offer for the semiconductor industry will consist of two specialized units: Semiconductor Materials and Delivery Systems & Services. Semiconductor Materials will continue to concentrate on the distribution and development of materials-based solutions. Delivery Systems & Services will focus on the development, distribution, installation, and safe operation of delivery systems for chemicals and gases for the manufacture of semiconductors.

Opportunities from new active ingredients for cosmetics

In the current reporting year, we have systematically pushed ahead with the expansion of its research on cosmetic raw materials and supplies according to the principles of pharmaceutical drug development. The synergies from the knowledge and technology transfer from the Healthcare and Life Science business sector have substantially improved the development times and efficiencies of new active ingredients for cosmetics. Combined with the establishment of advanced 3D skin models, this results in a range of promising new cosmetic raw materials that are due to be launched over the coming quarters.

Partnerships with leading providers from growth markets beyond Europe and North America play an increasingly important role when it comes to commercializing these products, which are offered for optimized management of the tanning or whitening of the skin, among other things.

Opportunities from leveraging the e-commerce and distribution platform

With the acquisition of Sigma-Aldrich in 2015, we gained access to the leading e-commerce platform in life science, www.sigmaaldrich.com. With this distribution platform, our customers continue to benefit from a portfolio of more than 300,000 products, including highly respected brands. We are further expanding this platform to continuously increase the number of products available through e-commerce. Increasing speed and convenience during our customers' ordering processes as well as offering support through individualized product recommendations can lead to higher sales volumes and the winning of new customers. Consequently, this distribution channel can lead to an above-average development of sales in the medium term.

Risks due to increased competition and customer technology changes

In the Healthcare business sector, both our biopharmaceutical products and classic pharmaceutical business are exposed to increased competition from rival products (in the form of biosimilars and generics). In the Life Science and Performance Materials business sectors, risks are posed by not only cyclical business fluctuations, but also changes in the technologies used or customer sourcing strategies, particularly with respect to liquid crystals. We use close customer relationships and in-house further developments as well as market proximity, including precise market analyses, as mitigating measures. Overall, owing to its possible occurrence with a critical negative impact, the market risk is classified as a medium risk.

Opportunities offered by digitalization and activities to boost innovative strength

Digital technologies are becoming increasingly important for our markets and our world of work. In 2015, we launched several strategic digital initiatives geared toward improving the efficiency of our internal processes and toward evaluating the opportunities of digitalization for our products and customers. We are also working on establishing new business outside our three business sectors, with a focus on digitalization and our innovation fields of Clean Meat, Liquid Biopsy, and Biosensing and Interfaces. In addition to collaborations with external partners such as the European Space Agency, the Accelerator program, which is being driven by our Innovation Center, is one component of our innovation strategy.

Another innovation driver is the patent received in the United States in 2019 for a new way to connect physical objects with a digital twin using artificial intelligence and blockchain technology. This novel technology allows physical objects to be securely anchored in the digital world, thereby protecting the integrity of supply chains and preventing product counterfeiting. The three-year collaboration launched in 2019 with the Karlsruhe start-up HQS Quantum Simulations also opens up revolutionary possibilities in the field of quantum computing. The collaboration between the start-up company and our Chief Digital Organization focuses on the application and commercialization of quantum chemistry software on dedicated computers.

In the Healthcare business sector, we entered into a cooperation with Iktos in 2019, which gives us access to generative technology based on Iktos' artificial intelligence (AI) for three drug discovery projects. This enables us to design new drugs quickly and cost-effectively.

In November 2018, our Life Science business sector launched its new BioContinuum™ Platform to optimize biotherapeutic drug manufacturing through improved efficiency, simplified plant operations, and greater quality and consistency. Continuing to drive this innovation in 2019, Life Science launched the BioContinuum™ Buffer Delivery Platform. This integrated solution is tailored to provide the highest possible levels of accuracy and precision in buffer preparation and management. It represents the next advancement in drug manufacturing for the biopharmaceutical industry, elevating continuous process technology while simultaneously working toward fully optimized, contiguous biotechnological process management of the future. This seamless physical and digital integration of all components of the BioContinuum™ Platform makes process development more efficient, safer, and less costly.

The 2019 acquisitions of FloDesign Sonics and BSSN Software contributed to the extension of Life Science's innovative strength. With FloDesign Sonics, we receive access to a unique platform for industrial production of cell and gene therapies, which allows the processing of cells by means of sound waves. We are the first company to use sound wave technology for the production of cell therapies.

The acquisition of BSSN Software, a laboratory informatics provider in Darmstadt, contributed to an acceleration of the digital transformation in customer laboratories. The solutions developed by BSSN Software equip our customers with better and more efficient access to their laboratory data. These acquisitions strengthen our business with digital solutions for laboratory productivity and grant us a unique position in this extremely dynamic market. The 2019 performance enhancement of the Milli-Q® CLX 7000 clinical water purification systems with Milli-Q® Connect – a new cloud-based, remote monitoring and service capability – also contributes to this purpose.

In the Performance Materials business sector, there are opportunities with regard to digitalization, in particular from our positioning in the area of electronic materials for the semiconductor and display industries. These include in particular the acquisitions of Versum Materials and Intermolecular mentioned above, which will enable us to offer our customers not only state-of-the-art technological innovations, but an expanded product portfolio as well.

Opportunities provided by the CRISPR technology

A pioneer of genome-editing innovation for 15 years, we are leveraging CRISPR technology as a core competency of its business. In 2019, we obtained multiple patent awards from the European Patent Office as well as from patent offices in the United Kingdom, Israel, Korea, Canada, and the United States. In total, we have 22 existing CRISPR patents in nine regions.

CRISPR technologies open up promising new avenues for medical research and potential solutions to treat some of the most difficult diseases, including cancer as well as hereditary and rare diseases. To simplify what has become a difficult-to-navigate CRISPR patent landscape, we entered into an innovative CRISPR licensing agreement with the United States-based Broad Institute of MIT and Harvard in 2019. This new framework eases and accelerates access to CRISPR intellectual property for research purposes.

Opportunities offered by customer proximity

In 2019, we opened another state-of-the-art site for customer collaboration, our new M Lab™ Collaboration Center in Molsheim, France. The Center includes non-good manufacturing practice (GMP) pilot and bench scale labs for customers to engage in process development support, troubleshooting, and hands-on training. It is one of nine such centers around the world, each of which allows pharmaceutical manufacturers to explore new ways to increase productivity, improve processes, and mitigate risks. Other M Lab™ Collaboration Center are located in the United States, Singapore, Japan, Korea, India, France, Brazil, and China, where an additional M Lab™ Collaboration Center is planned to open in 2020.

Risks and opportunities of research and development

For us, innovation is a major element of the Group strategy. Research and development projects can experience delays, expected budgets can be exceeded, or targets can remain unmet. Research and development activities are of special importance to the Healthcare business sector. In the course of portfolio management, we regularly evaluate and, if necessary, refocus research areas and all R&D pipeline projects. Alliances with external partners and the out-licensing of programs also form part of the catalog of measures for the efficient allocation of resources. The conclusion and continuation of these partnerships and externalizations plays an important role. A deviation from the strategic targets defined in this area could have a critical negative impact on net assets, financial position, and results of operations. The occurrence of a risk of this magnitude is considered unlikely, which means that this is a medium risk.

The global strategic alliance formed in early 2019 with GlaxoSmithKline plc (GSK) for the joint development and marketing of the bintrafusp alfa (M7824) immunotherapy developed by us can be highlighted as an opportunity for research and development in the Healthcare business sector. This novel immunotherapy is currently undergoing clinical trials and shows potential for new options for several hard-to-treat cancers.

The strategic alliance concluded with Pfizer Inc. in 2014 enabled us to jointly develop Bavencio®. Following approvals for patients with metastatic Merkel cell carcinoma and those with locally advanced or metastatic urothelial carcinoma in 2017, the United States Food and Drug Administration (FDA), the European Commission, and the Japanese Ministry of Health, Labor and Welfare issued approvals for Bavencio® (avelumab) plus Inlyta® (axitinib) for first-line treatment of patients with advanced renal cell carcinoma in 2019. Additional applications for these products have been submitted to regulatory authorities worldwide.

Mavenclad® was approved in 2017 by the European Commission. It is the first short-course oral treatment approved in Europe for the treatment of relapsing multiple sclerosis in patients with high disease activity. In 2018, approvals were also granted in the Middle East and Africa (United Arab Emirates) and Latin America (Argentina). With the approvals in the United States and Switzerland in 2019, Mavenclad® is currently approved in over 65 countries.

After Japan granted "fast-track" regulatory designation to tepotinib in 2018, it was granted the "breakthrough therapy" designation by the FDA in September 2019, and the "orphan drug" designation by the Japanese Ministry of Health, Labor and Welfare in November 2019. The molecule may have the potential to treat patients with advanced non-small cell lung cancer (NSCLC) harboring MET exon 14 skipping mutations.

The approval of Erbitux® (cetuximab) in combination with FOLFOX or FOLFIRI as a first-line therapy for patients with RAS wild-type metastatic colorectal cancer (mCRC) in China is another important milestone in our claim to be a global specialty innovator.

In addition to marketing already approved medicines, we are pushing ahead with research projects in other important therapeutic areas. The portfolio of projects is evaluated on a regular basis. This may also lead to in-licensing or out-licensing, or further strategic alliances.

Investments made in 2019, for example to expand biopharmaceutical research in the United States, are intended to accelerate scientific progress and the further development of our innovative clinical pipeline worldwide. The expenses currently being incurred, especially in our Healthcare research and development, are already reflected in the current plans. The same applies to sales of Bavencio® and Mavenclad® for approved indications in the respective markets. Further approvals may result in an increased sales potential.

Risks of discontinuing development projects and regulatory approval of developed medicines

Sometimes development projects are discontinued after high levels of investment at a late phase of clinical development. Decisions – such as those relating to the transition to the next clinical phase – are taken with a view to minimizing risk. We are currently not aware of any risks beyond general development risks that could significantly affect the net assets, financial position, and results of operations.

Furthermore, there is the risk that regulatory authorities either do not grant or delay approval or grant only restricted approval. Additionally, there is the risk that undesirable side effects of a pharmaceutical product could remain undetected until after approval or registration, which could result in a restriction of approval or withdrawal from the market. Well-advanced programs in our pipeline and those of our partners result in potential new approvals; on the other hand, missing targets in this area may have critical negative effects on the financial position and operating result, for example due to lower net sales or the non-occurrence of milestone payments from collaboration agreements. Overall, these risks, with probabilities ranging from unlikely to possible, are considered to be medium risks.

Risks and opportunities related to the quality and availability of products

Risk of a temporary ban on products/production facilities or of non-registration of products due to non-compliance with quality standards

We are required to comply with the highest standards of quality in the manufacturing of pharmaceutical products (Good Manufacturing Practice or official pharmacopoeia). In this regard, we are subject to the supervision of the regulatory authorities. Conditions imposed by national regulatory authorities could result in a temporary ban on products/production facilities, and possibly affect new registrations with the respective authority. We make the utmost effort to ensure compliance with regulations, regularly perform our own internal inspections and also carry out external audits. Thanks to these quality assurance processes, the occurrence of a risk with a critical negative impact is unlikely; however, it cannot be entirely ruled out. Depending on the product concerned and the severity of the objection, such a risk can have a moderate negative impact on the net assets, financial position, and results of operations. Therefore, we rate this as a medium risk.

Risks of production availability

Further risks include operational failures due to fire or force majeure, for example natural disasters such as floods or earthquakes, which could lead to a substantial interruption or restriction of business activities. Insofar as it is possible and economically viable, the Group limits its damage risks with insurance coverage, the nature and extent of which is constantly adapted to current requirements. Likewise, we are exposed to risks of production outages and the related supply bottlenecks that can be triggered by technical problems in production facilities with very high capacity utilization. Furthermore, there are risks of supply bottlenecks due to a lack or disappearance of capacity. We are working to continuously mitigate the risks by making regular investments, setting up alternative sourcing options, and maintaining inventory levels.

Although the occurrence of these risks is considered unlikely, an individual event could have a critical negative effect on the net assets, financial position, and results of operations, and they are therefore classified as a medium risk.

Risks of dependency on suppliers

Quality controls along the entire value chain reduce the risks related to product quality and availability. This starts with the qualification of our suppliers. Quality controls also include comprehensive quality requirements for raw materials, purchased semi-finished products, and plants. We are dependent on individual suppliers for a number of precursor products, packaging materials, and finished goods. In the event that one of these suppliers curtails or discontinues production, or supply is disrupted, this could potentially have a critical impact on the business concerned. With long-term strategic alliances for precursor products critical to supply and price as well as alternative sourcing strategies, we reduce the probability of occurrence of these risks and rate them as possible. Overall, these are classified as medium risks.

Product liability risks

Companies in the chemical and pharmaceutical industries are exposed to product liability risks in particular. Product liability risks can lead to considerable claims for damages, loss of reputation, and costs to avert damages. We have taken out the liability insurance that is standard in the industry for such risks. However, it could be that the insurance coverage available is insufficient for individual cases. Although the probability of occurrence of product liability claims in excess of the existing insurance coverage is considered unlikely, individual cases could still have a critical negative effect on the net assets, financial position, and results of operations. We therefore rate a potential product liability risk as a medium risk.

Risks due to product-related crime and espionage

Owing to our portfolio, we are exposed to a number of sector-specific crime risks. This relates primarily to products, including among other things, counterfeiting, illegal channeling, and misuse, as well as all types of property crime, including attempts at these crimes. Crime phenomena such as cybercrime and espionage could equally affect our innovations or innovation abilities as such.

To combat product-related crime, an internal coordination network covering all functions and businesses ("Anti-Counterfeiting Operational Network") was set up several years ago. In addition, security measures are in use to protect products against counterfeiting. Innovative technical security solutions and defined preventive approaches are used to ward off dangers relating to cybercrime and espionage. Measures to prevent risks and to prosecute identified offenses are conducted in all the relevant crime areas in close and trustworthy cooperation with the responsible authorities. The impact of these risks on business operations depends on the respective individual case, product-specific factors, the value chain, and regional aspects in particular. Our Corporate Security department is responsible for the overall coordination of all measures in this area. Overall, the threat resulting from crime in general is seen as being possible and is classified as a medium risk.

Opportunities due to expanding local presence in high-growth markets

For numerous markets in the emerging economies, we expect continuous above-average contributions to growth in the coming years. In order to further expand this potential for our businesses, we have moved forward with several investment projects in recent years. Following the investments already made in China in 2018, we have made further investments there of € 17 million in 2019 to expand the capacity of our pharmaceutical production facilities. In addition, the Life Science Nantong and Wuxi sites began operation in 2019, improving our local capacities in China. We also launched a seed fund of RMB 100 million (€ 13 million) in 2019, which is specifically aimed at financing start-up companies in the Healthcare, Life Science, and Performance Materials business units, as well as new businesses in China. This is intended to promote relevant innovations from China and bring us closer to the Chinese start-up scene in view of the country's increased focus on innovation. The innovation hubs in Shanghai and Guangzhou will also contribute to the nationwide acceleration of innovation development.

Risks and opportunities from the use of social media

Our company and its employees are active on numerous social media channels. The consistent and legally compliant use of the channels and their content is important in terms of increasing awareness of our brand, among other things. We take precautions and implements processes to ensure awareness of the proper handling of social media, controlling publication, and actively managing communication.

Nevertheless, reputational risks could result, for instance through public dialogues in social media.

Overall, we rate this as a low risk.

Financial risks and opportunities

As a corporate group that operates internationally, and due to our presence in the capital market, we are exposed to various financial risks and opportunities. Above all, these are liquidity and counterparty risks, financial market risks and opportunities, risks of fluctuations in the market values of operational tangible and intangible assets, as well as risks and opportunities from pension obligations.

Risk and opportunity management in relation to the use of financial instruments

In the area of financial risks and opportunities, we use an active management strategy to reduce the effects of fluctuations in exchange and interest rates. The management of financial risks and opportunities by using derivatives in particular is regulated by extensive guidelines. Speculation is prohibited. Derivative transactions are subject to constant risk controls. A strict separation of functions between trading, settlement, and control functions is ensured.

Liquidity risks

In order to ensure its continued existence, a company must be able to fulfill its commitments from operating and financial activities at all times. Therefore, to reduce potential liquidity risks, we have a central Group-wide liquidity management system in place, and a balanced maturity profile. The maturities of our financial liabilities are aligned with our planned free cash flow. Furthermore, we have a multicurrency revolving credit facility of € 2 billion with a term until 2024, which ensures continuing solvency if any liquidity bottlenecks occur. As our loan agreements do not contain any financial covenants, these agreed lines of credit can be accessed even if our credit rating should deteriorate. Additionally, we have a commercial paper program with a maximum volume of € 2 billion.

Overall, the liquidity risk is unlikely and rated as low.

Counterparty risks

Counterparty risks arise from the potential default by a partner in connection with financial investments, loans, and financing commitments on the one hand and receivables in operating business on the other.

As for counterparty risks from financial transactions, we review all positions relating to trading partners and their credit ratings on a daily basis. We manage financial risks of default by diversifying our financial positions and through the related active management of our trading partners. Significant financial transactions involving credit risk are entered into with banks and industrial companies that have a good credit rating. Moreover, our large banking syndicate – the multi-currency revolving credit facility of € 2 billion was syndicated by 20 banks – reduces possible losses in the event of default.

The solvency and operational development of trading partners is regularly reviewed as part of the management of operational counterparty risks. Sovereign risks are also analyzed. The volume of receivables of each customer is capped in line with their credit ratings. Risk-mitigating measures, such as credit insurance, are utilized as appropriate. Nevertheless, defaults by isolated trading partners, even those with outstanding credit ratings, cannot be entirely ruled out, although rated as unlikely (further information can be found in “Credit risks” in the note “Management of financial risks” in the Notes to the Consolidated Financial Statements).

Counterparty risk is classified as a medium risk overall owing to the unlikely probability of occurrence with a potential critical negative effect.

Financial market opportunities and risks

As a result of our international business activities and global corporate structure, we are exposed to risks and opportunities from fluctuations in exchange rates. These result from financial transactions, operating receivables and liabilities, as well as forecast future cash flows from sales and costs in foreign currency. We use derivatives to manage and reduce the aforementioned risks and opportunities (further information can be found in the note "Derivative financial instruments" in the Notes to the Consolidated Financial Statements). Due to their possible occurrence with a potentially critical negative effect on the net assets, financial position, and results of operations, foreign exchange rate risks are rated as medium risk.

Variable interest and current financial liabilities are exposed to the risks and opportunities of interest rate fluctuations. These are also managed and reduced using derivatives. Interest rate risks have a potentially moderate negative impact, are considered unlikely, and pose low risks overall.

Risks of impairment of balance sheet items

The carrying amounts of individual balance sheet items are subject to the risk of changing market and business conditions and thus to changes in fair values as well. Necessary impairments could have a significant negative non-cash impact on earnings and affect the accounting ratios. This applies in particular to the high level of intangible assets including goodwill, which mainly derive from the purchase price allocations made in connection with past acquisitions (further information can be found in the note "Intangible assets" in the Notes to the Consolidated Financial Statements). All relevant risks were assessed during the preparation of the Consolidated Financial Statements and taken into account accordingly. We rate risks beyond this as unlikely with a critical negative impact. Therefore, this is seen as a medium risk.

Risks and opportunities from pension obligations

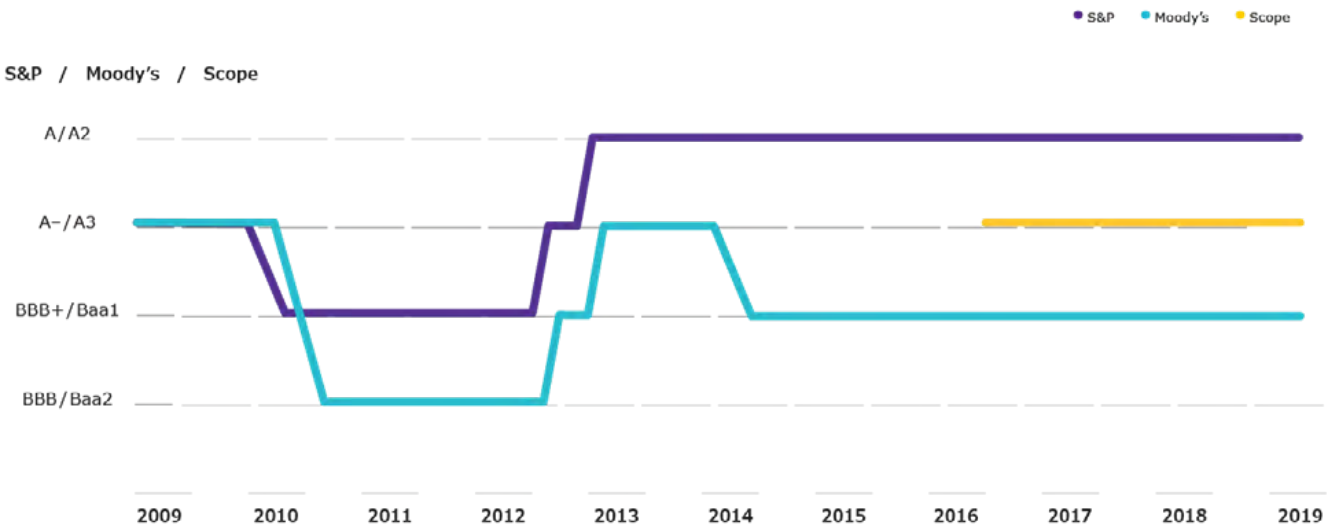
We have commitments in connection with pension obligations. The present value of defined benefit obligations can be significantly increased or reduced by changes in the relevant valuation parameters, for example the interest rate or future salary increases. Pension obligations are regularly assessed as part of annual actuarial reports. The obligations are covered by the pension provisions reported in the balance sheet based on the assumptions as of the balance sheet date. Some of these obligations are funded by plan assets (further information can be found in the note "Provisions for pensions and other post-employment benefits" in the Notes to the Consolidated Financial Statements). To the extent that pension obligations are covered by plan assets consisting of interest-bearing securities, shares, real estate, and other financial assets, decreasing or negative returns on these assets can adversely affect the fair value of plan assets and thus result in further additions to pension provisions. By contrast, rising returns increase the value of plan assets, thereby resulting in excess cover of plan liabilities. We increase the opportunities of fluctuations in the market value of plan assets on the one hand and reduce the risks on the other by using a diversified investment strategy. The unlikely risk due to pension obligations could have moderate negative effects on the net assets, financial position, and results of operations, and is classified as low.

Assessment by independent rating agencies

The capital market uses the assessments published by rating agencies to help lenders assess the risks of a financial instrument used by our company. We are currently rated by Standard & Poor's, Moody's, and Scope. Standard & Poor's has issued a long-term credit rating of A with a stable outlook, Moody's a rating of Baa1 with a stable outlook, and Scope a rating of A–, likewise with a stable outlook. In line with market procedures, our financing conditions are closely tied to our rating. The better a rating, the more favorably we can generally raise funds on the capital market or from banks.

REPORT ON RISKS AND OPPORTUNITIES

Overview of rating development



Legal risks

Generally, we strive to minimize and control our legal risks. To this end, we have taken the necessary precautions to identify threats and defend our rights where necessary.

Nevertheless, we are still exposed to risks from litigation or legal proceedings. In particular, these include risks in the areas of product liability, competition and antitrust law, pharmaceutical law, patent law, trademark law, data protection law, tax law, and environmental protection. As a research-based company, we have a valuable portfolio of industrial property rights, patents, and brands that could become the target of attacks and infringements. The outcome of future proceedings or those currently pending is difficult to foresee.

For instance, we are currently involved in litigation with Merck & Co. Inc., Kenilworth, NJ, United States (outside the United States and Canada: MSD), against whom we have filed lawsuits in various countries. This company has also sued us in the United States for trademark infringement, among other things.

Due to long statutes of limitations or in some cases the absence thereof, it is not possible to rule out that we will face third-party claims arising from the same issue despite the conclusion of legal proceedings. Court or official rulings or settlements can lead to expenses with a significant impact on our business and earnings.

Despite extensive precautionary measures, non-compliance with laws and regulations leading to related consequences can never be completely excluded.

Tax risks are reviewed regularly and systematically by Group Tax. Corresponding standards and guidelines are used in order to identify tax risks at an early stage as well as to review, evaluate, and correspondingly minimize them. Risk reduction measures are coordinated by Group Tax together with the subsidiaries abroad.

In our opinion, the lawsuits described below constitute the most significant legal risks. This should not be seen as an exhaustive list of all legal disputes currently ongoing.

Risks from product-related and patent law disputes

We are involved in a patent dispute with Biogen Inc., United States (Biogen), in the United States. Biogen claims that the sale of Rebif® in the United States infringes on a Biogen patent. The disputed patent was granted to Biogen in the United States in 2009. Subsequently, Biogen sued us and other pharmaceutical companies for infringement of this patent. Our company defended itself against all allegations and brought a countersuit claiming that the patent is invalid and not infringed by our actions. In the first instance, a jury recognized the invalidity of the patent. This jury verdict was overturned by the federal judge in the same instance in September 2018. For the time being, the patent is thus deemed to be legally valid and to have been infringed. We filed a complaint with the United States Court of Appeals for the Federal Circuit (second instance) against the first-instance ruling in October 2018. A decision is expected in the first half of 2020. In this context, we recognized provisions in a three-digit million euro amount. Cash outflow within the next twelve months is considered possible at present.

Nevertheless, potentially critical negative impacts of the litigation on the financial position cannot be ruled out.

In the Performance Materials business sector, we are involved in a legal dispute with JNC Corporation, Japan (JNC). JNC claims that by manufacturing and marketing certain liquid crystals mixtures, our company has infringed JNC patents. JNC asserts its claims in court in two jurisdictions. We maintain that JNC's patent infringement assertion is invalid in three jurisdictions owing to relevant prior art and has filed the corresponding nullity actions. No final decisions have so far been reached in two jurisdictions. In one jurisdiction, the nullity action was concluded with legally binding effect in favor of us in 2019. In this jurisdiction, JNC refrained from filing a patent infringement claim. In view of this development, the provision was reduced in 2019. After the adjustment, the remaining provision for this matter amounts to a double-digit million euro amount. Cash outflow within the next twelve months is considered possible at present.

Nevertheless a potentially considerable impact of the legal dispute on the financial position cannot be ruled out.

Risks due to antitrust and other government proceedings

Raptiva®: In December 2011, the federal state of São Paulo, Brazil, sued us for damages because of alleged collusion between various pharmaceutical companies and an association of patients suffering from psoriasis and vitiligo. This collusion is alleged to have been intended to increase sales of the medicines from the companies involved to the detriment of patients and state coffers. Moreover, patients are also suing for damages in connection with the product Raptiva®. We have taken appropriate accounting measures for these issues, which relate to various legal cases. Risks in excess of this with a substantial negative effect on the net assets, financial position, and results of operations cannot be ruled out, but are considered unlikely. This is rated as a medium risk.

On July 6, 2017, we received notice from the European Commission (EU Commission) in connection with the antitrust review proceedings for the acquisition of Sigma-Aldrich, in which the EU Commission informed our company of its preliminary conclusion that our company and Sigma-Aldrich allegedly transmitted incorrect and/or misleading information within the scope of the acquisition of Sigma-Aldrich. The EU Commission received registration of the merger on April 21, 2015, and granted clearance on June 15, 2015, subject to the condition that our company and Sigma-Aldrich divest parts of the European solvents and inorganic chemicals businesses of Sigma-Aldrich in order to resolve antitrust concerns. According to the preliminary viewpoint of the EU Commission, communicated in a letter dated July 6, 2017, our company and Sigma-Aldrich withheld related important information about an innovation project. According to the EU Commission, the innovation project should have been included in the remedies package. At the present time, an EU Commission administrative procedure is still pending that could lead to a fine being imposed by the EU Commission if the EU Commission considers its view to be proven. Our company is entitled to legal recourse should a fine be imposed. The ongoing investigations are limited to the examination of violations of EU merger control procedures and do not affect the validity of the EU Commission's decision to approve the merger. As the risk is considered to have a potential critical negative impact on the net assets and financial position, a provision has been set up.

Paroxetine: In connection with the divested generics business, we are subject to antitrust investigations by the British Competition and Market Authority (CMA) in the United Kingdom. In March 2013, the authorities informed us of the assumption that a settlement agreement entered into in 2002 between Generics (UK) Ltd. and several subsidiaries of GlaxoSmithKline plc, United Kingdom, in connection with the antidepressant drug paroxetine, violates British and European competition law. Our company, the then-owner of Generics (UK) Ltd., was allegedly involved in the negotiations for the settlement agreement and is therefore liable. The investigations into Generics (UK) Ltd. started in 2011, without this being known to us. On February 11, 2016, the CMA imposed a fine in this matter. We have taken legal action against this fine. Appropriate accounting measures have been taken. As things stand at present, a decision and outflow of resources are not expected within the next 12 months because the Appeal Tribunal has since submitted the relevant legal questions to the European Court of Justice (CJEU) for a preliminary ruling. This is currently classified as a medium risk with a moderate negative impact on the financial position.

Human resources risks

Our future growth is highly dependent on our innovative strength. Therefore, the expertise and engagement of employees in all sectors in which we operate are crucial to the success of the company. The markets relevant to the company are characterized by intensive competition for qualified specialists and by the challenge of being perceived by the public as an attractive employer. Fluctuation risks specific to countries and industries have to be identified ahead of time and specifically addressed in order to keep the skills and expertise critical to success and business within the company.

Recruiting and retaining specialists and talent is therefore one of the key priorities for the company and is managed through the targeted use of, for instance, employer branding initiatives, global talent and succession management processes, as well as competitive compensation packages. Nevertheless, employee-related risks that affect business activities are possible, even though their impact is difficult to assess. We rate this as a medium risk.

Information technology risks

We use a variety of IT systems and processes in order to optimally support our globalization. Trends in information technology offer various opportunities but also harbor risks.

Risks due to cybercrime and the failure of business-critical applications

Increasing international networking and the related possibility of IT system abuse are resulting in cybercrime risks for our company, such as the failure of central IT systems, the disclosure or loss of the data integrity of confidential data from research and business activities, the manipulation of IT systems in process control, or an increased burden or adverse impact on IT systems as a result of virus attacks.

The Group operates an information protection management system based on ISO 27001 comprising security guidelines as well as organizational and technical measures to prevent and address IT security incidents. Globally used IT applications form the basis for the contractual delivery of products and solutions. The failure of business-critical IT applications could therefore have a direct influence on our ability to deliver and the quality of our products. This also applies to the failure of a data center. To achieve the required service quality, we use a quality management system certified to ISO 9001 that also applies to the provision of IT. In addition, to reduce the risk of failure, we operate several redundantly designed data centers. Furthermore, insurance solutions for cybercrime offenses are in place at Group level.

Likewise, complications with the changeover of IT systems could negatively impact the earnings situation. Close monitoring of critical IT projects serves to mitigate this risk.

Despite the mitigating measures taken and functional continuity plans, the effects of cybercrime or the failure of business-critical IT applications and their influence on the net assets, financial position, and results of operations are considered high risks owing to likely and potentially critical negative impacts.

Environmental and safety risks

As a company with global production operations, we are exposed to risks of possible damage to people, goods, and our reputation. Audits, consulting and training on environmental protection, and occupational health and safety minimize these risks to people and the environment. In order to ensure the continuity of plant and equipment, we monitor these risks both at our own sites as well as at suppliers and contract manufacturers. By adhering to high technical standards, our rules of conduct, and all legal requirements in environmental protection and occupational health and safety, we ensure the preservation of goods and assets. We have taken sufficient appropriate accounting measures for the environmental risks known to us. Nevertheless, we classify these as a high risk since a critical negative impact on the financial position cannot be ruled out.

Risks due to the divestment, acquisition, and integration of companies and businesses

Irrespective of the fact that acquisitions made in the past have been successfully completed, the risk of conducting acquisition and integration exists for future transactions and for the current integration of Versum Materials. This includes, among other things, the inability to meet sales volume targets and higher integration costs than expected, as well as the failure to meet synergy goals. The divestment of companies and businesses can lead to liability vis-à-vis the buyer, or additional expenses, for instance through indemnity clauses and guarantee commitments or long-term supply contracts. Through strong due diligence processes and closely managed integration processes, we seek to reduce the probability of occurrence of this risk. Therefore, we classify this as a medium risk with an unlikely probability of occurrence and potentially critical negative effects on the net assets, financial position, and results of operations.

Overall view of the risk and opportunity situation and management assessment

The material individual risks in the businesses have been named in the report above, with business-related risks being the most significant alongside legal risks.

These risks include already the risks stemming from the recent developments regarding the Covid-19 pandemic. Most notably, the pandemic increases existing risks related to more restrictive regulatory requirements regarding drug pricing and reimbursement, the demand for our products, business interruptions at our production facilities, lack of availability of good quality materials or services, risks related to research and development, and negative macroeconomic developments.

With respect to high and medium risks, certain changes have occurred, as the assessment of the individual risks has of course shifted over the fiscal year due to changing external and internal conditions while the overall risk profile remained stable. Thanks to the risk reduction measures taken – such as the consistent implementation of management action (organizational responsibility and process improvements), existing insurance coverage, and accounting precautions – we were able to take counteraction, in particular against significant individual risks.

The overall risk of the Group, which is derived from the probability-weighted aggregation of the identified risks, leads to the assessment that we are not exposed to risks of a nature to threaten the existence of the Group as a going concern, or for which coverage and financing of the losses is questionable. We are confident that we will continue to successfully master the challenges arising from the above risks in the future as well. Our company also benefits from diversification through our different products and markets.

In our view, business-related opportunities offer the greatest potential. An important element here is the continuous expansion of our businesses. With the successful focusing and continued intensification of our research and development activities, we want to be able to continue to offer our customers innovative products and help shape markets. Moreover, we also consolidate our expertise in numerous alliances with industrial partners as well as various universities and international organizations. We are making targeted investments in future-oriented companies and start-ups via our our corporate venture capital fund and our Accelerator programs. The topic of innovation is at the forefront of all our activities. Externally, this is becoming particularly apparent through our Innovation Center at Group headquarters in Darmstadt, which is to develop into a nucleus of creativity at our company. The activities listed hold significant opportunities for us in the medium to long term, beyond the underlying forecast period.

We pursue the opportunities that arise and specify their expected effects in the forecast development of net sales, EBITDA pre, and business free cash flow. Furthermore, we will actively seek new opportunities, examine their implementation and drive them forward where appropriate. If opportunities arise in addition to the forecast developments, or these occur more quickly than anticipated, this could have correspondingly positive effects on our net assets, financial position, and results of operations.

Report on Expected Developments[1]

The following report provides a forecast for fiscal 2020 of the development of the Group and its three business sectors: Healthcare, Life Science and Performance Materials.

On October 7, 2019, the Group completed the acquisition of Versum Materials, Inc. a supplier in the electronic materials segment for a purchase price for the acquisition of 100% of the company's shares of € 5.3 billion. For this reason, the effect of the Versum acquisition will be reported as a portfolio effect in the first three quarters of 2020. Likewise, the acquisition of Intermolecular Inc. closed on September 20, 2019. The purchase price for the acquisition of 100% of the company's shares was € 56 million. This transaction represents an equity value of approximately US$ 62 million. We do not expect it to have a material portfolio effect.

Forecast for the Group

FORECAST FOR THE GROUP

€ million	**Actual results 2019**	Forecast for 2020	Key assumptions
Net sales	16,152	• Solid organic growth • Portfolio effect in the mid single-digit percentage range • Slightly negative foreign exchange effect of 0% to -3%	• Organic growth driven by Healthcare and Life Science; Performance Materials with slight organic growth • Positive portfolio effect in the mid single-digit percentage range, mainly resulting from the acquisition of Versum Materials • Foreign exchange effect due to emerging market currencies and the U.S. dollar
EBITDA pre	4,385	• Strong organic growth • Positive portfolio effect in the mid single-digit percentage range • Slightly negative foreign exchange effect of 0% to -3%	• Strong organic growth in Life Science supported by solid organic growth in Healthcare and Performance Materials with slight organic growth • Realization of synergies from the integration of Versum Materials in Performance Materials as planned • Foreign exchange effect due to emerging market currencies and the U.S. dollar
Business free cash flow	2,732	Percentage growth in the mid twenties range	Rise in EBITDA pre and positive effects from working capital; higher investments in property, plant, and equipment

Net sales

For the Group, in 2020 we expect solid organic net sales growth in comparison with the previous year, driven mainly by our Healthcare and Life Science business sectors. We forecast slight organic growth for Performance Materials. In the first three quarters, the effect of the acquisition of Versum Materials will be reported as a portfolio effect, which we expect to be in the mid-single-digit percentage range. With regard to exchange rate developments, we continue to expect a volatile environment due to political and macroeconomic developments. Overall, we forecast a slightly unfavorable foreign exchange development of 0% to -3% that can be attributed to the currencies of several growth markets, including China, and the development of the U.S. dollar. Our forecast for 2020 is based on an exchange rate of the euro against the U.S. dollar in the range of 1.11 to 1.16.

[1] Owing to the altered expectations in terms of the impact of the Covid-19 pandemic, this Report on Expected Developments was updated accordingly on May 12, 2020.

EBITDA pre

EBITDA pre is our key financial indicator to steer operating business. We forecast strong organic growth for fiscal 2020. This organic growth will be mainly attributable to the Healthcare and Life Science business sectors while also Performance Materials contributes with slight organic growth. The portfolio effect from the acquisition of Versum Materials is expected to be in the mid-single-digit percentage range and will lead to a slight improvement in the margin of the Group.

The expected foreign exchange development is forecast to have a slightly negative effect in the percentage range of between 0% and -3% on Group EBITDA pre; it will be seen particularly in the Performance Materials and Healthcare businesses. The development of the U.S. dollar and of the currencies in several growth markets will have an adverse impact on earnings. These foreign exchange effects will be partly mitigated by currency hedging, although we do not hedge all emerging market currencies.

Business free cash flow

For business free cash flow, we expect growth rates in the mid-twenties percentage range in 2020. The development is attributable to the increase in EBITDA pre, which includes the contribution of Versum Materials, and positive effects from further improved working capital management. Higher investments in property, plant, and equipment will lower business free cash flow.

Forecast for the Healthcare business sector

FORECAST FOR THE HEALTHCARE BUSINESS SECTOR

€ million	**Actual results 2019**	Forecast for 2020	Key assumptions
Net sales	6,714	• Solid organic growth • Slightly negative foreign exchange effect	• Stable development of the base business in organic terms • Substantial growth contribution by our newly approved products, particularly Mavenclad® • Negative foreign exchange effect due to foreign exchange developments in several growth markets and of the U.S. dollar
EBITDA pre	1,922	• Solid organic growth • Moderate negative foreign exchange effect	• Expected substantial earnings contributions from our new products, especially Mavenclad® , offset negative mix effects associated with the projected decline in Rebif® sales • Marketing and selling expenses as well as research and development costs decrease in percent of sales due to systematic cost management and strict pipeline prioritization • Negative foreign exchange effect due to foreign exchange developments in several growth markets and of the U.S. dollar
Business free cash flow	1,252	Increase in the low double-digit teens percent range	• Rise in EBITDA pre • Improved management of working capital offsets higher investments in property, plant and equipment

Net sales

For the Healthcare business sector, we expect solid organic sales growth in 2020. We anticipate a stable development of base business, reflecting the continued competitive pressure and the associated decline in Rebif® sales. However, the Rebif® decline will be offset by continued positive growth contributions of products from the General Medicine & Endocrinology and Fertility franchises, largely attributable to growth markets. New regulations in China (volume-based procurement) have a slightly mitigating effect on sales of products from the General Medicine & Endocrinology franchise, in particular. We expect our new products to contribute significantly to organic sales. For 2020, we forecast Mavenclad® and Bavencio® sales to show further substantial increases. Unfavorable foreign exchange developments in several growth markets and with respect to the U.S. dollar are expected to lead to a slightly negative foreign exchange effect.

EBITDA pre

For 2020, we expect EBITDA pre of the Healthcare business sector to see solid organic growth. The negative earnings effects resulting from the projected decline of Rebif® sales and the associated negative product mix effects in the base/core business should be more than offset by substantial earnings contributions from our new products, particularly Mavenclad®. In addition, we will continue our systematic cost management and strict pipeline prioritization. We therefore expect marketing and selling expenses as well as research and development costs to decline in percent of sales, with research and development costs remaining heavily dependent on the development of clinical data and further expected study results. In 2020, the upfront cash payment from the global strategic alliance with Pfizer for Bavencio® and Xalkori® and milestone payments will no longer be reflected in profit and loss. However, the upfront cash payment in the context of the global strategic alliance with GlaxoSmithKline plc (GSK) for the joint development and marketing of bintrafusp alfa will have a positive effect in the low triple digit Euro millions in fiscal 2020. The exact amount is dependent on the cost evolution and on reaching development milestones and will be recognized in other operating income. The forecast for Healthcare moreover continues to include effects from active portfolio management. But overall, the earnings contribution attributable to these effects will be significantly below the prior-year figure. Furthermore, we expect EBITDA pre to be moderately burdened by foreign exchange effects.

Business free cash flow

In 2020, we expect business free cash flow of the Healthcare business sector to show an increase in the low teens percentage range. The main drivers will be the expected rise in EBITDA pre and improvement of working capital.

Forecast for the Life Science business sector

FORECAST FOR THE LIFE SCIENCE BUSINESS SECTOR

€ million	**Actual results 2019**	Forecast for 2020	Key assumptions
Net sales	6,864	• Strong organic growth • Slightly negative foreign exchange effect	• All businesses contribute to growth • Process Solutions remains the main driver of growth, followed by Applied Solutions • Negative foreign exchange effect on account of the U.S. dollar and foreign exchange developments in several growth markets
EBITDA pre	2,129	• Strong and profitable organic earnings growth • Foreign exchange effect slightly negative	• Organic earnings growth on account of the expected sales growth and slight margin improvement • Negative foreign exchange effect due to the trend of exchange rates on several growth markets
Business free cash flow	1,375	Strong increase in the low to mid twenties percentage range	• Rise in EBITDA pre • Improved management of working capital • On the other hand, increase in capital spending on strategic projects

Net sales

For the Life Science business sector, we expect strong organic sales growth in 2020 compared to the prior year. All business units are forecast to make a contribution to the positive organic development. The Process Solutions business unit is again likely to remain the strongest driver of organic growth in 2020, followed by Applied Solutions. Moderate growth in the Research Solutions business unit should also contribute to the development of sales. We do not expect the acquisitions of FloDesign Sonics Inc. and BSSN Software GmbH to have a material portfolio effect. Due to the development of currencies in various growth markets and of the U.S. dollar, we project a slightly negative foreign exchange effect.

EBITDA pre

In 2020, the Life Science business sector is expected to show strong organic growth of EBITDA pre compared with the previous year. The persistently dynamic demand trend and a slight margin increase will also contribute to the organic growth in earnings. The foreign exchange impact on earnings in fiscal 2020 could be slightly negative, based on our estimates.

Business free cash flow

We expect business free cash flow of the Life Science business sector to see an increase in the low to mid-twenties percentage range. Higher EBITDA pre and positive effects from the improved management of working capital will be mitigated by higher capital spending on strategic projects .

Forecast for the Performance Materials business sector

FORECAST FOR THE PERFORMANCE MATERIALS BUSINESS SECTOR

€ million	**Actual results 2019**	Forecast for 2020	Key assumptions
Net sales	2,574	• Slight organic growth • Portfolio effect in the low to mid thirties percentage range • Slightly negative foreign exchange effect	• Strong growth momentum in the Semiconductor Solutions business unit • Continued price decline in Liquid Crystals business, slightly mitigated by a volume increase • Slight growth of Surface Solutions • Portfolio effects due to Versum Materials in the low to mid thirties percentage range, no material portfolio effect from Intermolecular • Negative foreign exchange effect due to the trend of exchange rates on several growth markets and of the U.S. dollar
EBITDA pre	803	• Slight organic growth • Portfolio effects in the low to mid thirties percentage range • Slightly negative foreign exchange effect	• Growth in Semiconductor Solutions can offset price decline in Liquid Crystals supported by active cost management • Versum Materials earnings contribution in the low to mid thirties percentage range leads to slight margin improvement • Planned realization of synergies of around € 25 million from the integration of Versum Materials • Negative foreign exchange effect due to the foreign exchange developments in several growth markets and of the U.S. dollar
Business free cash flow	641	Increase with growth rates in the low thirties percentage range	Rise in EBITDA pre including the contribution from Versum Materials, reduced by higher capital investments

Net sales

We forecast a slightly positive organic sales development for the Performance Materials business sector in fiscal 2020. In particular, we expect to see a strong growth dynamic in the Semiconductor Materials. We also anticipate slight organic growth for Surface Solutions compared to the previous year. The Liquid Crystals business will suffer from the continuing price decline due to the price pressure prevailing within the industry. The reduced volume growth versus the prior year will only be able to offset the negative price effects to a limited extent. For Versum Materials, we expect a portfolio effect in the low to mid-thirties percentage range in the first three quarters of 2020. Moreover, the acquisition of Intermolecular closed on September 20, 2019. We do not consider the resulting portfolio effect to be material. Due to the development of the U.S. dollar and of currencies in several growth markets, we expect a slightly negative foreign exchange effect.

EBITDA pre

For the year 2020 we are assuming moderate organic growth of EBITDA pre in the Performance Materials business sector. The price decline in liquid crystals will be offset by anticipated growth in Semiconductor Solutions and by active cost management. We estimate that the portfolio effect of Versum Materials will show total growth in the low to mid-thirties percentage range, which will improve the margin of the business slightly. This forecast includes the planned realization of synergies in the amount of around € 25 million. We expect a slightly negative foreign exchange effect that is attributable to the development of the U.S. dollar and of individual growth/emerging? market currencies.

Business free cash flow

For the Performance Materials business sector we forecast a rise in business free cash flow in the low thirties percentage range. The main driver will be the increase in EBITDA pre, essentially owing to the contribution from Versum Materials.

Corporate and Other

We expect Corporate and Other to be below the prior year in fiscal 2020. This is mainly due to a substantially lower burden from foreign currency hedging, which will partly offset opposing foreign exchange effects in the sectors.

Updated forecast for the Group dated May 12, 2020

In the context of the global outbreak of the Covid-19 pandemic, in deviation from our previous forecast we assume a significant burden on global economic growth, which will affect all our businesses, particularly however Healthcare and Performance Materials. Due to the high level of uncertainty with respect to the further development of the Covid-19 pandemic, this outlook is being made with a considerably higher degree of uncertainty than normally. Since the dynamics of the pandemic vary regionally, we are presenting our assumptions in this respect as follows: For China, we assume that the Covid-19 pandemic reached its peak at the end of the first quarter and that a significant easing of the situation will set in as of the second quarter of 2020. For Europe and the United States, we do not expect the pandemic to peak until the second quarter, and currently expect that the outbreak will normalize by the end of the third quarter. Moreover, the current forecast does not assume that a second disease wave will occur in the named regions.
In deviation from the Report on Expected Developments dated February 14, 2020, we now expect a euro-U.S. dollar exchange rate in the range of 1.08 to 1.12. All further forecast assumptions – beyond the Covid-19 implications and the U.S. dollar exchange rate – are identical to those made in our original Report on Expected Developments. Taking into account the present state of knowledge, the forecast previously given is updated as follows:

€ million	Net sales	EBITDA pre	Business free cash flow
Group	**~16,800 to 17,800** • Slight to moderate organic growth • Portfolio effect in the mid single-digit percentage range • Exchange rate effect -2% to +1%	**~4,350 to 4,850** • Stable organic development • Positive portfolio effect in the mid single-digit percentage range • Slightly adverse foreign exchange effect of 0% to -3%	**~2,650 to 3,250**
Healthcare	• Organic stable • Adverse portfolio effect in the mid double-digit million range • Neutral to moderately adverse foreign exchange effect	• Organic slightly negative • Slightly to moderately adverse foreign exchange effect	Moderate decline
Life Science	• Strong organic growth • Neutral to slightly adverse foreign exchange effect	• Strong organic growth • Neutral to moderately adverse foreign exchange effect	Increase in the low percentage teens range
Performance Materials	• Moderate to strong organic decline • Portfolio effect in the low to mid-thirties percentage range • Slightly positive foreign exchange effect	• Organic decline in the low to mid-teens percentage range • Portfolio effect in the low to mid-thirties percentage range • Moderately positive foreign exchange effect	Increase with growth rates in the low twenties percentage range
Corporate and Other	• -	• Slightly higher than in 2019	-

Report in accordance with Section 315a (1) of the German Commercial Code (HGB)

The following information is provided in accordance with section 315a (1) of the German Commercial Code (HGB) and the explanatory report pursuant to section 176 (1) sentence 1 of the German Stock Corporation Act (AktG).

As of the balance sheet date, the company's subscribed capital is divided into 129,242,251 no-par value bearer shares plus one registered share. Each share therefore corresponds to € 1.30 of the share capital. The holder of the registered share is E. Merck Beteiligungen KG, Darmstadt, Germany, a related party of E. Merck, Darmstadt, Germany. It is entitled and obliged to appoint one-third of the members of the Supervisory Board representing the limited liability shareholders. If the holder of the registered share is a general partner, he or she has no such right of appointment. The transfer of the registered share requires the company's approval. The approval is granted at the sole discretion of the personally liable general partner with an equity interest, namely E. Merck KG, Darmstadt, Germany.

Pursuant to the information on voting rights submitted to us in accordance with the German Securities Trading Act (WpHG), on December 31, 2019, no shareholders owned direct or indirect investments exceeding 10% of the voting rights.

According to the Articles of Association of Merck KGaA, Darmstadt, Germany, the general partners not holding an equity interest who form the Executive Board are admitted by E. Merck KG, Darmstadt, Germany, with the consent of a simple majority of the other general partners. A person may be a general partner not holding an equity interest only if he or she is also a general partner of E. Merck KG, Darmstadt, Germany. In addition, at the proposal of E. Merck KG, Darmstadt, Germany, and with the approval of all general partners not holding an equity interest, further persons who are not general partners not holding an equity interest may be appointed to the Executive Board.

The Articles of Association can be amended by a resolution at the Annual Meeting that requires the approval of the general partners. Notwithstanding any statutory provisions to the contrary, the resolutions of the General Meeting are adopted by a simple majority of the votes cast. Where the law requires a capital majority in addition to the voting majority, resolutions are adopted by a simple majority of the share capital represented in the vote. The Articles of Association of the company encompass authorized and contingent capital.

The Executive Board is authorized to increase the company's share capital with the approval of the Supervisory Board and of E. Merck KG, Darmstadt, Germany, once or repeatedly, up to and including April 27, 2022, by up to a total of € 56,521,124.19 by issuing new no-par value bearer shares against cash and/or non-cash contributions (Authorized Capital 2017). Limited liability shareholders shall be generally granted the statutory right to subscribe to the new shares. However, the Executive Board is authorized, with the approval of the Supervisory Board, to exclude the limited liability shareholders' subscription right, in full or in part, in case of a capital increase against cash contributions pursuant to or by analogous application of section 186 (3) sentence 4 AktG, if the issue price of the new shares is not substantially lower than the stock exchange price of the company's shares already listed and if the new shares which are issued under exclusion of the subscription right do not exceed a proportional amount of 10% of the share capital either at the time of the Authorized Capital 2017 taking effect or at the time of the Authorized Capital 2017 being utilized. This restriction to 10% of the share capital shall include the proportional amount of the share capital that is attributable to shares that are issued under exclusion of the subscription right or sold during the term of the Authorized Capital 2017, based on an authorization to issue new shares or sell own shares by direct or analogous application of section 186 (3) sentence 4 AktG. Further, this restriction shall also include the proportional amount of the share capital that is attributable to shares which may or must be issued in order to service bonds carrying a conversion or option right or a conversion or option obligation, if the bonds are issued during the term of the Authorized Capital 2017 under exclusion of the limited liability shareholders' subscription right by analogous application of section 186 (3) sentence 4 AktG.

It is likewise possible to exclude the subscription right of the limited liability shareholders with the approval of the Supervisory Board in the case of capital increases through non-cash contributions, particularly for the purpose of acquiring enterprises, parts of enterprises or interests in enterprises. In addition, with the approval of the Supervisory Board, the limited liability shareholders' subscription rights can be excluded in order to enable E. Merck KG, Darmstadt, Germany, to exercise its right pursuant to article 32 (3) of the company's Articles of Association to participate in a capital increase by issuing shares or freely transferable share subscription rights.

It is likewise possible to exclude, with the approval of the Supervisory Board, the subscription right of the limited liability shareholders in order to enable E. Merck KG, Darmstadt, Germany, to exercise its right pursuant to article 33 of the Articles of Association to convert, in full or in part, its equity interest into share capital.

Moreover, with the approval of the Supervisory Board, the subscription right of the limited liability shareholders can be excluded if and to the extent this is necessary to grant the holders or creditors of conversion or option rights, and/or the holders or creditors of financing instruments carrying conversion or option obligations, which were or are issued by the company or by a domestic or foreign company in which the company directly or indirectly holds the majority of the votes and capital, a subscription right to the extent to which they would be entitled after the exercise of the conversion or option rights or after the performance of a conversion or option obligation.

Lastly, with the approval of the Supervisory Board, the subscription right of the limited liability shareholders can be excluded in order to exclude fractional amounts from the subscription right.

The sum of shares issued on the basis of the Authorized Capital 2017 under exclusion of the limited liability shareholders' subscription right must not exceed a proportional amount of 20% of the share capital, by taking into account other shares of the company which, during the term of the Authorized Capital 2017, are sold or issued under exclusion of the subscription right or are to be issued under bonds issued after April 28, 2017, under exclusion of the subscription right; this limitation shall apply both at the time of this authorization taking effect and at the time of this authorization being exercised.

To the extent that the subscription right is not excluded under the above provisions, it may also be granted to the limited liability shareholders by way of an indirect subscription right pursuant to section 186 (5) AktG or, in part, by way of a direct subscription right, and otherwise by way of an indirect subscription right pursuant to section 186 (5) AktG.

Furthermore, the Executive Board is authorized, with the approval of the Supervisory Board, to determine the additional details of the capital increase and its implementation, including the content of rights attached to the shares as well as the terms and conditions of the share issue.

The Articles of Association also encompass contingent capital. The share capital is contingently increased by up to € 66,406,298.40 divided into 51,081,768 shares (Contingent Capital I). The contingent capital increase serves to grant exchange rights to E. Merck KG, Darmstadt, Germany, in accordance with article 33 of the Articles of Association to enable the conversion of its equity interest. The shares carry dividend rights from the beginning of the fiscal year following the year in which the conversion option is exercised.

Moreover, the share capital is contingently increased by up to € 16,801,491.20 composed of up to 12,924,224 no par value bearer shares (Contingent Capital II). This increase in contingent capital is only to be implemented insofar as the bearers or creditors of option or conversion rights, or with an obligation to convert or exercise options on warrant bonds, option participation certificates, option participation bonds, convertible bonds, convertible participation certificates, or convertible participation bonds issued against contributions that are issued or guaranteed by the company or a subordinate Group company on the basis of the authorization resolution of the Annual General Meeting of April 27, 2018, to April 26, 2023, utilize their option or conversion rights, or to fulfill their conversion obligation or obligation to exercise options insofar as they are obliged to fulfill their conversion or option exercise obligation, or insofar as the company exercises an option, wholly or in part, of granting shares in the company instead of paying the sum of money due, and to the extent that in each case a cash settlement is not granted, or own shares or other forms of fulfillment are used. Each issue of new shares shall take place at the determined option or conversion price, pursuant to the aforementioned authorization resolution. The new shares participate in the profit from the beginning of the fiscal year in which they are created; insofar as this is legally permissible, the Executive Board may, with the approval of the Supervisory Board, and in deviation from section 60 (2) AktG, stipulate that the new shares also participate in the profit for a past fiscal year. The Executive Board is authorized, with the approval of the Supervisory Board and of E. Merck KG, Darmstadt, Germany, to stipulate the further details of the implementation of the increase in contingent capital.

The company is not authorized to acquire its own shares.

The company has not entered into any material agreements subject to a change of control pursuant to a takeover offer nor has it entered into any compensation agreements with the members of the Executive Board or employees in the event of a takeover offer.

Additional Information in accordance with the German Commercial Code (HGB)[1]

The management report of Merck KGaA, Darmstadt, Germany, has been combined with the Group management report. The annual financial statements and the combined management report of the Group and Merck KGaA, Darmstadt, Germany, for 2019 are being filed with the electronic German Federal Gazette (elektronischer Bundesanzeiger) and are available on the website of the German company register.

Merck KGaA, Darmstadt, Germany, headquartered in Darmstadt, is the parent company of the Group. In addition to its function as a holding company, Merck KGaA, Darmstadt, Germany, generates sales in the Healthcare, Life Science, and Performance Materials business sectors. The Healthcare business sector has been run in a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019 (see "Effects of material company agreements on the net assets, financial position, and results of operations"). Merck KGaA, Darmstadt, Germany, bears a significant portion of the Group-wide research and development costs, and employs the majority of the 11,000-plus workforce in Darmstadt. Of that number, just under 3,000 employees of the Healthcare business sector have been employed at a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019.

The financial statements of Merck KGaA, Darmstadt, Germany, have been prepared in accordance with the provisions of the German Commercial Code (HGB), as amended by the German Accounting Directive Implementation Act (BilRUG), and the German Stock Corporation Act (AktG). The full version of the annual financial statements of Merck KGaA, Darmstadt, Germany, together with the unqualified auditor's opinion has been submitted to the operator of the electronic Federal Gazette (elektronischer Bundesanzeiger), where they are published and forwarded to the company register.

Statement on Corporate Governance

The Statement of Corporate Governance according to section 289a of the German Commercial Code (HGB) is contained in the "Corporate Governance" section.

Effects of material company agreements on the net assets, financial position, and results of operations

End of the temporary business lease of the Healthcare business sector

As part of the strategic development of Merck KGaA, Darmstadt, Germany, the existing operating activities of the Healthcare, Life Science, and Performance Materials business sectors within Merck KGaA, Darmstadt, Germany, together with the relevant assets and liabilities (hereinafter: "operating sectors") were spun off at their carrying values into three separate companies (hereinafter: "OpCo" or plural "OpCos") with the legal form of a GmbH or German limited liability corporation (operating spin-off). This operating spin-off is based on the spin-off and takeover agreement concluded between Merck KGaA, Darmstadt, Germany, and the OpCos in notarized form on March 2, 2018. Following approval by the 2018 Annual General Meeting, the operating spin-off took place with economic effect as of 0:00 hours on January 1, 2018.

[1] Owing to the altered expectations as regards the impact of the Covid-19 pandemic, this 2020 forecast for Merck KGaA, Darmstadt, Germany, was updated accordingly on May 12, 2020.

Immediately after the spin-off took effect, all shares held by Merck KGaA, Darmstadt, Germany, in the respective OpCos were transferred to holding companies via a further spin-off (holding company spin-off), as a result of which the OpCos are each indirectly held by Merck KGaA, Darmstadt, Germany, via an intermediate holding company. The acquiring legal entities within the scope of the holding company spin-off were Merck Healthcare Holding GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, for the business shares of Healthcare OpCo, Merck Life Science Holding GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, for the business shares of Life Science OpCo, and Merck Performance Materials Holding GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, for the business shares of Performance Materials OpCo (referred to individually as "HoldCo", independently of the sector, and jointly as "HoldCos"). To this end, Merck KGaA, Darmstadt, Germany, and the HoldCos signed a notarized spin-off and takeover agreement on March 2, 2018. The holding company spin-off took place with economic effect as of 0:00 hours on January 1, 2018.

Since the technical system requirements for the introduction of the sector-specific enterprise resource planning (ERP) systems as regards the OpCos were not in place at the time of the spin-off, the business activities spun off to the OpCos have been temporarily leased back by the relevant OpCos to Merck KGaA, Darmstadt, Germany, until sector-specific ERP systems have been introduced. For this purpose, also on March 2, 2018, Merck KGaA, Darmstadt, Germany, entered into a business leasing contract with each respective OpCo with economic effect as of 0:00 hours on January 1, 2018, to lease back all the operating business previously spun off to the OpCo. Under the terms of the respective business leasing contract, Merck KGaA, Darmstadt, Germany, leases the entire operation from the respective OpCo, as well as all fixed assets in this context; it acquires the current assets as well as certain liabilities and provisions at their carrying amounts under German commercial law. The business lease allowed the spin-off measures to be implemented for all OpCos with economic effect at a uniform time, 0:00 hours on January 1, 2018, while retaining the flexibility of transitioning the management of the relevant operating business in accordance with the sector-specific ERP introduction at an individual time to the OpCo in question in a targeted manner. On the basis of the business leasing contract, Merck KGaA, Darmstadt, Germany, will temporarily continue to operate the spun-off business as a leaseholder in its own name and for its own account. Once the relevant ERP systems have been introduced for the respective OpCo, the business lease with this OpCo will be terminated and the business previously leased out will pass to the OpCo.

The aforementioned spin-off and business leasing contracts form part of an overall entrepreneurial concept. They were submitted to the General Meeting of Merck KGaA, Darmstadt, Germany, for approval on April 27, 2018 (2018 Annual General Meeting) as a coherent restructuring measure, and were approved by it. The gradual implementation of the measures is due to be completed in 2020. In 2018, the Healthcare OpCo changed its legal form to that of a German corporation with general partners ("Kommanditgesellschaft auf Aktien") and has since been trading under the name of Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany.

The business leasing contract under which the Healthcare business sector was leased back to Merck KGaA, Darmstadt, Germany, was terminated with the agreement dated January 11, 2019, with economic effect as of 24:00 hours on March 31, 2019. The sector-specific ERP system for the Healthcare business sector was introduced as planned on April 1, 2019. As a result of the end of the business leasing contract, the leased objects allocated to the Healthcare business sector at the end of the lease – comprising current assets as well as certain liabilities and provisions, including the leased objects acquired or created by means of maintenance, replacement, and expansion investments – were transferred to Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, at their carrying amounts under German commercial law and in a condition commensurate with their continued and proper operational use up to the date the business leasing contract ended. The carrying amounts of the debt exceeded the carrying amounts of assets, and so Merck KGaA, Darmstadt, Germany, made a settlement payment to Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany. In addition, the licenses for the intangible assets and know-how leased to Merck KGaA, Darmstadt, Germany, came to an end.

The table below shows the assets and debt of Merck KGaA, Darmstadt, Germany, immediately before and after the end of the business lease and the transfer of the assets and debt to Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany. As a result of the termination of the business lease, there were mainly lower sales, material, personnel and other operating expenses in fiscal year 2019.

€ million	Merck KGaA, Darmstadt, Germany March 31, 2019	**Merck KGaA, Darmstadt, Germany April 1, 2019**
ASSETS		
A. Fixed assets		
Intangible assets	237.0	237.0
Tangible assets	885.5	885.5
Financial assets	17,532.0	17,532.0
	18,654.5	**18,654.5**
B. Current assets		
Inventories	702.4	506.9
Trade accounts receivable	105.7	84.3
Other receivables and other assets	1,111.6	1,106.0
Cash and cash equivalents	2.0	2.0
	1,921.7	**1,699.2**
C. Prepaid expenses	58.9	58.9
Total ASSETS	**20,635.1**	**20,412.6**
EQUITY AND LIABILITIES		
A. Net equity		
Subscribed capital	168.0	168.0
General partner's equity	397.2	397.2
Capital reserves	3,813.7	3,813.7
Retained earnings	701.6	701.6
Profit carried forward E. Merck KG, Darmstadt, Germany	60.8	60.8
Net retained profit: shareholders	138.6	138.6
	5,279.9	**5,279.9**
B. Provisions		
Provisions for pensions and other post-employment benefits	302.4	302.4
Other provisions	854.1	684.9
	1,156.5	**987.3**
C. Liabilities		
Financial liabilities	1,500.0	1,500.0
Trade accounts payable	365.2	273.4
Other liabilities	12,317.1	12,357.8
	14,182.3	**14,131.2**
D. Deferred income	16.4	14.2
Total EQUITY AND LIABILITIES	**20,635.1**	**20,412.6**

Business development

Net sales of Merck KGaA, Darmstadt, Germany, decreased in 2019. The decline of € 1,140 million resulted primarily from the Healthcare and Performance Materials business sectors. The Healthcare business sector has been held in a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019. On the other hand, net sales of the Life Science business sector rose, in particular.

			Change	
€ million	**2019**	2018	€ million	%
Healthcare	1,102	2,310	-1,208	-52.3
Life Science	987	780	207	26.5
Performance Materials	1,263	1,386	-123	-8.9
Other sales	293	309	-16	-5.2
Total	**3,645**	**4,785**	**-1,140**	**-23.8**

Sales of the Healthcare sector include product sales generated until the termination of the business lease as well as sales from intercompany cross-charges. Other sales mainly included intragroup cross-charging for IT services, trademarks, rent, and other administrative services.

The share of sales with other Group companies (Group sales) amounted to 92.0% in 2019 (2018: 93.6%).

			Change	
€ million	**2019**	2018	€ million	%
Group sales	3,355	4,477	-1,122	-25.1
Sales to third parties	290	308	-18	-5.8
Total	**3,645**	**4,785**	**-1,140**	**-23.8**

At 81.7% (2018: 86.7%), the share of exports in 2019 was below the previous year's level.

			Change	
€ million	**2019**	2018	€ million	%
Outside Germany	2,978	4,148	-1,170	-28.2
Germany	667	637	30	4.7
Total	**3,645**	**4,785**	**-1,140**	**-23.8**

The decline in net sales of the Healthcare business sector is attributable to the fact that its business has been continued in a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019.

In the Performance Materials business sector, sales at the Display Solutions business unit declined year-on-year by -7.6%. Sales of the Surface Solutions business unit also declined, by -1.1%. All in all, a sharp increase in sales at Cosmetics and OLED was not enough to offset this decline. From a regional perspective, sales in Asia-Pacific and Europe fell.

Net sales of the Life Science business sector increased by a double-digit rate over the previous year's figure, mainly due to the Process Solutions business unit (+21%). The Research Solutions (+6.0%) and Applied Solutions (+6.9%) business units also posted higher sales year-on-year and contributed to growth. Sales growth was generated in the Europe, Asia-Pacific, and North America regions. By contrast, a slight fall was recorded in the Middle East and Africa regions.

RESULTS OF OPERATIONS

			Change	
€ million	**2019**	2018	€ million	%
Net sales	3,645	4,785	-1,140	-23.9
Other income	215	172	43	25.0
Cost of materials	-1,459	-1,776	317	-17.8
Personnel expenses	-1,128	-1,305	177	-13.6
Depreciation, amortization, and write-downs	-122	-112	-10	8.9
Other operating expenses	-1,382	-2,152	770	-35.8
Investment income/write-downs of financial assets	1,099	1,234	-135	-10.9
Financial result	-228	-262	34	-13.0
Profit before profit transfers and taxes	**641**	**584**	**56**	**9.6**
Profit transfers	-456	-454	-2	0.4
Taxes	-16	32	-48	-150.0
Profit after profit transfers and taxes	**169**	**162**	**7**	**4.3**

The increase in **other income** primarily resulted from cross-charges within the scope of the business lease. This was offset by lower income from the reversal of provisions and lower exchange rate gains.

The **cost of materials** fell overall, due to fact that the Healthcare business has been continued in a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019. Owing to higher sales volume with declining prices in some cases, the cost of materials in relation to sales rose to 40.0% (2018: 37.1%).

The decline in **personnel expenses** was mainly attributable to the business transfer of about 3,000 employees from the Healthcare business sector to a separate company, the Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019.

Depreciation, amortization, and write-downs rose as a result of the investments made in 2018 and 2019.

The continuation of the Healthcare business sector in a separate company since April 1, 2019, led to a fall in **other operating expenses**, mainly in marketing, research and other external services and remuneration.

Investment income fell essentially on account of lower dividend payments in the Group. The profit transfers from subsidiaries decreased mainly due to a dividend received in the previous year from an intermediate holding company with a profit transfer agreement. In addition, one-off effects in one subsidiary further reduced the profit transfer. This was offset by higher profit transfers from other subsidiaries, particularly Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany; see section "Effects of material company agreements on the net assets, financial position, and results of operations".

The **financial result** increased mainly due to higher fair values of plan assets. This was offset by higher interest expense resulting from the financing for Versum, see Note (5) "Acquisitions and divestments" in the Notes to the Consolidated Financial Statements.

Net assets and financial position

ASSETS

€ million	Dec. 31, 2019	Dec. 31, 2018	Change € million	Change %
Fixed assets	**23,550**	**18,670**	**4,880**	**26.1**
Intangible assets	232	239	-7	-2.8
Tangible assets	860	899	-39	-4.3
Financial assets	22,458	17,532	4,926	28.1
Current assets	**1,726**	**2,336**	**-610**	**-26.1**
Inventories	567	725	-158	-21.8
Trade accounts receivable	186	315	-129	-41.0
Other receivables and other assets	973	1,293	-320	-24.8
Cash and cash equivalents	1	3	-2	-66.7
Prepaid expenses	**47**	**34**	**13**	**36.6**
	25,323	**21,040**	**4,283**	**20.4**

LIABILITIES

€ million	Dec. 31, 2019	Dec. 31, 2018	Change € million	Change %
Net equity	**5,338**	**5,329**	**9**	**0.2**
Provisions	**983**	**1,119**	**-136**	**-12.1**
Provisions for pensions and other post-employment benefits	379	288	92	31.9
Other provisions	605	832	-227	-27.3
Liabilities	**18,988**	**14,575**	**4,413**	**30.3**
Financial liabilities	3,000	1,500	1,500	100.0
Trade accounts payable	384	446	-62	-14.0
Other liabilities	15,605	12,629	2,976	23.6
Deferred income	**14**	**17**	**–3**	**–17.2**
	25,323	**21,040**	**4,283**	**20.4**

The change in net assets and in the financial position of Merck KGaA, Darmstadt, Germany, was mainly a result from capital and financing measures in connection with the acquisition of Versum. With a 20.4% increase in total assets, the equity ratio amounted to 21.1% (2018: 25.3%). The fall in the equity ratio is mainly attributable to the financing measures as part of the Versum acquisition.

The end of the business lease of the Healthcare business sector resulted in a decline in the assets and liabilities associated with this business sector (see "Effects of material company agreements on the net assets, financial position and results of operations").

Intragroup capital measures as part of the Versum acquisition resulted in an increase in financial assets.

Current assets (€ –610 million) decreased principally due to lower profit transfers compared with the previous year, mainly as a result of a dividend received in the previous year from an intermediate holding company with a profit transfer agreement. Moreover, inventories and trade accounts receivable fell in 2019 due to the continuation of the Healthcare business sector within Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, as of April 1, 2019.

The drop in other provisions (€ –227 million) resulted primarily from the operating spin-off (see "Effects of material company agreements on the net assets, financial position and results of operations").

The increase in financial liabilities was due to the issue of bonds as part of the Versum acquisition.

The rise in other liabilities resulted mainly from intragroup financing measures in the wake of the Versum acquisition.

Research and development

In 2019, research and development spending on projects of Merck KGaA, Darmstadt, Germany, and of other Group companies totaled € 434 million (2018: € 923 million). A large portion was also incurred by companies outside the Group. The decline of € 489 million (53.0%) was mainly attributable to the fact that the Healthcare business sector has been continued in a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019. Further information can be found in the section "Research and Development" in the Management Report of the Group.

RESEARCH AND DEVELOPMENT EXPENSES

			Change	
€ million	**2019**	2018	€ million	%
Healthcare	132	604	-472	-78.1
Life Science	57	46	11	22.8
Performance Materials	244	260	-16	-6.3
Other R&D spending that cannot be allocated to individual business sectors	2	13	-11	-85.8
Total	**434**	**923**	**-489**	**-53.0**

The ratio of research and development spending to sales was 11.9% (2018: 19.3%). Overall, the average number of employees working in research and development was 1,678. Merck KGaA, Darmstadt, Germany, is one of the main research sites of the Group, accounting for a share of 19.1% (2018: 41.6%) of total Group research and development spending. The decline is mainly attributable to the fact that the R&D activities of the research-intensive Healthcare business sector have been continued at the operating company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019.

Dividend

For 2019, we are proposing to the General Meeting the payment of a dividend of € 1.30 per share.

Personnel

As of December 31, 2019, Merck KGaA, Darmstadt, Germany, had 8,474 employees, representing a decrease over the previous year (2018: 11,133). The decline was mainly attributable to the fact that employees from the Healthcare business sector have been employed at a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany.

The average number of employees by functional area is as follows:

PERSONNEL

Average number of employees during the year	**2019**	2018
Production	3,164	3,756
Administration	3,143	3,213
Research	1,678	2,674
Logistics	620	671
Marketing and sales	510	590
Other	23	79
Total	**9,138**	**10,983**

Risks and opportunities

Merck KGaA, Darmstadt, Germany, is largely subject to the same opportunities and risks as the Group. More information can be found in the Report on Risks and Opportunities.

Forecast for Merck KGaA, Darmstadt, Germany

Deviations of actual business development in 2019 from the previously reported guidance

The combined management report for 2018 forecast a decline in net sales at the Healthcare business sector in 2019 due to the fact that the business lease would end and, related to that, its operating business would be continued in Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, from April 1, 2019. A slight increase in net sales was forecast for the Life Science business sector, whereas a slight drop in net sales was expected for the Performance Materials business sector. A slight increase over the previous year was forecast for net income for the year.

In the Performance Materials business sector, sales at the Display Solutions business unit declined year over year by -7.6% und thus met the expectations from the management report 2018. Sales of the Surface Solutions business unit also declined, by -1.1%. All in all, a sharp increase in sales at the Cosmetics and OLED business units was not enough to offset this decline.

Net sales of the Life Science business sector increased by a double-digit rate over the previous year's figure and were thus above our forecast from the management report 2018, mainly due to the Process Solutions business unit (+21%). The Research Solutions (+6.0%) and Applied Solutions (+6.9%) business units also posted higher sales year-on-year and contributed to growth.

The continuation of the Healthcare business sector in Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, led to a fall in the associated net sales and cost of materials and personnel, and other operating expenses at Merck KGaA, Darmstadt, Germany, as expected.

Forecast 2020

For fiscal 2020, a significant decline in net sales is expected overall. This is due to the planned termination of the business leasing contracts with Merck Life Science Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, and Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, as well as the resulting transfer of the Life Science and Performance Materials business sector's operating business.

As in 2018, the financing costs of the Sigma-Aldrich acquisition as well as the Versum acquisition in 2019 continue to adversely affect net income. Nevertheless, net income for the year is expected to be at a comparable level to 2019 due to the positive investment income and dividends from the subsidiaries.

Merck Financial Services GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, will provide the company with sufficient financial resources and thus ensure liquidity.

Currently no risks can be identified that may jeopardize the continued existence of the company.

Updated forecast for 2020 dated May 12, 2020

This combined management report was originally prepared on February 14, 2020 by the Executive Board of Merck KGaA, Darmstadt, Germany. Owing to the originally planned termination of the lease agreements with Merck Life Science Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, and Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, in fiscal 2020 as well as the resulting transfer of the operating businesses, a significant decline in net sales of Merck KGaA, Darmstadt, Germany, was forecast. As the project scheduling has meanwhile been updated, the successive implementation of the measures in fiscal 2020 is not likely to be completed. Taking into account this present state of knowledge, while simultaneously considering the development of the Covid-19 pandemic, the forecast previously given is updated as follows: Net sales for 2020 are now expected to be at a level comparable to 2019. All further forecast assumptions are identical to those made in our original forecast.

ANNUAL FINANCIAL STATEMENTS

Balance Sheet as of December 31, 2019

ASSETS

€ million	Note	Dec. 31, 2019	Dec. 31, 2018
Fixed assets			
Intangible assets	→ 1	232.3	239.2
Tangible assets	→ 2	859.9	899.2
Financial assets	→ 3	22,457.6	17,531.9
		23,549.8	**18,670.3**
Current assets			
Inventories	→ 4	567.0	725.3
Receivables and other assets			
Trade accounts receivable	→ 5	186.2	314.7
Other receivables and other assets	→ 6	972.9	1,293.1
Cash and cash equivalents	→ 7	0.5	2.7
		1,159.6	**1,610.5**
		1,726.6	**2,335.8**
Prepaid expenses	→ 8	**46.6**	**34.1**
		25,323.0	**21,040.2**

EQUITY AND LIABILITIES

€ million	Note	Dec. 31, 2019	Dec. 31, 2018
Net equity	→ 9		
Subscribed capital		168.0	168.0
General partner's equity		397.2	397.2
Capital reserves		3,813.7	3,813.7
Retained earnings		701.6	701.6
Profit carried forward: E. Merck KG, Darmstadt, Germany		62.6	60.8
Net retained profit: shareholders		194.5	187.4
		5,337.7	**5,328.7**
Provisions	→ 10		
Provisions for pensions and other post-employment benefits		378.6	287.6
Other provisions		604.7	831.7
		983.3	**1,119.3**
Liabilities	→ 11		
Financial liabilities	→ 12	3,000.0	1,500.0
Trade accounts payable	→ 13	383.6	445.8
Other liabilities	→ 14	15,604.8	12,629.5
		18,988.4	**14,575.3**
Deferred income		**13.7**	**16.9**
		25,323.0	**21,040.2**

Income Statement for the period from January 1 to December 31, 2019

€ million	Note	2019	2018
Sales	→ 15	**3,645.1**	**4,785.0**
Changes in inventories		32.7	24.8
Other own work capitalized		35.6	35.8
Other operating income	→ 16	146.6	111.9
Total operating income		**3,860.0**	**4,957.5**
Cost of materials	→ 17	–1,459.1	–1,776.1
Personnel expenses	→ 18	–1,128.0	–1,304.8
Depreciation, amortization and write-downs		–121.9	–112.1
Other operating expenses	→ 19	–1,381.6	–2,151.5
Total operating expenses		**–4,090.6**	**–5,344.5**
Income/expense from investments	→ 20	1,099.5	1,234.2
Financial result	→ 21	–227.9	–262.4
Profit transfer to E. Merck KG, Darmstadt, Germany	→ 22	–449.0	–447.3
Loss transfer from E. Merck KG, Darmstadt, Germany	→ 22	–7.4	–7.1
Income tax	→ 23	–15.8	31.5
Profit after tax/net income		**168.8**	**161.9**

Statement of Changes in Fixed Assets

€ million	Intangible assets	Tangible assets	Financial assets	**Total**
Accumulated acquisition and production costs as of Jan. 1, 2019	**436.0**	**1,995.3**	**17,568.2**	**19,999.5**
Additions	95.4	70.9	5,016.2	5,182.5
Disposals	–54.3	–44.3	–100.8	–199.4
Transfers	–	–	–	–
Accumulated acquisition and production costs as of Dec. 31, 2019	**477.1**	**2,021.9**	**22,483.6**	**24,982.6**
Accumulated depreciation, amortization and write-downs as of Jan. 1, 2019	**196.8**	**1,096.1**	**36.3**	**1,329.2**
Depreciation, amortization and write-downs	49.2	72.7	–	121.9
Disposals	–1.2	–6.8	–	–8.0
Reversals of write-downs	–	–	–10.3	–10.3
Accumulated depreciation, amortization and write-downs as of Dec. 31, 2019	**244.8**	**1,162.0**	**26.0**	**1,432.8**
Net carrying amount as of Dec. 31, 2019	**232.3**	**859.9**	**22,457.6**	**23,549.8**

Notes as of December 31, 2019[1]

General Disclosures

The annual financial statements of MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany, (hereinafter Merck KGaA, Darmstadt, Germany) have been prepared in accordance with the provisions of the German Commercial Code (HGB) applicable to large corporations, the German Stock Corporation Act (AktG), and the supplementary provisions of the Articles of Association. The income statement has been prepared in accordance with the total cost (nature of expense) method. Deferred taxes have not been reported as there is an excess of deferred tax assets. Plan assets are offset against the relevant provisions in accordance with section 246 HGB. For details, please see the Notes to the items of the balance sheet and the income statement. Merck KGaA, Darmstadt, Germany, prepares consolidated financial statements, which are contained in the Annual Report of the Group. In addition, Merck KGaA, Darmstadt, Germany, is included in the consolidated financial statements of the E. Merck Kommanditgesellschaft, Darmstadt, Germany, (hereinafter E. Merck KG, Darmstadt, Germany). Both sets of financial statements are filed with the German Federal Gazette (Bundesanzeiger) and are available at www.bundesanzeiger.de. Certain items of the balance sheet and income statement have been combined in order to enhance the clarity of presentation. These items are shown separately in the Notes.

Effects of material company agreements on the net assets, financial position, and results of operations

END OF THE TEMPORARY BUSINESS LEASE OF THE HEALTHCARE BUSINESS SECTOR

As part of the strategic development of Merck KGaA, Darmstadt, Germany, the existing operating activities of the Healthcare, Life Science, and Performance Materials business sectors within Merck KGaA, Darmstadt, Germany, together with the relevant assets and liabilities (hereinafter: "operating sectors"), were spun off at their carrying values into three separate companies (hereinafter "OpCo" or plural "OpCos") with the legal form of a GmbH or German limited liability corporation (operating spin-off). This operating spin-off is based on the spin-off and takeover agreement concluded between Merck KGaA, Darmstadt, Germany, and the OpCos in notarized form on March 2, 2018. Following approval by the 2018 Annual General Meeting, the operating spin-off took place with economic effect as of 0:00 hours on January 1, 2018.

Immediately after the spin-off took effect, all shares held by Merck KGaA, Darmstadt, Germany, in the respective OpCos were transferred to holding companies via a further spin-off (holding company spin-off), as a result of which the OpCos are each indirectly held by Merck KGaA, Darmstadt, Germany, via an intermediate holding company. The acquiring legal entities within the scope of the holding company spin-off were Merck Healthcare Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany, for the business shares of Healthcare OpCo, Merck Life Science Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany, for the business shares of Life Science OpCo, and Merck Performance Materials Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany, for the business shares of Performance Materials OpCo (referred to individually as "HoldCo", independently of the sector, and jointly as "HoldCos"). To this end, Merck KGaA, Darmstadt, Germany, and the HoldCos signed a notarized spin-off and takeover agreement on March 2, 2018. The holding company spin-off took place with economic effect as of 0:00 hours on January 1, 2018.

Since the technical system requirements for the introduction of the sector-specific ERP systems as regards the OpCos were not in place at the time of the spin-off, the business activities spun off to the OpCos have been temporarily leased back by the relevant OpCos to Merck KGaA, Darmstadt, Germany, until sector-specific ERP systems have been introduced. For this purpose, also on March 2, 2018, Merck KGaA, Darmstadt, Germany, entered into a business leasing contract with the respective OpCo with economic effect as of 0:00 hours on January 1, 2018, to lease back all the operating business previously spun off to the OpCo. Under the terms of the respective business leasing contract, Merck KGaA, Darmstadt, Germany, leases the entire operation from the respective OpCo, as well as all fixed assets in this context; it acquires the current assets as well as certain liabilities and provisions at their carrying amounts under German commercial law. The business lease allowed the spin-off measures to be implemented for all OpCos with economic effect at a uniform time, 0:00 hours on January 1, 2018, while retaining the flexibility of transitioning the management of the relevant operating business in accordance with the sector-specific ERP introduction at an individual time to the OpCo in question in a targeted manner. On the basis of the business leasing contract, Merck KGaA, Darmstadt, Germany, will temporarily continue to operate the spun-off business as a leaseholder in its own name and for its own

[1] Owing to the altered expectations in terms of the impact of the Covid-19 pandemic, the section „Other Disclosures – Subsequent Events" was updated accordingly.

account. Once the relevant ERP systems have been introduced for the respective OpCo, the business lease with this OpCo will be terminated and the business previously leased out will pass to the OpCo.

The aforementioned spin-off and business leasing contracts form part of an overall entrepreneurial concept. They were submitted to the General Meeting of Merck KGaA, Darmstadt, Germany, for approval on April 27, 2018, (2018 Annual General Meeting) as a coherent restructuring measure and approved by it. The gradual implementation of the measures is due to be completed in 2020. In 2018, the Healthcare OpCo changed its legal form to that of a German corporation with general partners ("Kommanditgesellschaft auf Aktien") and has since been trading under the name of Merck Healthcare KGaA, Darmstadt, a subsidiary of Merck KGaA, Darmstadt, Germany.

The business leasing contract under which the Healthcare business sector was leased back to Merck KGaA, Darmstadt, Germany, was terminated with the agreement dated January 11, 2019, with economic effect as of 24:00 hours on March 31, 2019. The sector-specific ERP system for the Healthcare business sector was introduced as planned on April 1, 2019. As a result of the end-of-the-business leasing contract, the leased objects allocated to the Healthcare business sector at the end of the lease – comprising current assets as well as certain liabilities and provisions, including the leased objects acquired or created by means of maintenance, replacement, and expansion investments – were transferred to the Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany, at their carrying amounts under German commercial law and in a condition commensurate with their continued and proper operational use up to the date the business leasing contract ended. The carrying amounts of the liabilities exceeded the carrying amounts of the assets, with the result that Merck KGaA, Darmstadt, Germany, made a compensation payment to Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany. In addition, the licenses for the intangible assets and know-how leased to Merck KGaA, Darmstadt, Germany, came to an end.

The following table presents the assets and liabilities of Merck KGaA, Darmstadt, Germany, immediately before and after the termination of the business lease took effect and the assets and liabilities were transferred to Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany.

The termination of the business lease primarily resulted in lower net sales, cost of materials and personnel, and other operating expenses in fiscal 2019.

€ million	Merck KGaA, Darmstadt, Germany March 31, 2019	Merck KGaA, Darmstadt, Germany April 1, 2019
ASSETS		
A. Fixed assets		
Intangible assets	237.0	237.0
Tangible assets	885.5	885.5
Financial assets	17,532.0	17,532.0
	18,654.5	**18,654.5**
B. Current assets		
Inventories	702.4	506.9
Trade accounts receivable	105.7	84.3
Other receivables and other assets	1,111.6	1,106.0
Cash and cash equivalents	2.0	2.0
	1,921.7	**1,699.2**
C. Prepaid expenses	58.9	58.9
Total ASSETS	**20,635.1**	**20,412.6**
EQUITY AND LIABILITIES		
A. Net equity		
Subscribed capital	168.0	168.0
General partner's equity	397.2	397.2
Capital reserves	3,813.7	3,813.7
Retained earnings	701.6	701.6
Profit carried forward: E. Merck KG, Darmstadt, Germany	60.8	60.8
Net retained profit: shareholders	138.6	138.6
	5,279.9	**5,279.9**
B. Provisions		
Provisions for pensions and other post-employment benefits	302.4	302.4
Other provisions	854.1	684.9
	1,156.5	**987.3**
C. Liabilities		
Financial liabilities	1,500.0	1,500.0
Trade accounts payable	365.2	273.4
Other liabilities	12,317.1	12,357.8
	14,182.3	**14,131.2**
D. Deferred income	16.4	14.2
Total EQUITY AND LIABILITIES	**20,635.1**	**20,412.6**

Notes to the Balance Sheet

(1) Intangible assets

€ million	Concessions, industrial property rights and similar rights and assets as well as licenses to such rights and assets	Goodwill	Advance payments	**Total**
Accumulated acquisition and production costs as of Jan. 1, 2019	**399.4**	**2.8**	**33.8**	**436.0**
Additions	36.4	–	59.0	95.4
Disposals	–54.0	–	–0.3	–54.3
Transfers	24.1	–	–24.1	–
Accumulated acquisition and production costs as of Dec. 31, 2019	**405.9**	**2.8**	**68.4**	**477.1**
Accumulated amortization and write-downs as of Jan. 1, 2019	**194.0**	**2.8**	**–**	**196.8**
Amortization and write-downs	48.8	–	0.4	49.2
Disposals	–1.2	–	–	–1.2
Reversals of write-downs	–	–	–	–
Accumulated amortization and write-downs as of Dec. 31, 2019	**241.6**	**2.8**	**0.4**	**244.8**
Net carrying amount as of Dec. 31, 2019	**164.3**	**–**	**68.0**	**232.3**

Acquired intangible assets are carried at acquisition cost less straight-line amortization. In the case of concessions, industrial property rights, licenses, patents, and software, the useful life is between 3 and 15 years. Goodwill acquired indirectly is amortized over a period of 5 years. Write-downs for impairment are recognized if other than temporary impairments are expected. The write-downs for impairment of intangible assets during the fiscal year amounted to €0.4 million (2018: €0.0 million).

(2) Tangible assets

€ million	Land, land rights, and buildings, including buildings on third-party land	Plant and machinery	Other facilities, operating and office equipment	Construction in progress and advance payments to vendors and contractors	**Total**
Accumulated acquisition and production costs as of Jan. 1, 2019	**1,012.0**	**390.5**	**397.9**	**194.9**	**1,995.3**
Additions	9.1	1.8	9.9	50.1	70.9
Disposals	–2.3	–2.4	–8.1	–31.5	–44.3
Transfers	60.2	9.7	20.9	–90.8	–
Accumulated acquisition and production costs as of Dec. 31, 2019	**1,079.0**	**399.6**	**420.6**	**122.7**	**2,021.9**
Accumulated depreciation and write-downs as of Jan. 1, 2019	**470.4**	**325.0**	**300.7**	**–**	**1,096.1**
Depreciation and write-downs	33.5	11.8	26.5	0.9	72.7
Disposals	–2.1	–1.7	–3.0	–	–6.8
Additions	–	–	–	–	–
Accumulated depreciation and write-downs as of Dec. 31, 2019	**501.8**	**335.1**	**324.2**	**0.9**	**1,162.0**
Net carrying amount as of Dec. 31, 2019	**577.2**	**64.5**	**96.4**	**121.8**	**859.9**

Tangible assets are carried at the acquisition or production cost less depreciation for wear and tear. In the case of internally generated tangible assets, the production cost is calculated on the basis of directly attributable unit costs plus an appropriate share of overheads. Interest on borrowed capital is not included. Production facilities are depreciated over a period of 25 years, administrative and social buildings over 33 and 40 years, respectively. The useful life of plant is mainly between 10 and 15 years. The useful life of other tangible assets is typically between 2 and 20 years. Write-downs for impairment are recognized if other than temporary impairments are expected. In fiscal 2019, they totaled €0.9 million (2018: €3.9 million).

(3) Financial assets

	Investments in:		Loans to:		
€ million	affiliates	other companies	affiliates	others	**Total**
Accumulated acquisition costs as of Jan. 1, 2019	**17,564.0**	**0.9**	**–**	**3.3**	**17,568.2**
Additions	5,016.0	–	–	0.2	5,016.2
Disposals	–100.0	–	–	–0.8	–100.8
Transfers	–	–	–	–	–
Accumulated acquisition costs as of Dec. 31, 2019	**22,480.0**	**0.9**	**–**	**2.7**	**22,483.6**
Accumulated write-downs as of Jan. 1, 2019	**35.4**	**0.9**	**–**	**–**	**36.3**
Write-downs	–	–	–	–	–
Disposals	–	–	–	–	–
Reversals of write-downs	–10.3	–	–	–	–10.3
Accumulated write-downs as of Dec. 31, 2019	**25.1**	**0.9**	**–**	**–**	**26.0**
Net carrying amount as of Dec. 31, 2019	**22,454.9**	**–**	**–**	**2.7**	**22,457.6**

Financial assets are carried at acquisition cost less any write-downs required to the lower fair value. The list of shareholdings can be found in the section "List of Shareholdings of Merck KGaA, Darmstadt, Germany" in the Notes to the Annual Financial Statements on pages 154–177. Additions during the fiscal year are mainly due to capital and financing measures within the Group as part of the Versum acquisition.

(4) Inventories

€ million	Dec. 31, 2019	Dec. 31, 2018
Raw materials and production supplies	129.3	157.4
Work in progress	154.4	155.4
Finished goods and goods purchased for resale	279.4	407.5
Advance payments	3.9	5.0
	567.0	**725.3**

Work in progress and finished goods are carried at the production cost, which includes materials and production overheads, as well as appropriate amounts of depreciation charges on production facilities and directly attributable unit costs. Interest on borrowed capital is not included. Other inventories are carried at acquisition cost in compliance with the principle of the lower of cost or market. Where necessary, inventories are written down to the lower fair value.

(5) Trade accounts receivable

€ million	Total Dec. 31, 2019	thereof due after more than 1 year	Total Dec. 31, 2018	thereof due after more than 1 year
Receivables from affiliates	114.7	–	228.0	–
Receivables from other companies	71.5	–	86.7	–
	186.2	**–**	**314.7**	**–**

Trade accounts receivable are carried at their nominal amount. Adequate specific and global valuation allowances are charged for default and transfer risks unless these are covered by insurance. Short-term receivables denominated in foreign currencies were translated at the closing rates.

(6) Other receivables and other assets

€ million	Total Dec. 31, 2019	thereof due after more than 1 year	Total Dec. 31, 2018	thereof due after more than 1 year
Receivables from affiliates	753.2	–	1,059.0	–
– thereof from the general partner E. Merck KG, Darmstadt, Germany	(–)	(–)	(–)	(–)
Receivables from other companies	13.5	–	27.3	–
Tax receivables	203.3	–	203.1	–
Other assets	2.9	–	3.7	–
	972.9	**–**	**1,293.1**	**–**

Other receivables and other assets are carried at their nominal amount. Any default or other risks are covered by appropriate valuation allowances. Short-term receivables denominated in foreign currencies were translated at the closing rates. This item essentially relates to clearing accounts and short-term loans with other companies of the Group, recoverable taxes, and other advance payments.

(7) Cash and cash equivalents

Cash and cash equivalents relate essentially to credit balances at various banks in a variety of currencies. Foreign currency amounts are measured at the closing rate.

(8) Prepaid expenses

Prepaid expenses comprise amounts that will only be expensed after the end of the reporting period. This item mainly includes IT services as well as a discount of €4.7 million (2018: €2.9 million).

(9) Net equity

The share capital is reported under subscribed capital. The total capital consists of the share capital (Article 5 (1) of the company's Articles of Association) of €168,014,927.60, composed of shares, and the equity interest held by the general partner E. Merck KG, Darmstadt, Germany, Emanuel-Merck-Platz 1, 64293 Darmstadt, Germany, (Article 8 (1) of the company's Articles of Association) of €397,196,314.35. The company's share capital is composed of 129,242,251 shares and one registered share. The accounting par value of one share is €1.30. The Executive Board is authorized, with the approval of the Supervisory Board and of E. Merck KG, Darmstadt, Germany, to increase the share capital on one or several occasions until April 27, 2022, by up to a total of €56,521,124.19 by issuing new shares against cash and/or contributions in kind (Authorized Capital 2017). The new shares may be assumed by certain banks appointed by the Executive Board with the obligation to offer them to the limited liability shareholders (indirect subscription right). The Executive Board is authorized, with the approval of the Supervisory Board, to exclude the legal subscription right of the limited liability shareholders in the following cases:

- Capital increases against cash contributions if the issue price of the new shares is not significantly lower than the stock exchange price of already listed shares carrying the same rights, as defined in section 203 (1) and (2) and section 186 (3) sentence 4 AktG, at the time when the Executive Board finally fixes the issue price, and if the proportion of the share capital represented by the new shares for which the subscription right is excluded does not exceed 10 % of the share capital available at the time of the resolution of the Annual General Meeting or – if this amount is lower – of the share capital available at the time of exercising this authorization. The upper limit of 10 % of the share capital shall be reduced by the prorated amount of shares that are sold during the term of the Authorized Capital 2017 under exclusion of shareholders' subscription rights in accordance with section 71 (1) no. 8 sentence 5 and section 186 (3) sentence 4 AktG, as well as shares that must be issued to redeem option or convertible bonds with option or conversion privileges or to fulfill an option or conversion obligation, as long as the bonds have been issued during the term of this authorization under exclusion of subscription rights in accordance with section 221 (4) and section 186 (3) sentence 4 AktG;
- In the case of capital increases through non-cash contributions, particularly for the purpose of acquiring enterprises, parts of enterprises or interests in enterprises;
- To enable E. Merck KG, Darmstadt, Germany, to exercise its right in accordance with Article 32 (3) of the company's Articles of Association to participate in a capital increase by issuing shares or freely transferable share subscription rights;
- To enable E. Merck KG, Darmstadt, Germany, to exercise its right in accordance with Article 33 of the company's Articles of Association to convert its equity interest into share capital;
- As far as this is necessary, to grant subscription rights for new shares to holders of warrants and convertible bonds issued by the company or its subsidiaries, to the extent to which they would be entitled after exercising their option or conversion rights or after fulfilling their option and conversion obligations; and
- To exclude fractional amounts from the subscription right.

The Executive Board is authorized, with the approval of the Supervisory Board, to determine the additional details of the capital increase and its execution, including the content of the share rights as well as the terms and conditions of the share issue. The Supervisory Board is authorized to amend Article 5 (3) of the Articles of Association according to the respective utilization of Authorized Capital 2017 or after expiration of the authorization period. The share capital is contingently increased by up to €66,406,298.40, divided into 51,081,768 shares (Contingent Capital I). The contingent capital increase serves to grant exchange rights to E. Merck KG, Darmstadt, Germany, in accordance with Article 33 of the company's Articles of Association to enable it to convert its equity interest into shares. The shares carry dividend rights from the beginning of the fiscal year following the year in which the conversion option is exercised. The share capital is contingently increased by up to €16,801,491.20, composed of up to 12,924,224 no par value bearer shares (Contingent Capital II). This increase in contingent capital is only to be implemented insofar as the bearers or creditors of option or conversion rights or with an obligation to convert warrant bonds, option participation certificates, option participation bonds, convertible bonds, convertible participation certificates, or convertible participation bonds issued against contributions that are issued or guaranteed by the company or a subordinate Group company on the basis of the authorization resolution of the Annual General Meeting of April 27, 2018, to April 26, 2023, utilize their option or conversion rights or, to fulfill their conversion obligation or obligation to exercise options insofar as they are obliged to fulfill their conversion or option exercise obligation, or insofar as the company exercises an option, wholly or in part, of granting shares in the company instead of paying the sum of money due and to the extent that in each case a cash settlement is not granted, or own shares or other forms of fulfillment are used. Each issue of new shares shall take place at the determined option or conversion price, pursuant to the aforementioned authorization resolution. The new shares participate in the profit from the beginning of the fiscal year in which they are created; insofar as this is legally permissible, the Executive Board may, with the approval of the Supervisory Board, and in deviation from section 60 (2) AktG, stipulate that the new shares also participate in the profit for a past fiscal year. The Executive Board is authorized, with the approval of the Supervisory Board and of E. Merck KG, Darmstadt, Germany, to stipulate the further details of the implementation of the increase in contingent capital.

€ million	Jan. 1, 2019	Capital ratios Jan. 1, 2019	Dividend distribution 2019	Net income 2019	Allocation to profit carried forward	Dec. 31, 2019	Dividend distribution (proposal)	Expected status May 28, 2020	**Capital ratios May 28, 2020**
Share capital	168.0	(29.726%)	–	–	–	168.0	–	–	(29.726%)
General partner's equity E. Merck KG, Darmstadt, Germany	397.2	(70.274%)	–	–	–	397.2	–	–	(70.274%)
Total capital	565.2	(100%)	–	–	–	565.2	–	565.2	(100%)
Capital reserves	3,813.7		–	–	–	3,813.7	–	3,813.7	
Retained earnings	701.6		–	–	–	701.6	–	701.6	
Profit carried forward: E. Merck KG, Darmstadt, Germany	60.8		–	–	1.8	62.6	–	62.6	
Net retained profit: shareholders	187.4		–161.6	168.8	–	194.5	–168.0	26.5	
Total	**5,328.7**		**–161.6**	**168.8**	**1.8**	**5,337.7**	**–168.0**	**5,169.6**	

The general partners and the Supervisory Board will propose to the General Meeting the payment of a dividend of €1.30 per share from the reported net retained profit of €194.5 million. Based on the existing share capital, this corresponds to a total dividend payment of €168.0 million. The remaining net retained profit of €26.5 million is to be carried forward to new account. In the expectation that the General Meeting will resolve that the net retained profit established as of December 31, 2019, in accordance with Article 31 (3) in conjunction with Article 31 (1) of the company's Articles of Association shall be utilized to distribute a dividend of €1.30 per share, E. Merck KG, Darmstadt, Germany, will transfer an amount of €1.8 million to the profit carried forward, in accordance with its equity interest. This contribution was already recognized in the balance sheet in the reporting period. In the event that, contrary to this expectation, the General Meeting passes a different resolution on the utilization of the net retained profit, the above-mentioned contribution by E. Merck KG, Darmstadt, Germany, will be adjusted accordingly.

(10) Provisions

€ million	Provisions for pensions and other post-employment benefits	Provisions for tax liabilities	Obligations relating to personnel expenses	Provisions for licenses, commissions, and rebates	Provisions for outstanding supplier invoices	Provisions for litigation	Other provisions	**Total**
Jan. 1, 2019	**287.6**	**139.1**	**175.0**	**23.6**	**223.8**	**89.3**	**180.9**	**1,119.3**
Utilization[1]	–17.3	–17.8	–161.8	–31.0	–263.6	–5.6	–26.9	–524.0
Reversals	–	–58.0	-2.3	–1.8	–9.6	–0.9	–19.4	–92.0
Additions	108.3	64.1	114.1	14.3	134.6	12.6	32.0	480.0
Dec. 31, 2019	**378.6**	**127.4**	**125.0**	**5.1**	**85.2**	**95.4**	**166.6**	**983.3**

[1] Includes transfers to Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany.

The pension provisions are based on actuarial calculations. Pension obligations are calculated using the internationally recognized projected unit credit method.

The carrying values in the financial statements under German commercial law are based on the 2018 G Heubeck mortality tables. The amount calculated is discounted as a lump sum using the average market interest rate for an assumed term of 15 years.

The discount rate was determined using a ten-year average of 2.71 % (2018: 3.21 %) in accordance with the Deutsche Bundesbank. The difference in the discount rate resulting from the change in 2016 from a seven-year average to a ten-year average amounted to €170.8 million as of December 31, 2019 (December 31, 2018: €176.2 million), and according to law it is barred from distribution.

Other key parameters are, as in 2018, a salary trend of 3 % for exempt employees and 2.5 % for non-exempt employees, as well as a pension trend of 1 % for obligations under the Pension Plan 2005 and 1.75 % for prior obligations.

After adjusting for the partial transfer of plan assets to the OpCos, Merck KGaA, Darmstadt, Germany, paid its share of contributions of €502.9 million to the Merck Pensionstreuhand e. V., Darmstadt, Germany under a trust agreement in order to secure employees' future pension entitlements. These contributions qualify as plan assets, which must be offset against pension provisions in accordance with section 246 (2) sentence 2 HGB. The plan assets mainly consist of exchange-traded securities and were measured at current fair value. They had a fair value of €633.1 million as of December 31, 2019 (2018: €589.2 million), and were fully offset against pension provisions. The increase in fair value of €43.9 million (2018: €–24.7 million) was included in the interest expense resulting from the additions to pension provisions. In accordance with section 268 (8) HGB, an amount of €130.2 million (2018: €86.3 million) is barred from distribution. The effect of deferred taxes is already taken into account. The settlement amount of pension obligations disclosed in the balance sheet amounted to €1,011.7 million (2018: €876.8 million).

The other provisions cover all identifiable risks and uncertain obligations. These are carried in the settlement amount dictated by prudent business practice, taking into account any price and cost increases. Long-term provisions are discounted at the average market interest rate of the preceding seven years in line with their maturity.

Obligations relating to personnel expenses include provisions of €102.7 million (2018: €145.1 million) for bonus payments, anniversaries, and vacation as well as working time credits. Also reported in this item are provisions of €0.1 million (2018: €9.0 million) for obligations under the partial retirement program.

The provisions for obligations under the partial retirement program relate to outstanding obligations for work performed, the top-up amount, and severance payments to compensate for pension reductions due to early retirement. The provisions for the partial retirement program and anniversaries are based on actuarial calculations.

A demography fund was set up for all employees on the basis of the "Lebensarbeitszeit und Demografie Chemie" (Working Life and Demographic Change – Collective Agreement for the German Chemical Industry) dated April 16, 2008. Payments are regularly made into this fund and are invested with a trust under a trust agreement. The corresponding provisions were offset against associated receivables from the trust arising from the amounts invested (plan assets) in accordance with section 246 (2) sentence 2 HGB. The cost of the offset plan assets, which were calculated by the weighted average method in the case of investments in securities, is €37.1 million (2018: €31.3 million); the fair value is €39.9 million (2018: €31.7 million). The settlement amount of the offset liabilities is €39.9 million (2018: €31.7 million). The remaining obligations of €4.7 million (2018: €4.0 million) reported in this item relate to employees' vacation entitlements within the framework of the future use of long-term time accounts.

Assessing the need for recognizing provisions for litigation is based on the likelihood of possible outcomes for proceedings. In particular, the factors influencing this likelihood are:
- The validity of the arguments brought forward by the opposing party and
- The legal situation and current court rulings in comparable proceedings in the jurisdiction in question.

In addition, the following factors are also relevant in measuring other provisions for litigation:
- The duration of proceedings in pending legal disputes,
- The applicable license rate plus an expected infringement surcharge,
- The usual damages and fines for other legal disputes, and
- The discount factor to be used.

To assess a recognition obligation in relation to provisions for litigation and to quantify future outflows of resources, Merck KGaA, Darmstadt, Germany, draws on the knowledge of the legal department as well as outside counsel.

Like the measurement of provisions, the assessment of a recognition obligation for provisions for litigation is to a particular extent subject to a degree of estimation uncertainty. The uncertainties relate, in particular, to the assessment of the likelihood and the amount of an outflow of resources to cover probable obligations.

The legal matters described below represented the most significant legal risks.

Antitrust review proceedings for the acquisition of Sigma-Aldrich Corporation, United States, (Sigma-Aldrich): on July 6, 2017, Merck KGaA, Darmstadt, Germany, received notice from the European Commission (EU Commission) in connection with the antitrust review proceedings for the acquisition of Sigma-Aldrich, in which the EU Commission informed Merck KGaA, Darmstadt, Germany, of its preliminary conclusion that Merck KGaA, Darmstadt, Germany, and Sigma-Aldrich allegedly transmitted incorrect and/or misleading information within the scope of the acquisition of Sigma-Aldrich. The EU Commission received registration of the merger on April 21, 2015, and granted clearance on June 15, 2015, subject to the condition that Merck KGaA, Darmstadt, Germany, and Sigma-Aldrich divest parts of the European solvents and inorganic chemicals businesses of Sigma-Aldrich in order to resolve antitrust concerns. According to the preliminary viewpoint of the EU Commission communicated in a letter dated July 6, 2017, Merck KGaA, Darmstadt, Germany, and Sigma-Aldrich withheld related important information about an innovation project. According to the EU Commission, the innovation project should have been included in the remedies package. At present, an administrative procedure is being carried out at the EU Commission, which might result in the issuance of a fine. Merck KGaA, Darmstadt, Germany, is entitled to legal recourse should a fine be imposed. The ongoing investigations are limited to the examination of violations of EU merger control procedures and do not affect the validity of the EU Commission's decision to approve the merger. A provision in a fixed double-digit million-euro amount was still in place for this issue. A potential outflow of resources is considered possible for 2020.

Paroxetine: In connection with the divested generics business, Merck KGaA, Darmstadt, Germany, is subject to antitrust investigations by the British Competition and Market Authority (CMA) in the United Kingdom. In March 2013, the authorities informed Merck KGaA, Darmstadt, Germany, of the assumption that a settlement agreement entered into in 2002 between Generics (UK) Ltd. and several subsidiaries of GlaxoSmithKline plc, United Kingdom, in connection with the antidepressant drug paroxetine, violates British and European competition law. Merck KGaA, Darmstadt, Germany, the then owner of Generics (UK) Ltd., was allegedly involved in the negotiations for the settlement agreement and is therefore liable. The investigations into Generics (UK) Ltd. started in 2011, without this being known to Merck KGaA, Darmstadt, Germany. On February 11, 2016, the CMA imposed a fine in this matter. Merck KGaA, Darmstadt, Germany, has taken legal action against this fine. The Appeals Tribunal has since submitted the relevant legal questions to the European Court of Justice (CJEU) for a preliminary ruling. The CJEU confirmed in January 2020 that such settlement agreements may breach European competition law. Appropriate accounting measures have been taken. A decision and an outflow of resources within the next 12 months are considered possible. Merck KGaA, Darmstadt, Germany, recognized provisions in a low double-digit million-euro amount for these proceedings.

In addition to provisions for the above-mentioned legal disputes, provisions existed as of the balance sheet date for various other pending legal disputes.

(11) Liabilities

Liabilities are generally carried at their settlement amount, with pension and installment liabilities carried at their present value. Short-term liabilities denominated in foreign currencies were translated at the closing rates. No securities have been provided other than standard retention of title.

(12) Financial liabilities

€ million	Remaining maturity up to 1 year	Remaining maturity 1 to 5 years	Remaining maturity more than 5 years	**Total Dec. 31, 2019**	**Dec. 31, 2018**
Bonds	–	–	3,000.0	3,000.0	1,500.0
	–	**–**	**3,000.0**	**3,000.0**	**1,500.0**

In 2014, the company issued a hybrid bond at a volume of €1,500 million for the financing of the Sigma-Aldrich acquisition. The bond was issued in two tranches, each with a maturity of 60 years. The first tranche with a volume of €1,000 million pays a coupon of 2.625 % and contains an early bond redemption option after 6.5 years. The second tranche, with a nominal volume of €500 million and carrying coupon of 3.375 %, includes an early redemption right for Merck KGaA, Darmstadt, Germany, after ten years.

Additional hybrid bonds totaling €1,500 million with a maturity of 60 years were issued by the company in June 2019 to finance the Versum Materials acquisition. The first tranche with a volume of €500 million pays a coupon of 1.625 % and has a redemption option after 5.5 years. The €1,000 million second tranche carries a coupon of 2.875 % with the option of early redemption after ten years.

(13) Trade accounts payable

€ million	Remaining maturity up to 1 year	Remaining maturity 1 to 5 years	Remaining maturity more than 5 years	**Total Dec. 31, 2019**	**Dec. 31, 2018**
to affiliates	178.4	–	–	178.4	149.7
to other companies	203.1	2.1	–	205.2	296.1
	381.5	**2.1**	**–**	**383.6**	**445.8**

(14) Other liabilities

€ million	Remaining maturity up to 1 year	Remaining maturity 1 to 5 years	Remaining maturity more than 5 years	**Total Dec. 31, 2019**	**Dec. 31, 2018**
to affiliates	15,497.3	–	–	15,497.3	12,545.1
– thereof to the general partner E. Merck KG, Darmstadt, Germany	(454.6)	–	–	(454.6)	(453.9)
Advance payments from customers	0.4	–	–	0.4	0.7
Other liabilities	100.9	6.2	–	107.1	83.7
– thereof tax liabilities	(32.6)	–	–	(32.6)	(30.2)
– thereof social security liabilities	(3.7)	–	–	(3.7)	(0.1)
	15,598.6	**6.2**	**–**	**15,604.8**	**12,629.5**

The liabilities to affiliates relate to short-term loans amounting to €11.9 billion as well as liabilities of €3.0 billion from the clearing account with Merck Financial Services GmbH, Darmstadt, a subsidiary of Merck KGaA, Darmstadt, Germany. The other liabilities include obligations of €1.9 million (2018: €2.7 million) from recourse factoring. Employee loans were transferred, with Merck KGaA, Darmstadt, Germany, maintaining a contingent liability. These liabilities are secured in this respect by receivables from employees.

Notes to the Income Statement

(15) Sales

€ million	2019	2018
By sales market		
Germany	667.3	636.8
Rest of Europe	1,002.1	1,834.9
Asia-Pacific	1,479.7	1,773.8
North and Latin America	442.1	404.7
Rest of world	53.9	134.8
	3,645.1	**4,785.0**
By business sector		
Healthcare	1,102.3	2,309.8
Life Science	986.7	780.4
Performance Materials	1,262.8	1,385.6
	3,351.8	**4,475.8**
Other sales	293.3	309.2
	3,645.1	**4,785.0**

In addition to net sales from the sale of products generated until the end of the business lease, net sales of the Healthcare business sector also include net sales from intragroup cost transfers.

Other sales mainly consist of internal recharges for IT services, brand rights, rental expenses, and other administrative costs.

(16) Other operating income

€ million	2019	2018
Exchange rate gains from operating activities	27.3	44.6
Gains from the disposal of fixed assets	0.5	3.9
Grants received	4.6	4.0
Income from the reversal of provisions	34.0	46.5
Cost transfers in connection with the business lease	56.2	–
Other income	24.0	12.9
	146.6	**111.9**

Income from other accounting periods relates almost exclusively to income from the reversal of provisions and gains from the disposal of fixed assets. In fiscal 2019, the main items were reversals of other provisions and provisions for outstanding invoices, and lower exchange rate gains from operating activities.

(17) Cost of materials

€ million	2019	2018
Cost of raw materials, production supplies, and goods purchased for resale	579.9	913.2
Cost of purchased services	879.2	862.9
	1,459.1	**1,776.1**

(18) Personnel expenses and employees

€ million	2019	2018
Wages and salaries	882.6	1,043.9
Pension expenses	122.1	117.3
Compulsory social security contributions and special financial assistance	123.3	143.6
	1,128.0	**1,304.8**
Average number of employees during the year		
Production	3,164	3,756
Administration	3,143	3,213
Research	1,678	2,674
Logistics	620	671
Sales and marketing	510	590
Others	23	79
	9,138	**10,983**

Personnel expenses decreased, mainly due to the business transfer of nearly 3,000 employees from the Healthcare business sector to Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany.

The reported employee figures do not include employees in vocational training. In 2019, an average number of 558 (2018: 482) employees were enrolled in vocational training.

(19) Other operating expenses

€ million	2019	2018
Purchased sales and advertising services	249.9	568.0
Purchased repair services	108.9	96.2
Purchased research services	158.0	382.1
Other purchased services and procurements	561.6	773.0
Fees, contributions, and insurance premiums	217.7	266.2
Exchange rate losses from operating activities	26.6	42.2
Losses from the disposal of fixed assets	0.7	2.1
Addition to provisions for litigations	12.6	6.6
Others	45.6	15.1
	1,381.6	**2,151.5**

Due to the fact that the Healthcare business sector continued operating in a separate company, Merck Healthcare KGaA, Darmstadt, a subsidiary of Merck KGaA, Darmstadt, Germany, starting April 1, 2019, other operating expenses fell, particularly in purchased services and procurements, research, and sales and advertising services. See section "Effects of material company agreements on the net assets, financial position, and results of operations".

(20) Income / expense from investments

€ million	2019	2018
Income from profit and loss transfer agreements	380.6	747.6
Investment income from affiliates	753.6	493.6
Expenses from profit and loss transfer agreements	–34.7	–7.0
	1,099.5	**1,234.2**

Investment income fell essentially on account of lower dividend payments in the Group. The profit transfers from subsidiaries decreased mainly due to a dividend received in the previous year from an intermediate holding company with a profit transfer agreement. In addition, one-off effects in one subsidiary further reduced the profit transfer. This was offset by higher profit transfers from other subsidiaries, particularly Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany.

(21) Financial result

€ million	2019	thereof affiliates	2018	thereof affiliates
Other interest and similar income	41.9	18.3	28.3	15.7
Interest and similar expenses	–281.6	–196.5	–230.8	–178.8
Net interest	**–239.7**	**–178.2**	**–202.5**	**–163.1**
Exchange rate differences from financing activities	–	–	0.4	–
Interest component of the addition to pension provisions and of other long-term provisions	11.8	–	–60.3	–
	–227.9	**–178.2**	**–262.4**	**–163.1**

Interest income mainly includes payments for a credit default guarantee provided within the Group in connection with the acquisition of Sigma-Aldrich. The interest component of the addition to pension provisions is offset against interest income and changes in fair value of plan assets.

(22) Profit transfers between Merck KGaA, Darmstadt, Germany, and E. Merck KG, Darmstadt, Germany

In accordance with Articles 26 to 30 of the Articles of Association, the profit of Merck KGaA, Darmstadt, Germany, is attributed between E. Merck KG, Darmstadt, Germany, and the limited liability shareholders as follows:

PROFIT TRANSFER TO E. MERCK KG, DARMSTADT, GERMANY

Net income of Merck KGaA, Darmstadt, Germany (before reciprocal profit transfers)	625,170,732.58
Plus corporation tax	13,702,370.16
Basis for calculation of the profit transferred between Merck KGaA, Darmstadt, Germany, and E. Merck KG, Darmstadt, Germany	638,873,102.74
The share of E. Merck KG, Darmstadt, Germany, in the profit of Merck KGaA, Darmstadt, Germany, is (397,196,314/565,211,242)	448,961,419.93

LOSS TRANSFER FROM E. MERCK KG, DARMSTADT, GERMANY

Net loss of E. Merck KG, Darmstadt, Germany (before reciprocal profit transfers, adjusted for trade income tax), basis for calculation of the profit transferred between E. Merck KG, Darmstadt, Germany, and Merck KGaA, Darmstadt, Germany	–24,998,454.00
The share of Merck KGaA, Darmstadt, Germany, in the loss of E. Merck KG, Darmstadt, Germany, is (168,014,928/565,211,242)	–7,431,050.78

(23) Income tax

Income tax consists of trade tax expense of €2.1 million and corporate tax expense of €13.7 million. The carrying amounts of assets, liabilities, and deferred items under commercial and tax law resulted in an excess of deferred tax assets. The company exercised its option in accordance with section 274 (1) sentence 2 HGB not to recognize this excess. Material differences occur in the carrying amounts of assets and liabilities regarding intangible assets, inventories, other assets, pension provisions, and other provisions (deferred tax assets) as well as tangible assets (deferred tax liabilities). If recognized, a tax rate of 20.25 % would largely be applied. For financial assets, a tax rate of 1.01 % would apply as a result of special tax treatment.

Other Disclosures

CONTINGENT LIABILITIES

€ million	Dec. 31, 2019	thereof for affiliates	Dec. 31, 2018	thereof for affiliates
Guarantees	8,048.1	8,048.1	8,118.9	8,118.9
Warranties	–	–	–	–
	8,048.1	**8,048.1**	**8,118.9**	**8,118.9**

In order to fully ensure the Group financing activity of the Merck Financial Services GmbH, Darmstadt, a subsidiary of Merck KGaA, Darmstadt, Germany, Merck KGaA, Darmstadt, Germany, provided guarantees for Merck Financial Services GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany, to financing partners of our Group. The type and scope of these are in line with the financial obligations actually entered into by the Merck Financial Services GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany. On account of the Group's good credit rating, the probability of the guarantees and warranties being utilized is estimated as very low. Guarantees include warranties amounting to US$3.4 billion (€3.0 billion) for EMD Holding, United States, and amounting to €3.4 billion for Merck Financial Services GmbH, Darmstadt, a subsidiary of Merck KGaA, Darmstadt, Germany, which are primarily in connection with the acquisition of Sigma-Aldrich.

OTHER FINANCIAL OBLIGATIONS

€ million	Dec. 31, 2019	thereof for affiliates	Dec. 31, 2018	thereof for affiliates
Purchase commitments	168.6	–	131.1	–
Rental and lease obligations	33.1	–	35.8	–
Acceptance obligations from orders	24.3	–	24.3	–
Obligations to acquire intangible assets	–	–	541.3	–
	226.0	**–**	**732.5**	**–**

Obligations to acquire intangible assets of up to €541.3 million existed in the previous year, particular within the scope of research and development collaborations in the Healthcare business sector. Here, Merck KGaA, Darmstadt, Germany, had obligations to make milestone payments if certain objectives are achieved. The obligations to acquire intangible assets were transferred to Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany, when the business lease ended; as a result, they are no longer recognized.

CORPORATE GOVERNANCE

The Statement of Compliance in accordance with section 161 AktG was published on our website (www.emdgroup.com/en/investors/corporate-governance) and thus made permanently available.

FINANCIAL INSTRUMENTS

We use derivative financial instruments solely to hedge currency and interest rate positions, so as to minimize currency risks and financing costs caused by exchange rate or interest rate fluctuations. The instruments used are standard market forward exchange transactions and currency options. Corresponding valuation units were designated. The value changes of the derivatives are reported under the balance sheet item "other assets", respectively under "provisions for valuation units". The use of such derivatives is governed by internal regulations. Derivative transactions are subject to constant risk controls. The trading, settlement, and control functions are strictly separated, and this separation is monitored by our internal audit department. Derivative contracts are only entered into with banks with good credit ratings and are restricted to the hedging of our business operations and related financing transactions.

The following derivative financial positions were held as of December 31, 2019:

	Nominal amount		Fair value	
€ million	**Dec. 31, 2019**	**Dec. 31, 2018**	**Dec. 31, 2019**	**Dec. 31, 2018**
Forward exchange contracts	23.7	50.5	–0.2	–0.6
– thereof operating	(23.7)	(50.5)	(–0.2)	(–0.6)
	23.7	**50.5**	**–0.2**	**–0.6**

€ million	Remaining maturity up to 1 year	Remaining maturity more than 1 year	**Total Dec. 31, 2019**	Remaining maturity up to 1 year	Remaining maturity more than 1 year	**Total Dec. 31, 2018**
Forward exchange contracts	23.7	–	23.7	50.5	–	50.5
	23.7	**–**	**23.7**	**50.5**	**–**	**50.5**

The nominal amount is the aggregate of all buy and sell amounts relating to derivative financial transactions.

The "thereof operating" item comprises the derivative exposures used to hedge probable future cash flows mainly consisting of expected future sales and receivables disclosed in the balance sheet (excluding loans granted to affiliates). As of December 31, 2019, no derivative financial instruments were used to hedge pending transactions against foreign exchange risks.

The fair values are determined by valuing open positions at market prices, ignoring any opposite movements in the value of the underlyings. They correspond to the income or expenses that would result if the derivatives were closed out at the balance sheet date. The fair values are calculated on the basis of quoted prices or from current market data provided by a recognized information service. They are measured with the aid of middle spot rates that are observable in the market and maturities of specific interest premiums to or discounts on the traded market prices.

The reported operating forward exchange transactions are used to hedge exchange rate fluctuations in respect to future sales in the following currencies: USD (38.5 million), GBP (2.4 million), CHF (1.2 million), IDR (13.0 million).

A theoretical default risk for the existing derivative financial instruments exists up to the amount of the positive fair values. As of December 31, 2018, these amounted to €–0.2 million (2018: €–0.6 million) and exist solely with companies of the Group.

FURTHER INFORMATION

Merck KGaA, Frankfurter Straße 250, 64293 Darmstadt, Germany is registered with the German Commercial Register under No. HRB 6164. The competent register court is Darmstadt district court.

In accordance with the provisions of the German financial reporting disclosure law (Publizitätsgesetz), as the ultimate parent company within the Group, E. Merck Kommanditgesellschaft, Darmstadt, Germany (E. Merck KG, Darmstadt, Germany), prepares consolidated financial statements, which include Merck KGaA, Darmstadt, Germany, and its subsidiaries. Merck KGaA, Darmstadt, Germany, which manages the operations of the Group, prepares consolidated financial statements for the smallest group of companies within the Group. Both sets of consolidated financial statements as of December 31, 2019, are available at www.bundesanzeiger.de.

The information relating to the German Securities Trading Act (WpHG), the Executive Board and the Supervisory Board is published in the Notes to the Annual Financial Statements of Merck KGaA, Darmstadt, Germany, on pages 148–150.

COMPENSATION OF THE EXECUTIVE BOARD

The compensation of the Executive Board of Merck KGaA, Darmstadt, Germany, is basically paid by the general partner, E. Merck KG, Darmstadt, Germany.

From January to December 2019, fixed salaries of €5.6 million (2018: €5.9 million), variable compensation of €15.3 million (2018: €17.2 million), and additional benefits of €0.8 million (2018: €0.4 million) were recorded for members of the Executive Board of Merck KGaA, Darmstadt, Germany. Furthermore, additions to provisions at these companies also included expenses of €7.1 million (2018: €15.9 million) for the long-term incentive plan. Additions to pension provisions included current service costs of €3.0 million (2018: €3.1 million).

TOTAL COMPENSATION OF THE SUPERVISORY BOARD

The compensation of the Supervisory Board amounting to €880.8 thousand (2018: €869.0 thousand) consisted of a fixed portion of €823.8 thousand (2018: €822.5 thousand) and meeting attendance compensation of €57.0 thousand (2018: €46.5 thousand).

Further individualized information and details can be found in the Compensation Report.

AUDITORS' FEES

Information on the statutory auditors' fees is contained in the Consolidated Financial Statements of Merck KGaA, Darmstadt, Germany. In addition to the audit of the financial statements, other audit-related services, tax consultancy services, and other services for the company and/or controlled companies were provided by the auditor. Other audit-related services pertain to various statutory or contractually agreed audits. Tax consultancy services encompass services in connection with the preparation of tax returns for employees delegated abroad.

SUBSEQUENT EVENTS

Subsequent to the balance sheet date, no events of special importance occurred that could have a material impact on the net assets, financial position, and results of operations.

Addendum dated May 12, 2020

These annual financial statements were originally prepared on February 14, 2020 by the Executive Board of Merck KGaA, Darmstadt, Germany. The rapid development of Covid-19 into a global pandemic implies the following consequences for the net assets, financial position, and results of operations of Merck KGaA, Darmstadt, Germany, which were not expected based on the information available on the date of preparation, namely February 14, 2020. Since these developments represent a transaction of particular significance which is to be classified as a value-relevant event within the meaning of section 285 No. 33 of the German Commercial Code (HGB), these addenda are necessary due to the pending approval of the annual financial statements of Merck KGaA, Darmstadt, Germany, by the Annual General Meeting.

The net assets, financial position and results of operations could be adversely affected by the Covid-19 pandemic in the remainder of fiscal 2020, in particular by the loss of customer orders, temporary plant closures and supply chain restrictions. In addition, deteriorations in the creditworthiness of customers triggered by the Covid-19 pandemic could make it necessary to increase the valuation allowances on trade receivables. Further negative impacts as a result of the Covid-19 pandemic could also arise in the event of permanent impairments in the value of investments as well as deteriorating refinancing conditions on the capital market.

The event described above in the addenda to the financial statements prepared on February 14, 2020 have led to corresponding changes in the Report on Risks and Opportunities and on the Report of Expected Developments, which were made in the relevant chapters of the Combined Management Report and marked accordingly as addenda. The financial statements of Merck KGaA, Darmstadt, Germany, were supplemented on May 12, 2020 by the addendum describing the aforementioned effects of the Covid-19 pandemic.

PROPOSAL FOR THE APPROPRIATION OF NET RETAINED PROFIT

A proposal will be made to the General Meeting for the payment of a dividend of €1.30 per no-par value share from the portion of net retained profit to which limited liability shareholders are entitled, amounting to €194,502,706.90 (see Note (9)). Based on the current share capital, the resulting total dividend payment for fiscal 2019 is thus €168,014,927.60.

It is also proposed to carry forward to new account the remaining portion of the shareholders' net retained profit in the amount of €26,487,779.30.

Darmstadt, February 14, 2020 / May 12, 2020

Stefan Oschmann

Udit Batra

Kai Beckmann

Belén Garijo

Marcus Kuhnert

Members of the Executive Board of Merck KGaA, Darmstadt, Germany

Information on memberships of statutory supervisory boards and comparable German and foreign supervisory bodies (section 285 No. 10 HGB in conjunction with section 125 (1) sentence 5 AktG).

Member	Memberships of (a) statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations
Stefan Oschmann Munich, Chairman	No board positions
Udit Batra Wellesley (Massachusetts, United States), CEO Life Science	(b) – EMD Millipore Corporation, Billerica, Massachusetts, United States (President)
Kai Beckmann Darmstadt, CEO Performance Materials	(a) – Bundesdruckerei GmbH, Berlin
Belén Garijo Frankfurt am Main, CEO Healthcare	(b) – Banco Bilbao Vizcaya Argentaria S.A., Bilbao, Spain – L'Oréal S.A., Clichy, France
Marcus Kuhnert Königstein, Chief Financial Officer	No board positions

Members of the Supervisory Board of Merck KGaA, Darmstadt, Germany

The Supervisory Board has 16 members. In fiscal 2019 up to the end of the Annual General Meeting on April 26, 2019, the Supervisory Board was composed as follows:

Member	Memberships of (a) further statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations
Wolfgang Büchele Römerberg, Chairman of Exyte AG, Stuttgart	(a) – Gelita AG, Eberbach (Chairman) (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] – Kemira Oyj, Helsinki, Finland
Michael Fletterich Gernsheim, Chairman of the Joint Works Council of Merck KGaA, Darmstadt, Germany	No board positions
Crocifissa Attardo Darmstadt, full-time member of the Joint Works Council of Merck KGaA, Darmstadt, Germany	(b) – BKK of Merck KGaA, Darmstadt, Germany (rotating chairperson)
Mechthild Auge Wehrheim, full-time member of the Joint Works Council of Merck KGaA, Darmstadt, Germany	No board positions
Gabriele Eismann Seeheim-Jugenheim, Senior Product Manager	No board positions
Edeltraud Glänzer Hanover, Vice Chairperson of IG Bergbau, Chemie, Energie (IG BCE), Hanover	(a) – B. Braun Melsungen AG, Melsungen – Evonik Industries AG, Essen (Vice Chairperson)
Michaela Freifrau von Glenck Zurich, retired teacher	No board positions
Siegfried Karjetta[2] Darmstadt, physician	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]
Albrecht Merck Schriesheim, Commercial Director of the Castel Peter Winery, Bad Dürkheim	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]
Dietmar Oeter Seeheim-Jugenheim, Vice President Corporate Quality Assurance	No board positions
Alexander Putz Michelstadt, full-time member of the Joint Works Council of Merck KGaA, Darmstadt, Germany	No board positions
Helga Rübsamen-Schaeff Langenburg, Chairperson of the Advisory Board of AiCuris Antiinfective Cures GmbH, Wuppertal	(a) – 4SC AG, Martinsried – Bonn University Hospital, Bonn (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]
Gregor Schulz Umkirch, pediatrician	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]
Theo Siegert Düsseldorf, Managing Partner of de Haen Carstanjen & Söhne KG, Düsseldorf	(a) – Henkel AG & Co KGaA, Düsseldorf (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] – DKSH Holding Ltd., Zurich, Switzerland
Tobias Thelen[2] Munich, Managing Partner of Altmann Analytik GmbH & Co. KG, Munich	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]
Veit Ulshöfer Sachsenheim, Global Head of Research and Bioinformatics	No board positions

[1] Internal board position.
[2] Members appointed according to article 6 (5) of the Articles of Association.

As of the end of the Annual General Meeting on April 26, 2019, the composition of the Supervisory Board is now as follows:

Member	Memberships of (a) further statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations	Member of the Supervisory Board since
Wolfgang Büchele Römerberg, Chairman of Exyte AG, Stuttgart	(a) – Gelita AG, Eberbach (Chairman) (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] – Wegmann Unternehmens-Holding GmbH & Co. KG, Fürstenfeldbruck – Kemira Oyj, Helsinki, Finland	July 1, 2009
Michael Fletterich Gernsheim, Chairman of the Joint Works Council of Merck KGaA, Darmstadt, Germany	No board positions	July 1, 1998
Gabriele Eismann Seeheim-Jugenheim, Senior Product Manager	No board positions	May 9, 2014
Jürgen Glaser Bingen, Regional Director of the German Mining, Chemical, and Energy Industrial Union (IG BCE), Darmstadt	(a) – SIRONA Dental Systems GmbH – HFC Prestige Service Germany GmbH (Vice Chairman) (b) – BKK of Merck KGaA, Darmstadt, Germany	April 26, 2019
Edeltraud Glänzer Hanover, Chairperson of the Board of Directors at the August-Schmitt-Stiftung, Bochum	(a) – B. Braun Melsungen AG, Melsungen – Evonik Industries AG, Essen (Vice Chairperson)	March 28, 2008
Sascha Held Riedstadt, full-time member of the Joint Works Council of Merck KGaA, Darmstadt, Germany	No board positions	April 26, 2019
Michael Kleinemeier Heidelberg, Member of the Executive Board of SAP SE, Walldorf, SAP Digital Business Services	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]	April 26, 2019
Renate Koehler Darmstadt, pharmacist and Manager of Engel-Apotheke pharmacy, Darmstadt	No board positions	April 26, 2019
Anne Lange Riedstadt, full-time member of the Joint Works Council of Merck KGaA, Darmstadt, Germany	No board positions	April 26, 2019
Peter Emanuel Merck[2] Hamburg, Managing Partner of Golf-Lounge GmbH, Hamburg	No board positions	April 26, 2019
Dietmar Oeter Seeheim-Jugenheim, Vice President Corporate Quality Assurance	No board positions	May 9, 2014
Christian Raabe Höchst, IT Business Partner	No board positions	April 26, 2019
Helene von Roeder Frankfurt am Main, Member of the Executive Board (CFO) of Vonovia SE, Bochum	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] – Vonovia Finance B.V., Amsterdam, Netherlands – AVW Versicherungsmakler GmbH, Hamburg – Victoria Park AB, Malmö, Sweden – Hembla AB, Stockholm, Sweden	April 26, 2019
Helga Rübsamen-Schaeff Langenburg, Chairperson of the Advisory Board of AiCuris Antiinfective Cures GmbH, Wuppertal	(a) – 4SC AG, Martinsried – Bonn University Hospital, Bonn (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]	May 9, 2014
Daniel Thelen Cologne, Head of Infrastructure Development for western region at DB Netz AG, Frankfurt am Main/Duisburg	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]	April 26, 2019
Simon Thelen[2] Cologne, Chief Physician for Hand Surgery at the Clinic for Trauma and Hand Surgery, University Hospital Düsseldorf	(a) – Merck Healthcare KGaA a subsidiary of Merck KGaA, Darmstadt, Germany[1] (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]	April 26, 2019

[1] Internal board position.
[2] Members appointed according to article 6 (5) of the Articles of Association.

Disclosures in accordance with section 160 (1) No. 8 of the German Stock Corporation Act (AktG)

In accordance with the German Securities Trading Act (WpHG), any shareholder whose equity interest reaches, exceeds, or falls below the thresholds of 3, 5, 10, 15, 20, 25, 30, 50, or 75 percent of the voting rights in a listed company must notify the company and the German Federal Financial Supervisory Authority (BaFin) of this without delay. The company was informed of the existence of the following equity interests until the preparation of the annual financial statements (the number of shares or the percentage equity interest is taken from the most recent voting rights notification sent to Merck KGaA, Darmstadt, Germany, and may therefore no longer be correct):

BlackRock, Inc., Wilmington, Delaware, United States, notified us that on November 10, 2017, its share of the voting rights amounted to 7.20 %. 7.20 % of the voting rights (9,303,989 voting rights) are attributed to BlackRock, Inc. in accordance with section 22 WpHG (obsolete version).[1] 0.03 % of the voting rights (37,444 voting rights) are attributed to BlackRock, Inc. as instruments pursuant to section 25 (1) no. 1 WpHG (obsolete version) (Securities Lending).[1] 0.18 % of the voting rights (230,800 voting rights) were attributed to BlackRock, Inc. as instruments pursuant to section 25 (1) no. 2 WpHG (obsolete version) (Contract for Difference).[1]

Templeton Global Advisors Limited, Nassau, Bahamas, notified us that on November 20, 2019, its share of the voting rights fell below the threshold of 3 % of the voting rights due to the sale of shares and amounted to 2.98 % on that date. 2.98 % of the voting rights (3,850,736 voting rights) were attributed to Templeton Global Advisors Limited in accordance with section 34 WpHG.

We received the following notification on July 17, 2015 in accordance with section 21 (1) WpHG:

On July 16, 2015, the share of the voting rights of Sun Life Global Investments Inc., Toronto, Ontario, Canada, in Merck KGaA, Darmstadt, Germany, fell below the threshold of 5 % of the voting rights due to the disposal of shares and amounted to 4.91 % (6,342,586 voting rights) on that date.[1]

4.91 % of the voting rights (6,342,586 voting rights) are attributed to the company in accordance with section 22 (1) sentence 1 no. 6 WpHG in conjunction with section 22 (1) sentence 2 WpHG.[1]

On July 16, 2015, the share of the voting rights of Sun Life Assurance Company of Canada – U.S. Operations Holdings, Inc., Wellesley Hills, Massachusetts, United States, in Merck KGaA, Darmstadt, Germany, fell below the threshold of 5 % of the voting rights due to the disposal of shares and amounted to 4.91 % (6,342,586 voting rights) on that date.[1]

4.91 % of the voting rights (6,342,586 voting rights) are attributed to the Company in accordance with section 22 (1) sentence 1 no. 6 WpHG in conjunction with section 22 (1) sentence 2 WpHG.[1]

On July 16, 2015, the share of the voting rights of Sun Life Financial (U.S.) Holdings, Inc., Wellesley Hills, Massachusetts, United States, in Merck KGaA, Darmstadt, Germany, fell below the threshold of 5 % of the voting rights due to the disposal of shares and amounted to 4.91 % (6,342,586 voting rights) on that date.[1]

4.91 % of the voting rights (6,342,586 voting rights) are attributed to the company in accordance with section 22 (1) sentence 1 no. 6 WpHG in conjunction with section 22 (1) sentence 2 WpHG.[1]

On July 16, 2015, the share of the voting rights of Sun Life Financial (U.S.) Investments LLC, Wellesley Hills, Massachusetts, United States, in Merck KGaA, Darmstadt, Germany, fell below the threshold of 5 % of the voting rights due to the disposal of shares and amounted to 4.91 % (6,342,586 voting rights) on that date.[1]

4.91 % of the voting rights (6,342,586 voting rights) are attributed to the Company in accordance with section 22 (1) sentence 1 no. 6 WpHG in conjunction with section 22 (1) sentence 2 WpHG.[1]

[1] Obsolete version; as of January 3, 2018, the numbering of WpHG has changed. The sections of the obsolete version correspond to the following sections of the current version:
section 21 WpHG corresponds to section 33 WpHG
section 22 WpHG corresponds to section 34 WpHG
section 25 WpHG corresponds to section 38 WpHG

On July 16, 2015, the share of the voting rights of Sun Life of Canada (U.S.) Financial Services Holdings, Inc., Boston, Massachusetts, United States, in Merck KGaA, Darmstadt, Germany, fell below the threshold of 5 % of the voting rights due to the disposal of shares and amounted to 4.91 % (6,342,586 voting rights) on that date.[1]

4.91 % of the voting rights (6,342,586 voting rights) are attributed to the Company in accordance with section 22 (1) sentence 1 no. 6 WpHG in conjunction with section 22 (1) sentence 2 WpHG.[1]

On July 16, 2015, the share of the voting rights of Massachusetts Financial Services Company (MFS), Boston, Massachusetts, United States, in Merck KGaA, Darmstadt, Germany, fell below the threshold of 5 % of the voting rights due to the disposal of shares and amounted to 4.91 % (6,342,586 voting rights) on that date.[1]

3.20 % of the voting rights (4,138,232 voting rights) are attributed to the Company in accordance with section 22 (1) sentence 1 no. 6 WpHG in conjunction with section 22 (1) sentence 2 WpHG.[1]

1.71 % of the voting rights (2,204,354 voting rights) are attributed to the company in accordance with section 22 (1) sentence 1 no. 6 WpHG.[1]

Amundi S.A., Paris, France, notified us that on December 30, 2019, its share of the voting rights exceeded the threshold of 3 % of the voting rights due to the acquisition of shares and amounted to 3.12 % on that date. 3.12 % of the voting rights (4,030,979 voting rights) were attributed to Amundi S.A., Paris, France, in accordance with section 34 WpHG.

[1] Obsolete version; as of January 3, 2018, the numbering of WpHG has changed. The sections of the obsolete version correspond to the following sections of the current version:
section 21 WpHG corresponds to section 33 WpHG
section 22 WpHG corresponds to section 34 WpHG
section 25 WpHG corresponds to section 38 WpHG

List of Shareholdings of Merck KGaA, Darmstadt, Germany, as of December 31, 2019

Country	Company	Registered office
Germany		
Germany	AB Allgemeine Pensions GmbH & Co. KG	Zossen
Germany	AB Pensionsverwaltung GmbH	Zossen
Germany	Alcan Systems GmbH	Darmstadt
Germany	Allergopharma GmbH & Co. KG	Reinbek
Germany	Allergopharma Verwaltungs GmbH[a)]	Darmstadt
Germany	AZ Electronic Materials GmbH	Darmstadt
Germany	Azelis Deutschland Kosmetik GmbH	Sankt Augustin
Germany	Biochrom GmbH[a)]	Berlin
Germany	BSSN Software GmbH	Darmstadt
Germany	BSSN UG (haftungsbeschränkt)	Darmstadt
Germany	Chemitra GmbH[a)]	Darmstadt
Germany	Emedia Export Company mbH	Gernsheim
Germany	InfraServ GmbH & Co. Wiesbaden KG	Wiesbaden
Germany	Inuru GmbH	Berlin
Germany	IOmx Therapeutics AG	Martinsried
Germany	LegenDairy Foods GmbH	Berlin
Germany	Litec-LLL GmbH[a)]	Greifswald
Germany	Merck 12. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 13. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 15. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 16. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 20. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 21. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 24. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 25. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 26. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 27. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 28. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 29. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 30. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 31. Allgemeine Beteiligungs-GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 36. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
100.00	100.00	EUR	53,374.18	–23,013.08	53,374.18	–23,013.08
100.00	100.00	b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		EUR	10,414.77	–16,555.78	10,414.77	–16,555.78
100.00	100.00	EUR	23.40	0.00	23.40	0.00
100.00		EUR	715,046.75	16,257.78	715,046.75	16,257.78
< 20.00	< 20.00	b)	b)	b)	b)	b)
100.00		EUR	4,978.59	–2,777.48	4,978.59	–2,777.48
100.00		EUR	201.98	–164.24	201.98	–164.24
100.00	100.00	EUR	0.94	0.00	0.94	0.00
100.00	100.00	EUR	642,199.72	10,328.86	642,199.72	10,328.86
100.00		EUR	25.60	0.00	25.60	0.00
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00	100.00	EUR	1,834.02	–37.85	1,834.02	–37.85
100.00	100.00	EUR	12,473,687.20	0.00	12,473,687.20	0.00
100.00		EUR	12,433,776.96	–54,408.93	12,433,776.96	–54,408.93
100.00		EUR	6,021,531.14	0.00	6,021,531.14	0.00
100.00		EUR	3,740,596.88	0.00	3,740,596.88	0.00
100.00		EUR	4,034,931.81	0.00	4,034,931.81	0.00
100.00		EUR	4,087,867.51	–1,909.13	4,087,867.51	–1,909.13
100.00	100.00	EUR	5,000,048.75	0.00	5,000,048.75	0.00
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)

Country	Company	Registered office
Germany	Merck 37. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 38. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 39. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 40. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck 41. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Accounting Solutions & Services Europe GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Weiterstadt
Germany	Merck Chemicals GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck China Chemicals Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Consumer Health Holding Germany GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Export GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Financial Services GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Financial Trading GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Gernsheim
Germany	Merck Foundation gGmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Healthcare Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Healthcare KGaA[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Gernsheim
Germany	Merck International GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Internationale Beteiligungen GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Life Science Germany GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Life Science GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Eppelheim
Germany	Merck Life Science Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Patent GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Performance Materials Germany GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Performance Materials GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Wiesbaden
Germany	Merck Performance Materials Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Real Estate GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Merck Schuchardt OHG, a subsidiary of Merck KGaA, Darmstadt, Germany	Hohenbrunn
Germany	Merck Serono GmbH[a)], a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	b)	b)	b)	b)	b)
100.00	100.00	EUR	–2,385.08	5,442.71	–2,385.08	5,442.71
100.00		EUR	315.28	1,375.51	315.28	1,375.51
100.00		EUR	5,548.65	–66.73	5,548.65	–66.73
100.00	100.00	EUR	1,189,961.76	27,408.44	1,189,961.76	27,408.44
100.00	100.00	EUR	–14,690.33	11,477.02	–14,690.33	11,477.02
100.00	100.00	EUR	401,490.74	3,095.42	401,490.74	3,095.42
100.00		EUR	5,021,199.97	–45,612.05	5,021,199.97	–45,612.05
100.00		b)	b)	b)	b)	b)
100.00	100.00	EUR	356,501.39	–168.99	356,501.39	–168.99
100.00		EUR	204,306.56	–78,831.65	204,306.56	–78,831.65
100.00	100.00	EUR	8,439,339.38	769,393.76	8,439,339.38	769,393.76
100.00	100.00	EUR	4,022,346.88	185,414.78	4,022,346.88	185,414.78
100.00		EUR	3,374,009.16	0.00	3,374,009.16	0.00
100.00		EUR	245,960.16	17,877.23	245,960.16	17,877.23
100.00	100.00	EUR	27,394.15	–3,665.07	27,394.15	–3,665.07
100.00	100.00	EUR	294,290.05	–165.06	294,290.05	–165.06
100.00		EUR	–1,350.94	–1,103.27	–1,350.94	–1,103.27
100.00		EUR	191,979.17	1,579.14	191,979.17	1,579.14
100.00		EUR	36,990.75	1,340.46	36,990.75	1,340.46
100.00	100.00	EUR	374,176.81	–149.81	374,176.81	–149.81
100.00	100.00	EUR	–5,316.85	2,940.38	–5,316.85	2,940.38
100.00	100.00	EUR	c)	c)	c)	c)
100.00	100.00	EUR	8,553.53	5,547.82	8,553.53	5,547.82

Country	Company	Registered office
Germany	Merck Vierte Allgemeine Beteiligungsgesellschaft mbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Gernsheim
Germany	Merck Wohnungs- und Grundstücksverwaltungsgesellschaft mbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt
Germany	Millipart GmbH	Gernsheim
Germany	pharma mall Gesellschaft für Electronic Commerce mbH	Sankt Augustin
Germany	PharmLog Pharma Logistik GmbH	Bönen
Germany	PrintCity GmbH & Co. KG	Neuried
Germany	Sigma-Aldrich Biochemie GmbH	Steinheim
Germany	Sigma-Aldrich Chemie GmbH	Steinheim
Germany	Sigma-Aldrich Chemie Holding GmbH	Taufkirchen
Germany	Sigma-Aldrich Grundstücks GmbH & Co. KG	Steinheim
Germany	Sigma-Aldrich Logistik GmbH	Steinheim
Germany	Sigma-Aldrich Produktions GmbH	Steinheim
Germany	Sigma-Aldrich Verwaltungs GmbH	Steinheim
Germany	Versum Materials Germany GmbH	Frankfurt am Main
Other European countries		
Belgium	Merck Chemicals N.V./S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Overijse
Belgium	Merck N.V.-S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Overijse
Belgium	ReWind Therapeutics N.V.	Leuven-Heverlee
Belgium	Sigma-Aldrich BVBA/SPRL	Overijse
Bulgaria	Merck Bulgaria EAD, a subsidiary of Merck KGaA, Darmstadt, Germany	Sofia
Denmark	Merck A/S, a subsidiary of Merck KGaA, Darmstadt, Germany	Soborg
Denmark	Merck Life Science A/S, a subsidiary of Merck KGaA, Darmstadt, Germany	Soborg
Denmark	Survac ApS	Frederiksberg
Estonia	Merck Serono OÜ, a subsidiary of Merck KGaA, Darmstadt, Germany	Tallinn
Finland	Abacus Diagnostica OY	Turku
Finland	Forendo Pharma OY	Turku
Finland	Merck Life Science OY, a subsidiary of Merck KGaA, Darmstadt, Germany	Espoo
Finland	Merck OY, a subsidiary of Merck KGaA, Darmstadt, Germany	Espoo
France	Aveni S.A.S.	Massy
France	DNA Script S.A.S.	Paris
France	Gonnon S.A.S.	Lyon
France	Merck Biodevelopment S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon
France	Merck Chimie S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Fontenay s/Bois
France	Merck Performance Materials S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Trosly Breuil
France	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon
France	Merck Santé S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon
France	Merck Serono S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
100.00		EUR	7,577,243.42	0.00	7,577,243.42	0.00
100.00	100.00	EUR	10,261.60	–416.53	10,261.60	–416.53
100.00		EUR	644,524.55	–19,206.90	644,524.55	–19,206.90
< 20.00		b)	b)	b)	b)	b)
< 20.00	< 20.00	b)	b)	b)	b)	b)
< 20.00	< 20.00	b)	b)	b)	b)	b)
100.00		EUR	42,450.00	–213.64	42,450.00	–213.64
100.00		EUR	60,265.92	7,051.53	60,265.92	7,051.53
100.00		EUR	51,342.92	6,189.75	51,342.92	6,189.75
100.00		EUR	34,886.79	2,232.63	34,886.79	2,232.63
100.00		EUR	241.60	–75.97	241.60	–75.97
100.00		EUR	10,382.42	2,115.56	10,382.42	2,115.56
100.00	100.00	EUR	284.62	–52.54	284.62	–52.54
100.00		EUR	5,719.17	415.40	5,719.17	415.40
100.00		EUR	19,707.05	4,564.48	19,707.05	4,564.48
100.00		EUR	38,194.29	2,088.63	38,194.29	2,088.63
< 20.00		b)	b)	b)	b)	b)
100.00		EUR	49,749.64	927.67	49,749.64	927.67
100.00		BGN	6,173.65	1,207.74	12,073.80	2,362.11
100.00		DKK	2,259.73	–727.50	16,879.96	–5,431.38
100.00		DKK	17,676.58	1,851.41	132,042.28	13,822.26
100.00	100.00	DKK	392.01	–39.18	2,928.31	–292.53
100.00		EUR	293.37	33.80	293.37	33.80
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		EUR	3,402.36	387.11	3,402.36	387.11
100.00		EUR	4,723.97	948.79	4,723.97	948.79
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		EUR	2,755,242.90	197,275.10	2,755,242.90	197,275.10
100.00		EUR	152,439.05	3,938.99	152,439.05	3,938.99
100.00		EUR	89,475.62	7,734.18	89,475.62	7,734.18
100.00		EUR	24,685.20	103.89	24,685.20	103.89
99.85		EUR	3,166,170.51	82,061.34	3,166,170.51	82,061.34
100.00		EUR	220,849.23	42,761.05	220,849.23	42,761.05
100.00		EUR	55,438.31	3,744.26	55,438.31	3,744.26

Country	Company	Registered office
France	Millipore S.A.S.	Molsheim
France	Sigma-Aldrich Chimie S.a.r.l.	Saint Quentin Fallavier
France	Sigma-Aldrich Chimie SNC	Saint Quentin Fallavier
France	Sigma-Aldrich Holding S.a.r.l.	Saint Quentin Fallavier
Greece	Merck A.E., a subsidiary of Merck KGaA, Darmstadt, Germany	Maroussi, Athens
Greece	Sigma-Aldrich (OM) Ltd.	Athens
United Kingdom	Artios Pharma Limited	Cambridge
United Kingdom	BioControl Systems Limited	London
United Kingdom	BioReliance Limited	Aberdeen
United Kingdom	BioReliance U.K. Acquisition Limited	London
United Kingdom	EiRx Therapeutics plc	St. Albans
United Kingdom	Epichem Group Limited	Gillingham
United Kingdom	F-star Therapeutics Limited	Cambridge
United Kingdom	Macrophage Pharma Limited	Berkhamsted
United Kingdom	Merck Chemicals Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Gillingham
United Kingdom	Merck Cross Border Trustees Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham
United Kingdom	Merck Holding Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham
United Kingdom	Merck Investments Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham
United Kingdom	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham
United Kingdom	Merck Pension Trustees Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham
United Kingdom	Merck Serono Europe Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham
United Kingdom	Merck Serono Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham
United Kingdom	Millipore (U.K.) Limited	Feltham
United Kingdom	Millipore UK Holdings LLP	Feltham
United Kingdom	Peratech HoldCo Limited	Brompton-on-Swale
United Kingdom	SAFC Biosciences Limited	Gillingham
United Kingdom	SAFC Hitech Limited	Gillingham
United Kingdom	Scancell Ltd.	Oxford
United Kingdom	Sigma Chemical Co. Ltd.	Gillingham
United Kingdom	Sigma-Aldrich Company Limited	Gillingham
United Kingdom	Sigma-Aldrich Financial Services Limited	Gillingham
United Kingdom	Storm Therapeutics Limited	London
United Kingdom	Versum Materials UK Limited	London
Ireland	Merck Finance Limited, a subsidiary of Merck KGaA, Darmstadt, Germany	Carrigtwohill
Ireland	Merck Millipore Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Carrigtwohill
Ireland	Merck Serono (Ireland) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Dublin
Ireland	Millipore Cork Unlimited Company	Carrigtwohill
Ireland	SAFC Arklow Ltd.	Arklow
Ireland	Shrawdine Limited	Arklow
Ireland	Sigma-Aldrich Ireland Ltd.	Arklow
Ireland	Silverberry Limited	Arklow
Ireland	Versum Materials Ireland Limited	Dublin
Italy	Allergopharma S.r.l.	Rome

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
100.00		EUR	482,888.83	98,245.30	482,888.83	98,245.30
100.00		EUR	39,078.75	2,981.88	39,078.75	2,981.88
100.00		EUR	14,136.48	493.35	14,136.48	493.35
100.00		EUR	3.69	–1.68	3.69	–1.68
100.00		EUR	18,876.06	–1,858.56	18,876.06	–1,858.56
100.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		GBP	1,628.69	53.16	1,389.76	46.70
100.00		GBP	46,536.81	27,384.67	39,709.86	24,056.34
100.00		GBP	20,104.76	20,010.09	17,155.39	17,578.06
< 20.00		b)	b)	b)	b)	b)
100.00		GBP	28,741.94	21,444.27	24,525.50	18,837.93
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		GBP	4,072.97	–3,654.03	3,475.46	–3,209.92
100.00		b)	b)	b)	b)	b)
100.00		EUR	1,518,914.60	–123.00	1,518,914.60	–123.00
100.00		GBP	–76.17	0.00	–65.00	0.00
100.00		b)	b)	b)	b)	b)
100.00		b)	b)	b)	b)	b)
100.00		GBP	940.85	167.31	802.83	146.97
100.00		GBP	31,361.20	3,829.54	26,760.51	3,364.10
100.00		GBP	184,416.67	10,871.16	157,362.74	9,549.88
100.00		GBP	–1,559.31	3,769.31	–1,330.56	3,311.18
< 20.00		b)	b)	b)	b)	b)
100.00		GBP	8,330.36	866.01	7,108.29	760.75
100.00		GBP	4,542.84	1,458.99	3,876.41	1,281.66
< 20.00		b)	b)	b)	b)	b)
100.00		b)	b)	b)	b)	b)
100.00		GBP	779,771.49	207,709.18	665,379.01	182,464.21
100.00		GBP	37,378.30	1,928.65	31,894.90	1,694.24
< 20.00		b)	b)	b)	b)	b)
100.00		USD	192,651.50	–870.54	215,885.27	–976.15
100.00		USD	67.60	–4.44	75.75	–4.98
100.00		EUR	463,690.33	88,782.78	463,690.33	88,782.78
100.00		EUR	6,588.04	1,043.72	6,588.04	1,043.72
100.00		EUR	52,031.74	82,943.67	52,031.74	82,943.67
100.00		b)	b)	b)	b)	b)
100.00		EUR	34,088.62	2,700.00	34,088.62	2,700.00
100.00		EUR	35,496.01	6,055.73	35,496.01	6,055.73
100.00		EUR	0.00	2,700.00	0.00	2,700.00
100.00		EUR	143.36	197.38	143.36	197.38
100.00		EUR	70.28	–2,468.90	70.28	–2,468.90

Country	Company	Registered office
Italy	BioIndustry Park Silvano Fumero S.p.A.	Colleretto Giacosa
Italy	H-BIO Puglia S.c.r.l.	Bari
Italy	Istituto di Ricerche Biomediche Antoine Marxer RBM S.p.A.	Colleretto Giacosa
Italy	Merck Life Science S.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Milan
Italy	Merck S.p.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Milan
Italy	Merck Serono S.p.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Rome
Italy	Versum Materials Italia S.r.l.	Milan
Croatia	Merck d.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Zagreb
Latvia	Merck Serono SIA, a subsidiary of Merck KGaA, Darmstadt, Germany	Riga
Lithuania	Merck Serono, UAB, a subsidiary of Merck KGaA, Darmstadt, Germany	Vilnius
Luxembourg	Mats Finance S.a.r.l.	Luxembourg
Luxembourg	Merck Chemicals Holding S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg
Luxembourg	Merck Finance S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg
Luxembourg	Merck Finanz S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg
Luxembourg	Merck Holding S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg
Luxembourg	Merck Invest SCS, a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg
Luxembourg	Merck Re S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg
Luxembourg	Millipore International Holdings, S.a.r.l.	Luxembourg
Luxembourg	Sigma-Aldrich Global S.a.r.l.	Luxembourg
Luxembourg	Sigma-Aldrich S.a.r.l.	Luxembourg
Malta	Merck Capital Holding Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Pietà
Malta	Merck Capital Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Pietà
Netherlands	Calypso Biotech B.V.	Amsterdam
Netherlands	Merck B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Schiphol-Rijk
Netherlands	Merck Chemicals B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Amsterdam Zuidoost
Netherlands	Merck Europe B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Amsterdam
Netherlands	Merck Holding Netherlands B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Schiphol-Rijk
Netherlands	Merck Ventures B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Amsterdam
Netherlands	Merck Window Technologies B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Veldhoven
Netherlands	Mosa Meat B.V.	Maastricht
Netherlands	Serono Tri Holdings B.V.	Schiphol-Rijk
Netherlands	Sigma-Aldrich B.V.	Zwijndrecht
Netherlands	Sigma-Aldrich Chemie N.V.	Zwijndrecht
Netherlands	SynAffix B.V.	Nijmegen
Netherlands	Versum Materials Asia B.V.	Utrecht

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		EUR	14,858.79	1,214.98	14,858.79	1,214.98
100.00		EUR	47,866.64	3,093.37	47,866.64	3,093.37
100.00		EUR	56,964.53	3,260.79	56,964.53	3,260.79
99.74		EUR	432,577.77	50,088.72	432,577.77	50,088.72
100.00		EUR	8,222.70	268.93	8,222.70	268.93
100.00		HRK	1,515.66	171.76	11,288.34	1,274.71
100.00		EUR	6,144.64	269.39	6,144.64	269.39
100.00		EUR	278.31	73.18	278.31	73.18
100.00		USD	3,483.26	173.28	3,903.34	194.31
100.00		EUR	1,518,794.52	−55.75	1,518,794.52	−55.75
100.00		USD	347,065.34	11,426.08	388,921.42	12,812.18
100.00		EUR	4,037,762.61	−149.91	4,037,762.61	−149.91
100.00		EUR	485,840.08	−74.66	485,840.08	−74.66
100.00		USD	56,220.49	1,160.48	63,000.68	1,301.25
100.00	100.00	EUR	61,312.00	4,438.00	61,312.00	4,438.00
100.00		EUR	2,908,118.05	2,808.44	2,908,118.05	2,808.44
100.00		EUR	2,401.22	−48.23	2,401.22	−48.23
100.00		USD	11,732.27	2,180.12	13,147.18	2,444.59
100.00		EUR	1,229,965.53	64,894.39	1,229,965.53	64,894.39
100.00		EUR	877,670.56	25,448.71	877,670.56	25,448.71
38.81		b)	b)	b)	b)	b)
100.00		EUR	923,355.08	12,013.01	923,355.08	12,013.01
100.00		EUR	2,840,383.20	58,587.42	2,840,383.20	58,587.42
100.00		EUR	674.64	674.64	674.64	674.64
100.00		EUR	3,743,661.11	−94.13	3,743,661.11	−94.13
100.00		EUR	163,797.93	−10,673.05	163,797.93	−10,673.05
100.00	100.00	EUR	2,394.20	−1,962.34	2,394.20	−1,962.34
< 20.00		b)	b)	b)	b)	b)
100.00		EUR	214,371.85	82,925.39	214,371.85	82,925.39
100.00		EUR	75,702.91	−0.78	75,702.91	−0.78
100.00		EUR	274,818.88	7,722.78	274,818.88	7,722.78
< 20.00		b)	b)	b)	b)	b)
100.00		USD	469,681.01	−1.06	526,324.54	−1.19

Country	Company	Registered office
Netherlands	Versum Materials Holdings Nederland B.V.	Utrecht
Netherlands	Versum Materials International B.V.	Utrecht
Netherlands	Versum Materials Netherlands B.V.	Utrecht
Netherlands	Versum Materials Netherlands International B.V.	Utrecht
Netherlands	Versum Materials Pacific B.V.	Utrecht
Norway	Merck Life Science AS, a subsidiary of Merck KGaA, Darmstadt, Germany	Oslo
Austria	Allergopharma Vertriebsgesellschaft mbH	Vienna
Austria	Merck Chemicals and Life Science GesmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Vienna
Austria	Merck Gesellschaft mbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Vienna
Austria	Sigma-Aldrich Handels GmbH	Vienna
Poland	Merck Business Solutions Europe Sp.z.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Wroclaw
Poland	Merck Sp.z.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Warsaw
Poland	Sigma-Aldrich Sp.z.o.o.	Poznan
Portugal	Laquifa Laboratorios S.A.	Algés
Portugal	Merck, S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Algés
Romania	Merck Romania S.R.L., a subsidiary of Merck KGaA, Darmstadt, Germany	Bucharest
Russia	Chemical Trade Limited LLC	Moscow
Russia	MedChem Limited	Moscow
Russia	Merck LLC, a subsidiary of Merck KGaA, Darmstadt, Germany	Moscow
Russia	SAF-LAB LLC	Moscow
Russia	Sigma-Aldrich Rus LLC	Moscow
Sweden	Galecto Biotech AB	Lund
Sweden	Merck AB, a subsidiary of Merck KGaA, Darmstadt, Germany	Solna
Sweden	Merck Chemicals and Life Science AB, a subsidiary of Merck KGaA, Darmstadt, Germany	Solna
Sweden	Sigma-Aldrich Sweden AB	Stockholm
Switzerland	Allergopharma AG	Therwil
Switzerland	Ares Trading SA	Aubonne
Switzerland	Asceneuron SA	Lausanne
Switzerland	CAMAG Chemie-Erzeugnisse und Adsorptionstechnik AG	Muttenz
Switzerland	Cridec SA	Eclepens
Switzerland	FoRx Therapeutics AG	Basel
Switzerland	Inthera Bioscience AG	Schlieren
Switzerland	iOnctura SA	Plan-les-Ouates
Switzerland	Merck & Cie, a subsidiary of Merck KGaA, Darmstadt, Germany	Altdorf
Switzerland	Merck (Schweiz) AG, a subsidiary of Merck KGaA, Darmstadt, Germany	Zug
Switzerland	Merck Performance Materials (Schweiz) AG, a subsidiary of Merck KGaA, Darmstadt, Germany	Schaffhausen
Switzerland	Merck Serono SA, a subsidiary of Merck KGaA, Darmstadt, Germany	Coinsins
Switzerland	ObsEva SA	Cologny
Switzerland	SeroMer Holding SA	Coinsins
Switzerland	Sigma-Aldrich (Switzerland) Holding AG	Buchs
Switzerland	Sigma-Aldrich Chemie GmbH	Buchs

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
100.00		USD	60,827.59	15.03	68,163.40	16.85
100.00		USD	75,007.64	–1.26	84,053.56	–1.42
100.00		USD	817,227.76	–2,466.55	915,785.42	–2,765.77
100.00		USD	728,540.51	–408.53	816,402.50	–458.09
100.00		USD	71,712.59	–419.14	80,361.13	–469.99
100.00		NOK	3,612.56	587.63	35,670.43	5,793.01
100.00		EUR	707.05	39.47	707.05	39.47
100.00		EUR	17,303.95	1,370.28	17,303.95	1,370.28
100.00		EUR	8,145.91	2,263.29	8,145.91	2,263.29
100.00		EUR	3,285.66	690.01	3,285.66	690.01
100.00		PLN	1,578.47	576.72	6,717.66	2,481.61
100.00		PLN	42,032.99	5,353.43	178,884.00	23,035.60
100.00		PLN	3,353.72	598.97	14,272.75	2,577.36
100.00		EUR	75.46	–3.00	75.46	–3.00
100.00		EUR	34,819.04	1,796.11	34,819.04	1,796.11
100.00		RON	5,143.27	2,047.97	24,605.92	9,717.48
100.00		b)	b)	b)	b)	b)
100.00		b)	b)	b)	b)	b)
100.00		RUB	99,773.20	572.31	6,933,448.92	41,626.47
100.00		b)	b)	b)	b)	b)
100.00		RUB	2,396.63	158.06	166,547.15	11,496.03
< 20.00		b)	b)	b)	b)	b)
100.00		SEK	11,176.04	–410.53	117,158.42	–4,337.40
100.00		SEK	86,374.18	26,149.11	905,460.50	276,277.92
100.00		SEK	4,018.70	772.36	42,128.04	8,160.30
100.00		CHF	2,469.91	71.62	2,682.57	79.67
100.00		EUR	1,077,501.08	445,993.17	1,077,501.08	445,993.17
25.35		b)	b)	b)	b)	b)
39.11		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
23.28		b)	b)	b)	b)	b)
73.60		b)	b)	b)	b)	b)
51.63	51.63	CHF	–51,103.46	60,551.42	–55,503.47	67,358.61
100.00		CHF	8,102.72	232.27	8,800.36	258.38
100.00		CHF	229,119.67	–55.26	248,846.87	–61.47
100.00		EUR	2,470,448.59	1,119,699.24	2,470,448.59	1,119,699.24
< 20.00		b)	b)	b)	b)	b)
100.00		EUR	3,283,150.26	993,578.18	3,283,150.26	993,578.18
100.00		CHF	6,424,636.29	1,021,147.97	6,977,797.48	1,135,945.43
100.00		CHF	121,835.19	12,322.32	132,325.20	13,707.60

Country	Company	Registered office
Switzerland	Sigma-Aldrich International GmbH	Buchs
Switzerland	Sigma-Aldrich Production GmbH	Buchs
Switzerland	Vaximm AG	Basel
Serbia	Merck d.o.o. Beograd, a subsidiary of Merck KGaA, Darmstadt, Germany	Belgrade
Slovakia	Merck spol. s r.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Bratislava
Slovakia	Sigma-Aldrich, spol. s r.o.	Bratislava
Slovenia	Merck d.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Ljubljana
Spain	Merck Chemicals and Life Science S.A.U., a subsidiary of Merck KGaA, Darmstadt, Germany	Madrid
Spain	Merck Life Science S.L.U., a subsidiary of Merck KGaA, Darmstadt, Germany	Madrid
Spain	Merck, S.L.U., a subsidiary of Merck KGaA, Darmstadt, Germany	Madrid
Czech Republic	Merck spol. s r.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Prague
Czech Republic	Sigma-Aldrich spol s r.o.	Prague
Turkey	Merck Ilac Ecza ve Kimya Ticaret AS, a subsidiary of Merck KGaA, Darmstadt, Germany	Istanbul
Hungary	BSSN Software Kft.	Budapest
Hungary	Merck Kft., a subsidiary of Merck KGaA, Darmstadt, Germany	Budapest
Hungary	Sigma-Aldrich Kft.	Budapest
North America		
Canada	EMD Chemicals Canada Inc.	Oakville
Canada	EMD Crop BioScience Canada Inc.	Toronto
Canada	EMD Inc.	Mississauga
Canada	Millipore (Canada) Ltd.	Oakville
Canada	Natrix Separations, Inc.	Burlington
Canada	Sigma-Aldrich Canada Co.	Oakville
United States	Akili Interactive Labs, Inc.	Boston
United States	Akrevia Therapeutics LLC	Cambridge
United States	Aldrich Chemical Co. LLC	Milwaukee
United States	Aldrich Chemical Foreign Holding LLC	St. Louis
United States	Aldrich-APL, LLC	Urbana
United States	Allergopharma USA, Inc.	Alexandria
United States	Allozyne, Inc.	Seattle
United States	Altoida, Inc.	Suwanee
United States	ApoGen Biotechnologies, Inc.	Seattle
United States	Archemix Corporation	Cambridge
United States	BioControl Systems, Inc.	Wilmington
United States	Biolinq Inc.	San Diego
United States	BioReliance Corporation	Rockville
United States	BioVascular, Inc.	La Jolla
United States	Bird Rock Bio, Inc.	La Jolla
United States	Cell Marque Corporation	Rocklin
United States	Cerilliant Corporation	Round Rock
United States	Deltanoid Pharmaceuticals, Inc.	Madison
United States	Dynaloy, LLC	Wilmington
United States	Dynamis Therapeutics, Inc.	Jenkintown
United States	Electron Transfer Technologies, Inc.	West Trenton
United States	ElectronInks Inc.	Austin

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
100.00		USD	4,968,376.22	434,581.08	5,567,562.39	487,300.11
100.00		CHF	37,797.66	6,683.22	41,052.04	7,434.55
22.06		b)	b)	b)	b)	b)
100.00		RSD	6,631.05	414.96	779,679.13	48,911.93
100.00		EUR	12,419.52	−1,186.18	12,419.52	−1,186.18
100.00		EUR	−246.84	59.79	−246.84	59.79
100.00		EUR	1,837.53	120.87	1,837.53	120.87
100.00		EUR	76,600.49	6,014.30	76,600.49	6,014.30
100.00		EUR	−24,835.44	2,013.73	−24,835.44	2,013.73
100.00		EUR	208,474.01	18,003.21	208,474.01	18,003.21
100.00		CZK	30,764.45	2,273.32	781,718.57	58,368.28
100.00		CZK	5,290.62	436.75	134,433.71	11,213.73
100.00		TRY	32,047.13	2,139.61	213,648.58	13,571.05
100.00		HUF	9.06	0.00	3,000.00	0.00
100.00		HUF	20,541.20	1,363.49	6,800,271.76	444,420.42
100.00		HUF	3,282.31	268.77	1,086,625.08	87,602.86
100.00		CAD	178.80	58.28	261.37	86.77
100.00		CAD	6,577.75	71.88	9,615.35	107.01
100.00		CAD	19,943.34	2,250.99	29,153.18	3,351.19
100.00		CAD	4,839.50	688.40	7,074.38	1,024.86
100.00		CAD	−6,236.55	−3,536.60	−9,116.59	−5,265.15
100.00		CAD	12,704.27	841.46	18,571.11	1,252.73
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		USD	439,233.42	316,024.21	492,204.97	354,361.11
100.00		USD	0.45	0.00	0.50	0.00
100.00		USD	8,466.43	2,146.28	9,487.48	2,406.65
100.00		USD	62.60	440.66	70.15	494.11
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		USD	64,434.98	5,248.25	72,205.84	5,884.91
< 20.00		b)	b)	b)	b)	b)
100.00		USD	103,358.46	66,725.39	115,823.49	74,819.84
< 20.00	< 20.00	b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		USD	82,358.36	14,763.55	92,290.78	16,554.52
100.00		USD	114,918.77	28,786.91	128,777.97	32,279.05
< 20.00		b)	b)	b)	b)	b)
100.00		USD	7,441.75	−145.14	8,339.22	−162.75
< 20.00	< 20.00	b)	b)	b)	b)	b)
100.00		USD	−122.41	0.00	−137.18	0.00
< 20.00		b)	b)	b)	b)	b)

Country	Company	Registered office
United States	EMD Accounting Solutions & Services America, Inc.	Rockland
United States	EMD Digital Inc.	Burlington
United States	EMD Finance LLC	Wilmington
United States	EMD Group Holding, Inc.	Wilmington
United States	EMD Holding Corp.	Rockland
United States	EMD Millipore Corporation	Burlington
United States	EMD Performance Materials Corp.	Philadelphia
United States	EMD Serono Holding, Inc.	Rockland
United States	EMD Serono Research & Development Institute, Inc.	Billerica
United States	EMD Serono, Inc.	Rockland
United States	FloDesign Sonics, Inc.	Wilbraham
United States	Fluka Chemical Corp.	St. Louis
United States	Grzybowski Scientific Inventions Ltd.	Evanston
United States	Hydrochlor, LLC	Wilmington
United States	Immunitas Therapeutics, Inc.	Wilmington
United States	Indi Molecular, Inc.	Culver City
United States	Intermolecular, Inc.	Wilmington
United States	Intrexon Corporation	Germantown
United States	J.C. Schumacher Company	Los Angeles
United States	Kraig Biocraft Laboratories, Inc.	Ann Arbor
United States	Lumiode, Inc.	New York
United States	MemryX Inc.	Ann Arbor
United States	Millipore Asia Ltd.	Wilmington
United States	Millipore UK Holdings I, LLC	Wilmington
United States	Millipore UK Holdings II, LLC	Wilmington
United States	Neurable Inc.	Boston
United States	Ormet Circuits, Inc.	San Diego
United States	Pacific Light & Hologram, Inc.	Wilmington
United States	Plexium Inc.	Wilmington
United States	Progyny, Inc.	Menlo Park
United States	Prolog Healthy Living Fund II, L.P.	St. Louis
United States	Prolog Healthy Living Fund, L.P.	St. Louis
United States	Raze Therapeutics, Inc.	Cambridge
United States	Research Organics, LLC	Cleveland
United States	Ribometrix Inc.	Durham
United States	Riffyn, Inc.	Oakland
United States	Robert W. Baird & Co.	Chicago
United States	SAFC Biosciences, Inc.	Lenexa
United States	SAFC Carlsbad, Inc.	Carlsbad
United States	SAFC, Inc.	Madison
United States	Serono Laboratories, Inc.	Rockland
United States	Sigma Chemical Foreign Holding LLC	St. Louis
United States	Sigma Redevelopment Corporation	St. Louis
United States	Sigma-Aldrich Co. LLC	St. Louis
United States	Sigma-Aldrich Corporation	St. Louis
United States	Sigma-Aldrich Foreign Holding Co.	St. Louis
United States	Sigma-Aldrich Manufacturing LLC	St. Louis
United States	Sigma-Aldrich Missouri Insurance Company	St. Louis
United States	Sigma-Aldrich Research Biochemicals, Inc.	Natick
United States	Sigma-Aldrich RTC, Inc.	Laramie
United States	Sigma-Aldrich, Inc.	Milwaukee
United States	Sigma-Genosys of Texas LLC	The Woodlands

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
100.00		USD	–744.87	1,082.17	–834.71	1,213.45
100.00		USD	–9,139.17	–8,316.02	–10,241.35	–9,324.84
100.00		USD	11,997.58	12,651.50	13,444.49	14,186.25
100.00		USD	4,781,884.12	–822.71	5,358,579.34	–922.51
100.00		USD	15,559,603.71	976,540.60	17,436,091.91	1,095,004.74
100.00		USD	3,157,170.14	348,465.20	3,537,924.85	390,737.51
100.00		USD	417,824.72	9,684.50	468,214.38	10,859.33
100.00		USD	1,096,569.86	214,953.23	1,228,816.18	241,029.20
100.00		USD	90,856.70	32,683.87	101,814.02	36,648.75
100.00		USD	37,838.49	58,456.73	42,401.81	65,548.11
100.00		USD	–1,021.65	–1,155.74	–1,144.86	–1,295.94
100.00		b)	b)	b)	b)	b)
100.00		USD	201.61	–33.44	225.93	–37.50
50.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		USD	17,163.35	–2,920.63	19,233.25	–3,274.94
< 20.00		b)	b)	b)	b)	b)
100.00		USD	0.00	0.00	0.00	0.00
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		USD	23,817.33	49.61	26,689.70	55.63
100.00		EUR	635,722.77	–35,594.51	635,722.77	–35,594.51
100.00		EUR	0.00	0.00	0.00	0.00
< 20.00		b)	b)	b)	b)	b)
100.00		USD	8,386.96	–6,900.66	9,398.43	–7,737.78
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
50.58		b)	b)	b)	b)	b)
38.32		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		USD	32,480.39	3,175.68	36,397.53	3,560.93
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		USD	114,009.84	85,645.53	127,759.42	96,035.19
100.00		USD	23,936.92	–7,352.19	26,823.71	–8,244.09
100.00		USD	87,220.78	8,877.96	97,739.61	9,954.95
100.00		USD	151.87	4.70	170.19	5.27
100.00		USD	0.45	0.00	0.50	0.00
100.00		USD	71,186.50	–7,118.27	79,771.59	–7,981.78
100.00		USD	4,100,437.28	125,796.58	4,594,950.01	141,056.96
100.00		USD	1,445,259.64	937,881.78	1,619,557.95	1,051,656.22
100.00		USD	–4,915.50	52,302.70	–5,508.31	58,647.54
100.00		USD	191,006.25	56,949.11	214,041.60	63,857.61
100.00		USD	12,274.38	3,440.30	13,754.67	3,857.65
100.00		USD	19,645.19	170.45	22,014.40	191.13
100.00		USD	13,970.46	400.39	15,655.29	448.96
100.00		USD	41,778.82	41,260.58	46,817.34	46,265.90
100.00		USD	6,046.98	–562.19	6,776.24	–630.39

Country	Company	Registered office
United States	Sonde Health, Inc.	Boston
United States	Supelco, Inc.	Bellefonte
United States	Telios Pharma, Inc.	Wilmington
United States	Tioga Pharmaceuticals, Inc.	San Diego
United States	TocopheRx, Inc.	Burlington
United States	Versum Materials Formulations and Technology, LLC	Wilmington
United States	Versum Materials Manufacturing Company, LLC	Wilmington
United States	Versum Materials Technology LLC	Wilmington
United States	Versum Materials US International, Inc.	Wilmington
United States	Versum Materials US LLC	Wilmington
United States	Versum Materials, Inc.	Wilmington
United States	ViuRx Pharmaceuticals, Inc.	Boston
Asia-Pacific (APAC)		
Australia	Biochrom Australia Pty. Ltd.	Bayswater
Australia	Immutep Limited	Sydney
Australia	Merck Healthcare Pty. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Macquarie Park
Australia	Merck Pty. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Bayswater
Australia	Proligo Australia Pty. Ltd.	Macquarie Park
Australia	SAFC Biociences Pty. Ltd.	Macquarie Park
Australia	Sigma-Aldrich Oceania Pty. Ltd.	Macquarie Park
Australia	Sigma-Aldrich Pty. Ltd.	Macquarie Park
China	Beijing Skywing Technology Co., Ltd.	Beijing
China	Merck Chemicals (Shanghai) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai
China	Merck Display Materials (Shanghai) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai
China	Merck Electronic Materials (Suzhou) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Suzhou
China	Merck Holding (China) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai
China	Merck Innovation Hub (Guangdong) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Guangzhou
China	Merck Life Science Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong
China	Merck Life Science Technologies (Nantong) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Nantong
China	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong
China	Merck Management Consulting (Shanghai) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai
China	Merck Performance Materials Hong Kong Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong
China	Merck Pharmaceutical (HK) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong
China	Merck Pharmaceutical Distribution (Jiangsu) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Nantong
China	Merck Pharmaceutical Manufacturing (Jiangsu) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Nantong
China	Merck Serono (Beijing) Pharmaceutical Distribution Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Beijing
China	Merck Serono (Beijing) Pharmaceutical R&D Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Beijing

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
< 20.00		b)	b)	b)	b)	b)
100.00		USD	18,327.30	–10,190.71	20,537.57	–11,426.95
< 20.00		b)	b)	b)	b)	b)
< 20.00	< 20.00	b)	b)	b)	b)	b)
100.00		b)	b)	b)	b)	b)
100.00		USD	981.84	0.22	1,100.25	0.25
100.00		USD	550,919.42	0.00	617,360.30	0.00
100.00		USD	–19,806.48	3.56	–22,195.15	3.99
100.00		USD	720,139.21	3,390.04	806,988.00	3,801.28
100.00		USD	982,716.50	–58,110.22	1,101,232.11	–65,159.58
100.00		USD	–88,236.02	–49,072.70	–98,877.29	–55,025.70
< 20.00		b)	b)	b)	b)	b)
100.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
100.00		AUD	19,719.90	2,365.97	31,528.18	3,807.53
100.00		AUD	6,838.75	1,674.63	10,933.80	2,694.96
100.00		AUD	1,842.89	–3.37	2,946.41	–5.42
100.00		AUD	10,644.76	632.62	17,018.85	1,018.07
100.00		AUD	32,800.30	4,572.93	52,441.12	7,359.16
100.00		AUD	15,694.99	4,128.34	25,093.15	6,643.70
100.00		CNY	3,780.38	3,094.12	29,498.65	23,949.26
100.00		CNY	17,663.03	2,612.05	137,826.40	20,217.98
100.00		CNY	60,927.58	17,744.43	475,424.02	137,346.50
100.00		CNY	59,619.33	5,206.11	465,215.62	40,296.67
100.00		CNY	149,735.83	11,790.47	1,168,403.69	91,261.30
100.00		CNY	1,367.31	–512.34	10,737.34	–3,962.66
100.00		USD	32,373.48	–419.73	36,277.73	–470.65
100.00		CNY	10,627.52	–10,123.04	82,927.63	–78,354.97
100.00		HKD	5,974.54	642.92	52,135.00	5,647.38
100.00		CNY	42,656.12	3.95	332,849.96	30.57
100.00		HKD	52,169.09	–4,731.68	455,237.87	–41,562.82
100.00		HKD	11,817.68	1,038.69	103,123.47	9,123.79
100.00		CNY	20,635.03	–685.66	161,017.24	–5,307.18
100.00		CNY	56,704.74	10,304.55	442,472.79	79,759.86
100.00		CNY	21,782.51	9,385.74	169,971.08	72,648.03
100.00		CNY	4,171.21	195.36	32,548.34	1,512.15

Country	Company	Registered office
China	Merck Serono Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Beijing
China	SAFC Hitech (Shanghai) Co., Ltd.	Shanghai
China	Sigma-Aldrich (Shanghai) Trading Co., Ltd.	Shanghai
China	Sigma-Aldrich (Wuxi) Life Science & Technology Co., Ltd.	Wuxi
China	Versum Materials (Dalian) Co., Ltd.	Dalian
China	Versum Materials (Shanghai) Co., Ltd.	Shanghai
India	Merck Life Science Pvt. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Mumbai
India	Merck Performance Materials Pvt. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Mumbai
India	Merck Specialities Pvt. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Mumbai
India	Sigma-Aldrich Chemicals Private Limited	Bangalore
Indonesia	P.T. Merck Chemicals and Life Sciences, a subsidiary of Merck KGaA, Darmstadt, Germany	Jakarta
Indonesia	P.T. Merck Tbk., a subsidiary of Merck KGaA, Darmstadt, Germany	Jakarta
Japan	BioReliance K.K.	Tokyo
Japan	Merck Biopharma Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo
Japan	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo
Japan	Merck Performance Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo
Japan	Showa Denko Versum Materials 2 Co., Ltd.	Tokyo
Japan	Sigma-Aldrich Japan G.K.	Tokyo
Japan	Versum Materials Japan Inc.	Kawasaki
Malaysia	Merck Sdn Bhd, a subsidiary of Merck KGaA, Darmstadt, Germany	Petaling Jaya
Malaysia	Sigma-Aldrich (M) Sdn Bhd	Kuala Lumpur
Malaysia	Versum Materials Malaysia Sdn Bhd	Kuala Lumpur
New Zealand	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Auckland
New Zealand	Sigma-Aldrich New Zealand Co.	Auckland
Philippines	Merck Business Solutions Asia Inc., a subsidiary of Merck KGaA, Darmstadt, Germany	Bonifacio Global City
Philippines	Merck Inc., a subsidiary of Merck KGaA, Darmstadt, Germany	Bonifacio Global City
Singapore	Merck Performance Materials Pte. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Singapore
Singapore	Merck Pte. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Singapore
Singapore	Sigma-Aldrich Pte. Ltd.	Singapore
Singapore	Versum Materials Singapore International Pte. Ltd.	Singapore
Singapore	Versum Materials Singapore Pte. Ltd.	Singapore
South Korea	Merck Electronic Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Seoul
South Korea	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Seoul
South Korea	Merck Performance Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Pyeongtaek-shi
South Korea	Sigma-Aldrich Korea Ltd.	Yongin City
South Korea	Versum Materials ADM Korea Inc.	Ansan-si

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
100.00		CNY	201,290.39	85,564.91	1,570,689.03	662,294.62
100.00		CNY	8,349.77	−75.03	65,154.06	−580.72
100.00		CNY	49,322.79	2,836.85	384,870.66	21,957.99
100.00		CNY	69,829.15	13,353.10	544,883.81	103,356.48
100.00		CNY	3,355.45	555.06	26,182.94	4,296.29
100.00		CNY	19,734.35	238.89	153,989.09	1,849.10
100.00		INR	46,360.27	12,938.92	3,704,120.85	1,021,151.09
100.00		INR	12,180.33	2,094.37	973,190.99	165,289.83
100.00		INR	59,401.20	9,734.84	4,746,072.34	768,282.36
100.00		INR	64,380.43	−920.92	5,143,905.84	−72,679.60
100.00		IDR	7,385.95	508.59	114,768,056.79	8,061,443.27
86.65		IDR	39,315.74	4,392.66	610,915,427.55	69,626,340.91
100.00		JPY	604.32	50.72	73,585.38	6,204.33
100.00		JPY	56,440.97	5,982.25	6,872,511.99	731,712.10
100.00		JPY	589,853.19	217,802.32	71,823,237.44	26,640,229.14
100.00		JPY	330,402.94	89,039.59	40,231,381.85	10,890,770.19
35.00		b)	b)	b)	b)	b)
100.00		JPY	38,734.64	3,209.85	4,716,508.52	392,608.93
100.00		JPY	6,162.66	1,653.15	750,394.20	202,202.75
100.00		MYR	17,014.91	2,700.18	78,037.17	12,535.28
100.00		MYR	1,869.87	−23.60	8,575.98	−109.58
100.00		MYR	3,778.08	261.01	17,327.78	1,211.71
100.00		NZD	1,637.32	−353.88	2,725.16	−600.91
100.00		NZD	969.22	92.16	1,613.18	156.49
99.99		PHP	6,497.91	−95.79	368,983.60	−5,547.78
100.00		PHP	20,995.33	1,475.29	1,192,219.98	85,439.30
100.00		USD	53,893.62	−2,344.67	60,393.20	−2,629.10
100.00		SGD	332,187.74	5,727.32	501,105.21	8,753.12
100.00		SGD	248,275.17	−1,893.82	374,523.09	−2,894.35
100.00		USD	13,945.38	−11.99	15,627.19	−13.44
100.00		USD	144,656.05	3,344.73	162,101.57	3,750.48
100.00		KRW	200,375.35	−11,209.90	259,521,545.52	−14,583,624.01
100.00		KRW	70,447.54	2,337.36	91,242,035.40	3,040,804.97
100.00		USD	123,305.08	23,135.80	138,175.68	25,942.40
100.00		KRW	39,061.92	3,304.47	50,592,099.66	4,298,978.62
100.00		USD	81,941.92	6,382.74	91,824.11	7,157.03

Country	Company	Registered office
South Korea	Versum Materials HYT Inc.	Ansan-si
South Korea	Versum Materials Korea Inc.	Siheung-si
South Korea	Versum Materials Korea Technology Inc.	Ansan-si
South Korea	Versum Materials PM Korea Inc.	Ulsan
South Korea	Versum Materials SPC Korea Ltd.	Pyeongtaek-shi
Taiwan	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Taipei
Taiwan	Merck Performance Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Taipei
Taiwan	SAFC Hitech Taiwan Co. Ltd.	Kaohsiung
Taiwan	Versum Materials Taiwan Co., Ltd.	Taipei
Thailand	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Bangkok
Vietnam	Merck Vietnam Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Ho Chi Minh City
Latin America		
Argentina	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Buenos Aires
Argentina	Sigma-Aldrich de Argentina S.R.L.	Buenos Aires
Brazil	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Rio de Janeiro
Brazil	Sigma-Aldrich Brasil Ltda.	São Paulo
Cayman Islands	CLEARInk Displays, Ltd.	Grand Cayman
Chile	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Santiago de Chile
Chile	Sigma-Aldrich Quimica Ltda.	Santiago de Chile
Dominican Republic	Merck Dominicana, S.R.L., a subsidiary of Merck KGaA, Darmstadt, Germany	Santo Domingo
Ecuador	Merck C.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Quito
Guatemala	Merck, S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Guatemala City
Colombia	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Bogota
Mexico	Merck Biopharma Distribution S.A. de C.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Mexico City
Mexico	Merck, S.A. de C.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Mexico City
Mexico	Sigma-Aldrich Quimica, S. de R.L. de C.V.	Toluca
Panama	Mesofarma Corporation	Panama City
Peru	Merck Peruana S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Lima
Uruguay	Ares Trading Uruguay S.A.	Montevideo
Venezuela	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Caracas
Venezuela	Representaciones MEPRO S.A.	Caracas
Middle East and Africa (MEA)		
Egypt	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Cairo
Algeria	MDCA Pharma Promotion SARL	Hydra
Algeria	Novapharm Production SARL	Wilaya de Tipiza
Israel	ARTSaVIT Ltd.	Yavne

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
100.00		KRW	76,473.21	4,000.25	99,046,343.89	5,204,158.00
100.00		KRW	149,524.38	2,891.84	193,660,536.74	3,762,160.37
100.00		KRW	63.75	0.05	82,569.71	70.65
100.00		KRW	110,181.87	644.94	142,705,019.75	839,039.97
100.00		USD	36,762.29	964.56	41,195.82	1,081.57
100.00		TWD	9,814.91	3,599.87	329,854.50	124,476.46
100.00		TWD	231,297.60	3,066.18	7,773,334.02	106,022.61
100.00		TWD	55,249.96	13,727.78	1,856,812.92	474,680.36
74.00		TWD	86,444.43	4,845.72	2,905,181.02	167,555.58
45.11		THB	29,610.33	539.92	989,819.89	18,802.06
100.00		VND	4,440.63	76.91	115,310,169.86	2,003,281.39
100.00		ARS	50,545.73	−17,981.95	3,391,664.31	−1,206,605.29
100.00		ARS	−1,512.42	−1,668.51	−101,484.45	−111,958.82
100.00		BRL	247,192.74	13,292.75	1,113,430.27	58,744.40
100.00		BRL	−320.36	2,426.62	−1,442.99	10,723.89
< 20.00		b)	b)	b)	b)	b)
100.00		CLP	49,429.63	11,203.23	41,576,173.04	8,891,829.98
100.00		CLP	998.85	177.41	840,154.86	140,805.28
100.00		b)	b)	b)	b)	b)
100.00		USD	19,144.61	−889.33	21,453.45	−997.22
100.00		GTQ	17,644.25	3,937.68	152,215.17	34,015.05
100.00		COP	27,098.52	851.53	99,825,743.69	3,147,006.60
100.00		MXN	12,455.39	10,975.30	263,909.84	238,124.40
100.00		MXN	116,553.58	−3,493.22	2,469,583.85	−75,790.24
100.00		MXN	3,945.56	−1,248.47	83,600.14	−27,087.24
100.00		USD	49,279.20	992.65	55,222.27	1,113.06
100.00		PEN	20,632.58	−2,156.96	76,683.03	−8,081.88
100.00		USD	38,316.81	5,402.13	42,937.81	6,057.46
100.00		b)	b)	b)	b)	b)
100.00		b)	b)	b)	b)	b)
100.00		EGP	3,445.16	−200.24	61,880.99	−3,779.81
49.00		b)	b)	b)	b)	b)
20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)

Country	Company	Registered office
Israel	Explore Bio 1 Ltd.	Yavne
Israel	Inter-Lab Ltd.	Yavne
Israel	InterPharm Laboratories Ltd.	Yavne
Israel	MediSafe Project Ltd.	Haifa
Israel	Merck Serono Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Herzliya Pituach
Israel	Metabomed Ltd.	Yavne
Israel	Pantheon Biosciences Ltd.	Yavne
Israel	Pilltracker 2015 Ltd.	Tel Aviv
Israel	PMatX Ltd.	Yavne
Israel	PxE Computational Imaging Ltd.	Lachish Darom
Israel	QLight Nanotech Ltd.	Jerusalem
Israel	Sentaur Bio Ltd.	Yavne
Israel	Sigma-Aldrich Israel Ltd.	Rehovot
Israel	Versum Materials Israel Ltd.	Tel Aviv
Israel	Wiliot Ltd.	Caesarea
Kenya	Merck Healthcare and Life Science Limited, a subsidiary of Merck KGaA, Darmstadt, Germany	Nairobi
Morocco	Merck Maroc S.A.R.L., a subsidiary of Merck KGaA, Darmstadt, Germany	Casablanca
Nigeria	Merck Pharmaceutical and Life Sciences Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Lagos
South Africa	Merck (Pty) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Halfway House
South Africa	Sigma-Aldrich (Pty) Ltd.	Kempton Park
Tunisia	Merck Promotion SARL, a subsidiary of Merck KGaA, Darmstadt, Germany	Tunis
Tunisia	Merck SARL, a subsidiary of Merck KGaA, Darmstadt, Germany	Tunis
United Arab Emirates	Merck Serono Middle East FZ-Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Dubai

a) Profit and loss transfer agreement
b) Not disclosed owing to minor significance in accordance with section 286 (3) no. 1 HGB
c) Operational site of Merck KGaA, Darmstadt, Germany

Equity interest (%)	thereof Merck KGaA, Darmstadt, Germany (%)	Reporting currency (ISO code)	IFRS net equity in thousand €	IFRS profit after tax in thousand €	IFRS net equity in thousand [reporting currency]	IFRS profit after tax in thousand [reporting currency]
20.00		b)	b)	b)	b)	b)
100.00		USD	8,698.86	–521.28	9,747.94	–584.51
100.00		USD	153,684.84	10,934.37	172,219.24	12,260.82
< 20.00		b)	b)	b)	b)	b)
100.00		USD	15,920.68	821.27	17,840.71	920.89
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
< 20.00		b)	b)	b)	b)	b)
90.00		ILS	–678.87	–498.37	–2,630.56	–1,996.54
< 20.00		b)	b)	b)	b)	b)
100.00		ILS	484.27	–17.51	1,876.51	–70.14
22.50		b)	b)	b)	b)	b)
100.00		ILS	69,605.77	1,919.20	269,715.38	7,688.61
100.00		USD	16,285.37	1,051.47	18,249.38	1,179.03
< 20.00		b)	b)	b)	b)	b)
100.00		KES	3,088.89	–542.75	350,884.40	–62,146.47
100.00		b)	b)	b)	b)	b)
100.00		b)	b)	b)	b)	b)
100.00		ZAR	30,197.94	1,971.01	476,441.99	31,946.59
100.00		ZAR	2,776.35	414.55	43,803.35	6,719.18
100.00		TND	–7.56	58.92	–23.92	193.45
100.00		TND	–189.52	–3,188.94	–599.73	–10,470.71
100.00		AED	112,103.86	6,691.33	461,397.05	27,557.22

Independent Auditor's Report

To MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany

Report on the Audit of the Annual Financial Statements and of the Combined Management Report

Opinions
We have audited the annual financial statements of MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany, which comprise the balance sheet as of December 31, 2019, the income statement for the period from January 1 to December 31, 2019, and notes to the annual financial statements, including the recognition and measurement policies presented therein. In addition, we have audited the combined management report of MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany, for the financial year from January 1, 2019, to December 31, 2019. In accordance with German legal requirements, we have not audited the components of the combined group management report specified in the "Other Information" section of our auditor's report.

In our opinion, on the base of the knowledge obtained in the audit,
- the accompanying annual financial statements comply, in all material respects, with the requirements of German commercial law applicable to business corporations and give a true and fair view of the assets, liabilities and financial position of the Company as of December 31, 2019, and of its financial performance for the financial year from January 1, 2019, to December 31, 2019 in compliance with German Legally Required Accounting Principles, and
- the accompanying combined management report as a whole provides an appropriate view of the Company's position. In all material respects, this combined management report is consistent with the annual financial statements, complies with German legal requirements and appropriately presents the opportunities and risks of future development. Our opinion on the combined management report does not cover the content of the components of the management report specified in the "Other Information" section of the auditor's report.

Pursuant to Section 322 (3) sentence 1 HGB [Handelsgesetzbuch: German Commercial Code], we declare that our audit has not led to any reservations relating to the legal compliance of the annual financial statements and of the combined management report.

Basis for the Opinions
We conducted our audit of the annual financial statements and of the combined management report in accordance with Section 317 HGB and EU Audit Regulation No. 537/2014 (referred to subsequently as "EU Audit Regulation") and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer [Institute of Public Auditors in Germany] (IDW). Our responsibilities under those requirements and principles are further described in the "Auditor's Responsibilities for the Audit of the Annual Financial Statements and of the Combined Management Report" section of our auditor's report. We are independent of the Company in accordance with the requirements of European law and German commercial and professional law, and we have fulfilled our other German professional responsibilities in accordance with these requirements. In addition, in accordance with Article 10 (2)(f) of the EU Audit Regulation, we declare that we have not provided non-audit services prohibited under Article 5 (1) of the EU Audit Regulation. We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our opinions on the annual financial statements and on the combined management report.

Key Audit Matters in the Audit of the Annual Financial Statements
Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the annual financial statements for the financial year from January 1, 2019, to December 31, 2019. These matters were addressed in the context of our audit of the annual financial statements as a whole, and in forming our opinion thereon, we do not provide a separate opinion on these matters.

VALUATION OF INVESTMENTS IN AFFILIATED COMPANIES

Information on financial assets can be found in the notes to the financial statements under note 3.

The financial statement risk

As of December 31, 2019, the Company reported investments in affiliated companies of EUR 22,455 million as part of financial assets. This amount represents 89 % of total assets and thus the significant share of the Company's assets.

Investments in affiliated companies are recognized at cost or, if they are expected to be permanently impaired, at their lower fair value.

Assessing whether investments in affiliated companies are impaired depends considerably on the Company's estimates and exercise of judgment.

In the financial year 2019, the Company did not – as in the previous year – recognize impairment losses on investments in affiliated companies. Reversals of prior year impairment losses were recognized in the amount of EUR 10.3 million (in 2018: EUR 0.0 million) because the reasons for impairment losses have ceased to apply.

There is a risk for the financial statements that impairment of investments in affiliated companies may not be recognized in the financial statements.

Our audit approach

In a first step, we obtained explanations from the Company's finance department and evaluated underlying documentation to obtain an understanding of the Company's process for testing investments in affiliated companies for impairment. In doing this, we analyzed the Company's approach to determining potentially impaired investments in affiliated companies and, based on the information obtained in the course of our audit, assessed whether there were any indicators for impairment that were not identified by the Company.

In a second step, we assessed the calculation model used by the Company to determine the value of investments and reconciled the assumptions concerning the discount rate to external information. For individual investments in affiliated companies that were selected by us using a risk based approach, we scrutinized the revenue and earnings forecasts as well as underlying assumptions prepared by the respective CFO (or other individuals, as applicable), whereby we used the current earnings situation as a starting point for our analysis. In addition, we reconciled these projections and assumptions with other internally available data, e. g. for tax purposes. For selected investments in affiliated companies, we also assessed the accuracy of the Company's forecasting process by comparing the budgets prepared in previous years with actual results and by analyzing deviations, if any.

Our conclusions

The Company's assumptions and estimates regarding the valuation of participations in affiliated companies are appropriate.

RECOGNITION AND MEASUREMENT OF PROVISIONS FOR TAX LIABILITIES

For changes in provisions for tax liabilities, please refer to note 10 in the notes to the financial statements.

The financial statement risk

As of December 31, 2019, the Company recorded provisions for tax liabilities in the amount of EUR 127.4 million.

Application of German regulations on income tax and tax incentives is complex and subject to risks. The recognition and measurement of income tax liabilities requires the Group to exercise judgement in its assessment of tax matters and make estimates concerning tax risks. Merck KGaA, Darmstadt, Germany, routinely engages external experts to support its own risk assessment with expert opinions from tax specialists.

There is a risk for the financial statements that provisions for tax liabilities may not be fully recognized or not appropriately measured.

Our audit approach
We involved our own specialists in tax law into the audit team in order to evaluate both the assessment of tax risks of Merck KGaA, Darmstadt, Germany, as well as the related opinions of external experts engaged by Merck KGaA, Darmstadt, Germany.

We obtained an understanding of existing tax risks through inquiry of management and employees of the tax department. We assessed the competence, capabilities and objectivity of the external experts and evaluated their expert opinions.

In addition, we analyzed correspondence with the relevant tax authorities and assessed the assumptions underlying the determination of tax liabilities based on our knowledge and experience of how the relevant legal requirements are currently applied by the tax authorities and courts.

Our conclusions
The assumptions applied by Merck KGaA, Darmstadt, Germany, for recognition and measurement of provisions for tax liabilities are reasonable.

ACCOUNTING EFFECTS FROM THE TERMINATION OF THE BUSINESS LEASE CONTRACT WITH MERCK HEALTHCARE KGAA, A SUBSIDIARY OF MERCK KGAA, DARMSTADT, GERMANY.

Disclosures on the accounting effects from the termination of the business lease contract with Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany, in the financial year can be found in the notes to the financial statements under section "Effects of material company agreements on the net assets, financial position, and results of operations".

The financial statement risk
With retroactive effect as of January 1, 2018, the operative activities that were formerly undertaken in the legal entity Merck KGaA, Darmstadt, Germany, in the Healthcare, Life Science and Performance Materials business sectors were spun off into three separate companies (so called "OpCos") and subsequently leased back.

The business leasing contract in place with Merck Healthcare KGaA, Darmstadt, a subsidiary of Merck KGaA, Darmstadt, Germany, concerning the lease of the Healthcare business sector was terminated by Merck KGaA, Darmstadt, Germany, as of March 31, 2019.

Due to the large number of individual items to be transferred and the extent of manual steps, the correct identification of the assets and liabilities to be transferred as well as the determination of the respective book values as of the transfer date involve an increased inherent risk of material misstatement. In addition, there is the risk that transactions in the Healthcare business sector continued to be recorded by Merck KGaA, Darmstadt, Germany, after the termination of the business leasing contract.

There is a risk for the financial statements that the transferred assets and liabilities in the Healthcare business sector that are no longer to be recorded in the financial statements of Merck KGaA, Darmstadt, Germany, after the termination of the business leasing agreement were either not identified in full or inaccurately identified, and as a result were recognized inaccurately in the accounts of Merck KGaA, Darmstadt, Germany.

Our audit approach
In a first step, we obtained explanations from the departments involved in the transaction and evaluated underlying documentation to obtain an understanding of the Company's process for identifying assets and liabilities to be transferred and for allocating them to the Healthcare business sector. In doing so, we assessed the Company's approach to determine the allocation of transferred items to the respective business sectors as well as related allocation rules. Using the information gained in the course of our audit of the annual financial statements in other areas (e.g. analytical review of balance sheet and income statement accounts as well as sample-based test of details on the existence of revenue), we assessed whether there is any indication that assets and liabilities of to be transferred were not identified and that transactions continued to be recognized in the accounts of Merck KGaA, Darmstadt, Germany, after termination of the business leasing contract. Applying tests of details, we used specifically selected elements to verify whether the assets and liabilities to be transferred to Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany, were complete and had been transferred with the correct net book values as of the transfer date in in line with the provisions of the transfer agreement.

Our conclusions
The approach used for identifying and allocating assets and liabilities transferred to the Healthcare business sector is appropriate and in line with the terms of the contract and the accounting policies to be applied. The assets and liabilities to be assigned to the Healthcare business sector were accurately identified and were no longer recognized in the accounts of Merck KGaA, Darmstadt, Germany, after termination of the business leasing contract. Transactions in the Healthcare business sector were no longer recognized at Merck KGaA, Darmstadt, Germany, after termination of the business leasing contract.

Other Information
Management is responsible for the other information. The other information comprises Information in the combined group management report, not required by law or DRS 20, and marked as unaudited.

The other information furthermore comprises the remaining parts of the annual report.

The other information do not comprise the annual financial statements, the audited parts of the combined group management report and our auditor's report.

Our opinions on the consolidated financial statements and on the combined group management report do not cover the other information, and consequently we do not express an opinion or any other form of assurance conclusion thereon.

In connection with our audit, our responsibility is to read the other information and, in so doing, to consider whether the other information

- is materially inconsistent with the consolidated financial statements, with the information in the combined group management report audited for content or our knowledge obtained in the audit, or
- otherwise appears to be materially misstated.

Responsibilities of Management and the Supervisory Board for the Annual Financial Statements and the Combined Management Report
Management is responsible for the preparation of the annual financial statements that comply, in all material respects, with the requirements of German commercial law applicable to business corporations, and that the annual financial statements give a true and fair view of the assets, liabilities, financial position and financial performance of the Company in compliance with German Legally Required Accounting Principles. In addition, management is responsible for such internal control as they, in accordance with German Legally Required Accounting Principles, have determined necessary to enable the preparation of annual financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the annual financial statements, management is responsible for assessing the Company's ability to continue as a going concern. They also have the responsibility for disclosing, as applicable, matters related to going concern. In addition, they are responsible for financial reporting based on the going concern basis of accounting, provided no actual or legal circumstances conflict therewith.

Furthermore, management is responsible for the preparation of the combined management report that as a whole provides an appropriate view of the Company's position and is, in all material respects, consistent with the annual financial statements, complies with German legal requirements, and appropriately presents the opportunities and risks of future development. In addition, management is responsible for such arrangements and measures (systems) as they have considered necessary to enable the preparation of a combined management report that is in accordance with the applicable German legal requirements, and to be able to provide sufficient appropriate evidence for the assertions in the combined management report.

The Supervisory Board is responsible for overseeing the Company's financial reporting process for the preparation of the annual financial statements and of the combined management report.

Auditor's Responsibilities for the Audit of the Annual Financial Statements and of the Combined Management Report
Our objectives are to obtain reasonable assurance about whether the annual financial statements as a whole are free from material misstatement, whether due to fraud or error, and whether the combined management report as a whole provides an appropriate view of the Company's position and, in all material respects, is consistent with the annual financial statements and the knowledge obtained in the audit, complies with the German legal requirements and appropriately presents the opportunities and risks of future development, as well as to issue an auditor's report that includes our opinions on the annual financial statements and on the combined management report.

Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Section 317 HGB and the EU Audit Regulation and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer (IDW) will always detect a material misstatement. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these annual financial statements and this combined management report.
We exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the annual financial statements and of the combined management report, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinions. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal controls.
- Obtain an understanding of internal control relevant to the audit of the annual financial statements and of arrangements and measures (systems) relevant to the audit of the combined management report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of these systems.
- Evaluate the appropriateness of accounting policies used by management and the reasonableness of estimates made by management and related disclosures.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in the auditor's report to the related disclosures in the annual financial statements and in the combined management report or, if such disclosures are inadequate, to modify our respective opinions. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Company to cease to be able to continue as a going concern.
- Evaluate the overall presentation, structure and content of the annual financial statements, including the disclosures, and whether the annual financial statements present the underlying transactions and events in a manner that the annual financial statements give a true and fair view of the assets, liabilities, financial position and financial performance of the Company in compliance with German Legally Required Accounting Principles.
- Evaluate the consistency of the combined management report with the annual financial statements, its conformity with [German] law, and the view of the Company's position it provides.
- Perform audit procedures on the prospective information presented by management in the combined management report. On the basis of sufficient appropriate audit evidence we evaluate, in particular, the significant assumptions used by management as a basis for the prospective information, and evaluate the proper derivation of the prospective information from these assumptions. We do not express a separate opinion on the prospective information and on the assumptions used as a basis. There is a substantial unavoidable risk that future events will differ materially from the prospective information.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with the relevant independence requirements, and communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, the related safeguards.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the annual financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter.

Other Legal and Regulatory Requirements

Further Information pursuant to Article 10 of the EU Audit Regulation
We were elected as auditor by the Annual General Meeting on April 26, 2019. We were engaged by the Supervisory Board on June 28, 2019. We have been the auditor of MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany, without interruption since the financial year 1995.

We declare that the opinions expressed in this auditor's report are consistent with the additional report to the Supervisory Board pursuant to Article 11 of the EU Audit Regulation (long-form audit report).

Information on the Supplementary Audit

We issue this auditor's report on the amended annual financial statements and amended combined management report on the basis of our statutory audit completed on February 17 2020 and our supplementary audit completed on May 13 2020, which concerned the amendment to disclosures in the notes to the annual financial statements and the combined management report due to the updated reporting on risks and opportunities and on expected developments. Please refer to the presentation of the amendments by the Executive Board in the amended notes to the annual financial statements, section "Other Disclosures – Subsequent Events" and in the amended combined management report, section „Report on Risks and Opportunities – Overall view of the risk and opportunity situation and management assessment", section „Report on Expected Developments – Forecast for the Group" and section „Additional Information on Merck KGaA, Darmstadt, Germany, in accordance with the German Commercial Code (HGB) – Forecast for Merck KGaA, Darmstadt, Germany".

German Public Auditor Responsible for the Engagement

The German Public Auditor responsible for the engagement is Bodo Rackwitz.

Frankfurt am Main, 17 February 2020 / limited to the amendment referred to in the Information on the Supplementary Audit: 13 May 2020

KPMG AG
Wirtschaftsprüfungsgesellschaft
[Original German version signed by:]

[signature] Rackwitz
Wirtschaftsprüfer
[German Public Auditor]

[signature] Rienecker
Wirtschaftsprüferin
[German Public Auditor]

Responsibility Statement in accordance with section 264 (2) sentence 3 HGB and section 289 (1) sentence 5 HGB

To the best of our knowledge, and in accordance with the applicable reporting principles, the annual financial statements of Merck KGaA, Darmstadt, Germany, give a true and fair view of the assets, liabilities, financial position and profit or loss of Merck KGaA, Darmstadt, Germany, and the management report includes a fair view of the development and performance of the business and the position of the company, together with a description of the material opportunities and risks associated with the expected development of Merck KGaA, Darmstadt, Germany.

Darmstadt, February 14, 2020

Addendum to the annual financial statements of Merck KGaA, Darmstadt, Germany, and the combined management report regarding subsequent events:

The events subsequent to the balance sheet date relate to the impact of the Covid-19 pandemic and the resulting addenda to the section entitled "Other Disclosures – Subsequent events" of the notes to the annual financial statement as well as to the sections entitled „Report on Risks and Opportunities – Overall view of the risk and opportunity situation and management assessment", section „Report on Expected Developments – Forecast for the Group" and section „Additional Information on Merck KGaA, Darmstadt, Germany, in accordance with the German Commercial Code (HGB) – Forecast for Merck KGaA, Darmstadt, Germany" of the combined management report.

Darmstadt, May 12, 2020

Stefan Oschmann

Udit Batra

Kai Beckmann

Belén Garijo

Marcus Kuhnert

Report of the Supervisory Board

The Supervisory Board again properly executed its duties in 2019 in accordance with the law as well as the company's Articles of Association and rules of procedure. In particular, the Supervisory Board monitored the work of the Executive Board diligently and regularly.

COOPERATION WITH THE EXECUTIVE BOARD

The cooperation with the Executive Board was characterized by intensive, trustworthy exchange. During fiscal 2019, the Executive Board provided the Supervisory Board with regular written and verbal reports on the business development of Merck KGaA, Darmstadt, Germany, and the Group. In particular, the Supervisory Board was informed about the market and sales situation of the company against the background of macroeconomic development, and the financial position of the company and its subsidiaries, along with their earnings development and corporate planning. Within the scope of quarterly reporting, the sales and operating results were presented for the Group as a whole and broken down by business sector. Aside from the Supervisory Board meetings, the Chairman of the Supervisory Board also maintained, and continues to maintain, a regular exchange of information with the Chairman of the Executive Board.

KEY TOPICS OF THE SUPERVISORY BOARD MEETINGS

Four Supervisory Board meetings were held in fiscal 2019. At these meetings, the Supervisory Board intensely discussed the reports of the Executive Board as well as, together with the Executive Board, company developments and strategic issues.

At the meeting held on February 26, 2019, the Executive Board first intensively addressed the annual financial statements and consolidated financial statements for 2018, the combined management report, the audit report of the auditor on the separate non-financial (Group) report for fiscal 2018, and the proposal for the appropriation of the net retained profit. The auditor explained the audit reports including the focus areas of the audit. The Executive Board and the Head of Accounting reported on the financial statements. Furthermore, the Supervisory Board resolved upon the report and the objectives of the Supervisory Board with respect to its composition and the profile of skills and expertise, the Declaration of Conformity with the German Corporate Governance Code, and the Statement on Corporate Governance, which simultaneously includes the joint report on Corporate Governance of the Executive Board and Supervisory Board. The Supervisory Board also approved the proposals to be made to the Annual General Meeting including the proposals for electing new Supervisory Board members. The Executive Board reported on business performance in 2018 and presented the plans for fiscal 2019.

The Supervisory Board also took note of the written risk report as well as the report from Group Internal Auditing for 2018. In addition, the Supervisory Board discussed the mandatory change of auditor and resolved to prepare the public request for tender.

The meeting held on May 9, 2019, focused on current business developments in the first quarter of 2019 and the acquisition of Versum Materials. The report of the Research and Development Committee of the Board of Partners of E. Merck KG, Darmstadt, Germany, for Life Science / Performance Materials was a further focus of the meeting. The Supervisory Board also dealt with the Compliance and Data Protection Report for 2018.

At its meeting on July 31, 2019, the Supervisory Board focused intensively on the report of the Executive Board on business performance in the second quarter of 2019. In addition, the auditor explained the half-year financial report. Risk management within the company was a further topic. The Head of Risk Management presented the status report for the first half of 2019. No risks that could threaten the continued existence of the company were identified. Moreover, the list of permitted non-audit services was updated and an external audit of the non-financial declaration was resolved upon. The Executive Board also reported on the status of the "Tolso" project, a restructuring project in the Life Science business sector.

At its fourth meeting on November 8, 2019, the Supervisory Board dealt with the report of the Executive Board on the third quarter of 2019. Additional topics of focus were the 2019 status reports of Group Internal Auditing, status reports on compliance and data protection, and the report of the Research and Development Committee for Healthcare. Furthermore, the Group Executive Conference and the strategy of the Performance Materials business sector were discussed. A resolution on preparing for the mandatory change of auditor for Merck KGaA, Darmstadt, Germany, for fiscal 2023 audit was adopted.

ANNUAL FINANCIAL STATEMENTS

The annual financial statements of Merck KGaA, Darmstadt, Germany, the consolidated financial statements of the Group, and the combined management report for Merck KGaA, Darmstadt, Germany, and the Group, including the accounts, were audited by KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin.

The auditors issued an unqualified audit opinion on the annual financial statements of Merck KGaA, Darmstadt, Germany, in accordance with German Auditing Standards. The audit opinion for the annual financial statements contained the following key audit matters, i. e. those matters that, in the professional judgment of the auditor, were of most significance in the audit of the annual financial statements:

- Impairment testing of interests in associates
- Recognition and measurement of provisions for tax liabilities
- Balance sheet effects of the termination of the business lease agreement with Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany.

For the consolidated financial statements prepared in accordance with International Financial Reporting Standards and for the combined management report, the auditors issued the unqualified auditor's report reproduced in the Annual Report of the Group. The audit opinion for the consolidated financial statements contained the following audit topics of special importance:

- The acquisition of Versum Materials Inc.
- Recognition and measurement of income tax liabilities and deferred tax liabilities
- Goodwill impairment tests

In addition, the auditor audited the calculation of the participation of Merck KGaA, Darmstadt, Germany, in the profit of E. Merck KG, Darmstadt, Germany, in accordance with article 27 (2) of the Articles of Association, as well as the separate combined non-financial (Group) report. The annual financial statements of Merck KGaA, Darmstadt, Germany, the consolidated financial statements of the Group, the combined management report for Merck KGaA, Darmstadt, Germany, and the Group, the proposal of the Executive Board for the appropriation of net retained profit, and the separate combined non-financial (Group) report were submitted to the Supervisory Board together with the auditor's report.

In accordance with article 14 (2) of the Articles of Association, the Supervisory Board also examined the annual financial statements of Merck KGaA, Darmstadt, Germany, the proposal for the appropriation of net retained profit, and the auditor's report presented in accordance with article 27 (2) of the Articles of Association.

It also examined the consolidated financial statements of the Group as well as the combined management report for Merck KGaA, Darmstadt, Germany, and the Group, and took note of the auditor's report of KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin. It focused particularly on the aforementioned key audit matters of particular importance in the audit opinion, on the resulting risks for the financial statements, the approach adopted during the audit as described, and the conclusions drawn by the auditor. Furthermore, the Supervisory Board also examined the separate combined non-financial (Group) report and the memorandum on a limited assurance engagement prepared by the auditor on behalf of the Supervisory Board. The discussion of the relevant agenda item at the Supervisory Board's meeting on February 28, 2020, and at the meeting on May 13, 2020, to approve the financial statements was also attended by the auditors who sign the audit opinion on the annual financial statements of Merck KGaA, Darmstadt, Germany, and the consolidated financial statements of the Group as well as the separate combined non-financial (Group) report. Furthermore, at this meeting, the auditors reported on their audit. The Supervisory Board took note of and approved the results of the audit. On completion of its examination, the Supervisory Board raised no objections and thus approved the annual financial statements for Merck KGaA, Darmstadt, Germany, the consolidated financial statements of the Group, the combined management report of Merck KGaA, Darmstadt, Germany, and the Group prepared by the Executive Board, the report presented by the auditor in accordance with article 27 (2) of the Articles of Association, and the separate non-financial (Group) report. The Supervisory Board gave its consent to the proposal of the Executive Board for the appropriation of net retained profit after conducting its own review.

CORPORATE GOVERNANCE AND DECLARATION OF CONFORMITY

Corporate governance is a topic of high priority for the Supervisory Board. In its own estimation, the Supervisory Board has an adequate number of independent members. There were no conflicts of interest, as defined by the German Corporate Governance Code, involving Supervisory Board members during the year under review. In fiscal 2019, the Chairman of the Supervisory Board was prepared to hold talks with investors on topics pertaining to the Supervisory Board as appropriate, and remains willing to do so. The Supervisory Board will carry out its next self-assessment in fiscal 2020 on account of this year's election and resulting new composition of the Supervisory Board.

After discussing corporate governance issues in detail, the Executive Board and the Supervisory Board on February 3, 2020 adopted the updated Declaration of Conformity and issued it jointly on February 3, 2020, in accordance with section 161 AktG. The statement is permanently available on the website of Merck KGaA, Darmstadt, Germany (www.emdgroup.com/en/investors/corporate-governance/reports.html). More information about corporate governance at Merck KGaA, Darmstadt, Germany, including the compensation of the Executive Board and Supervisory Board, is given in the Statement on Corporate Governance of the Annual Report.

COMMITTEES

Apart from the Nomination Committee, the Supervisory Board of Merck KGaA, Darmstadt, Germany, currently has no further committees on account of the special features that apply to the Supervisory Board of a corporation with general partners (KGaA) under German company law, and because a corresponding need for this has not emerged to date. The members of the Nomination Committee, which existed until April 26, 2019, did not convene in fiscal 2019. No report is required on the work of other committees.

PERSONNEL MATTERS

With the exception of Helga Rübsamen-Schaeff, who was excused and absent from the meeting on May 9, 2019; Michael Kleinemeier, who was excused and absent from the meeting on May 9, 2019; and Anne Lange, who was excused and absent from the meeting on July 31, 2019, all Supervisory Board members attended all meetings of the Supervisory Board. The composition of the Supervisory Board changed as follows in 2019: Wolfgang Büchele, Michael Kleinemeier, Renate Koehler, Helene von Roeder, Helga Rübsamen-Schaeff, and Daniel Thelen were elected to the Supervisory Board as representatives of the limited liability shareholders by the Annual General Meeting on April 26, 2019. Peter Emanuel Merck and Simon Thelen were appointed to the Supervisory Board. Furthermore, Gabriele Eismann, Michael Fletterich, Edeltraud Glänzer, Jürgen Glaser, Sascha Held, Anne Lange, Dietmar Oeter, and Christian Raabe were elected to the Supervisory Board as employee representatives at the Delegates' Meeting on April 11, 2019, for a term starting at the end of the Annual General Meeting on April 26, 2019. The members of the Supervisory Board were inducted by Merck KGaA, Darmstadt, Germany, with onboarding activities and continuing education on topics such as corporate governance, the internal organization, and applicable regulations and legal requirements.

Darmstadt, February 28, 2020 / May 13, 2020

The Supervisory Board of Merck KGaA, Darmstadt, Germany,

Wolfgang Büchele
Chairman

FINANCIAL CALENDAR
for 2020

March
3/5/2020
Annual Press Conference

August
8/6/2020
Half-yearly Financial Report

May
5/14/2020
Quarterly Statement Q1

November
11/12/2020
Quarterly Statement Q3

May
5/28/2020
Annual General Meeting

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