MERCK KGAA, DARMSTADT, GERMANY

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Agenda

01 STRATEGIC ROADMAP

Group

Three high-tech businesses competing in attractive markets

Healthcare

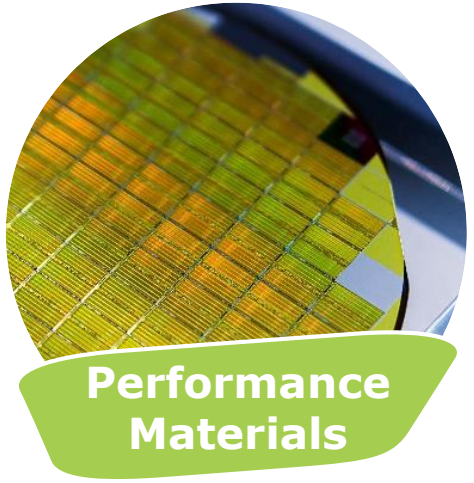
Leading in specialty pharma markets

- Biologics and small-molecule **prescription medicines** against cancer, multiple sclerosis, infertility
- **Research** focus: Oncology, Immunology & Immuno-Oncology
- **Successful portfolio management:** e.g. divestment of Consumer Health and Allergopharma

Life Science

Leading life science company

- Tools and services for **biotech research & production**
- **Tools and laboratory supply** for academic research and industrial testing



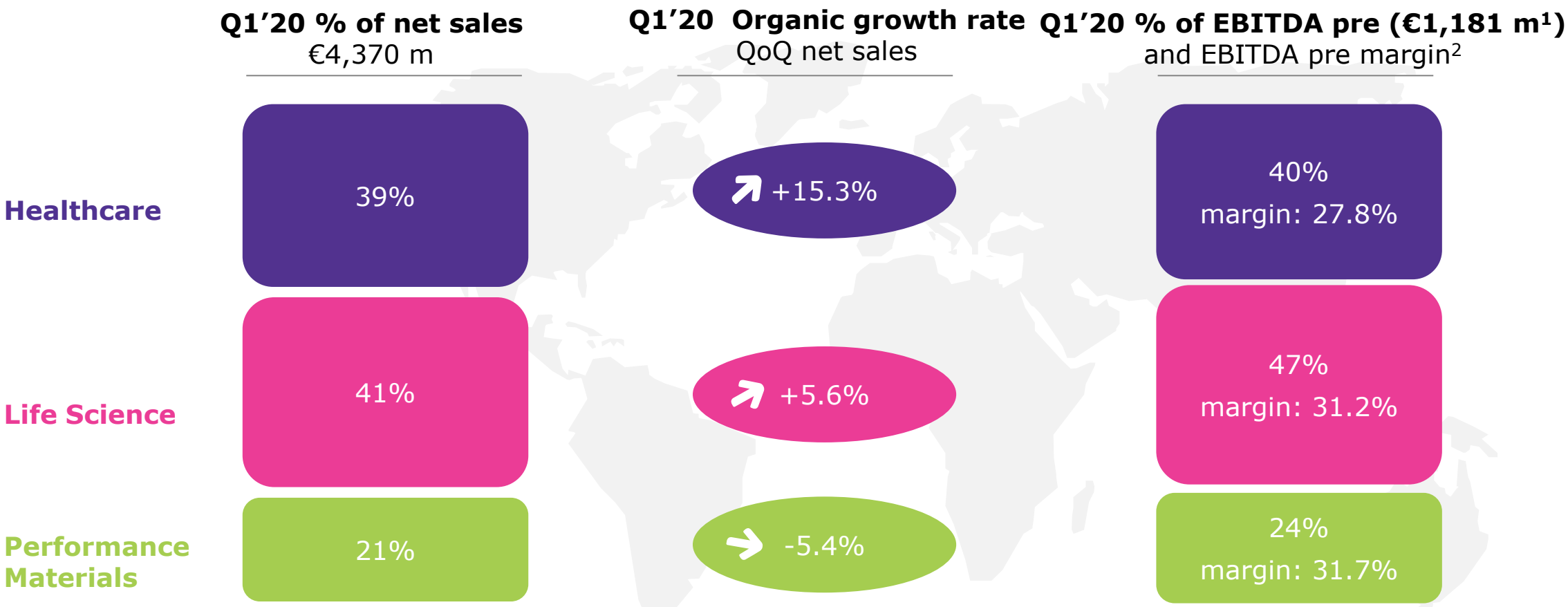
Performance Materials

Leading company in high-tech solutions

- High-tech solutions and materials for **electronics**
- Broad portfolio of **decorative and functional solutions**

Group

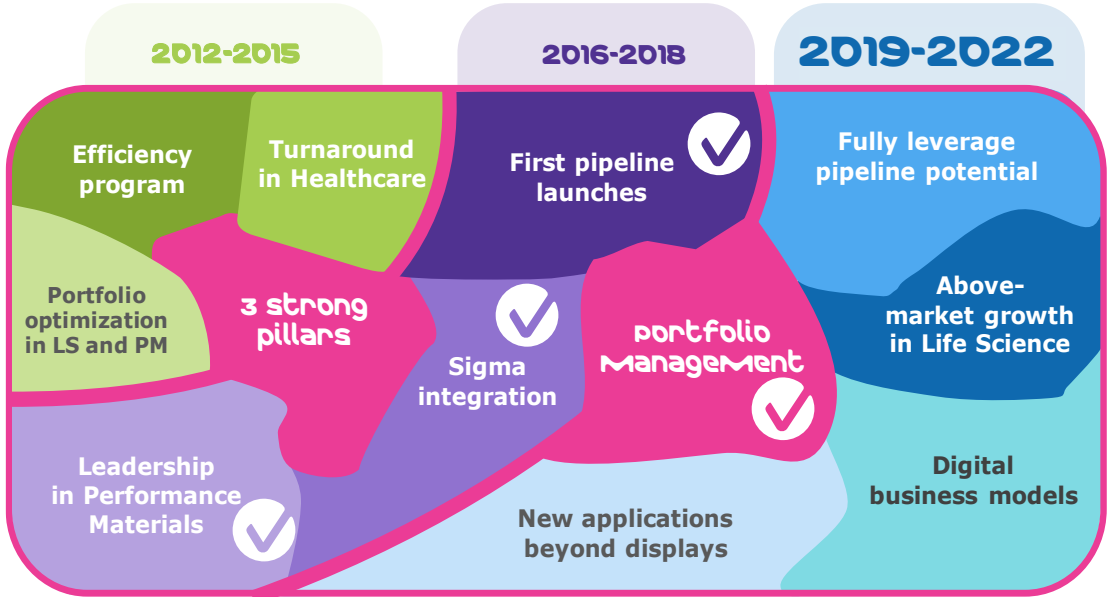
Diverse businesses posting attractive margins and strong growth



[1]includes Corporate/Others of -€129 m; [2]EBITDA pre margin in % of net sales; Totals may not add up due to rounding

Group

2019 – 2022: Entering the Growth & Expansion Phase



Group:
Sustainable profitable growth and regular portfolio evaluation

Healthcare:
Fully leveraging pipeline potential

Life Science:
Sustaining above-market growth

Performance Materials:
On track towards a Bright Future

On track to deliver on the growth phase of the 2016-2022 strategic agenda

Group

2020 and beyond: Growth amid a challenging environment

Group-wide:
Profitable Growth & Cost Discipline

Healthcare

- Sustain profitable growth driven by launches
- Execute on stringent cost discipline

Life Science

- Continue outperformance of market
- Leverage P&L with 20 – 30 bps margin expansion

Performance Materials

- Return to growth at 2-3% CAGR, ~30% margin
- Complete integration of Versum & synergy realization

Group
Executive Summary

Group:
Driving the **profitable growth and expansion phase** of our 2016 – 2022 strategic agenda

Healthcare:
Reaping the **fruit of the investment phase**, while keeping the base business at least stable, driving growth and managing costs

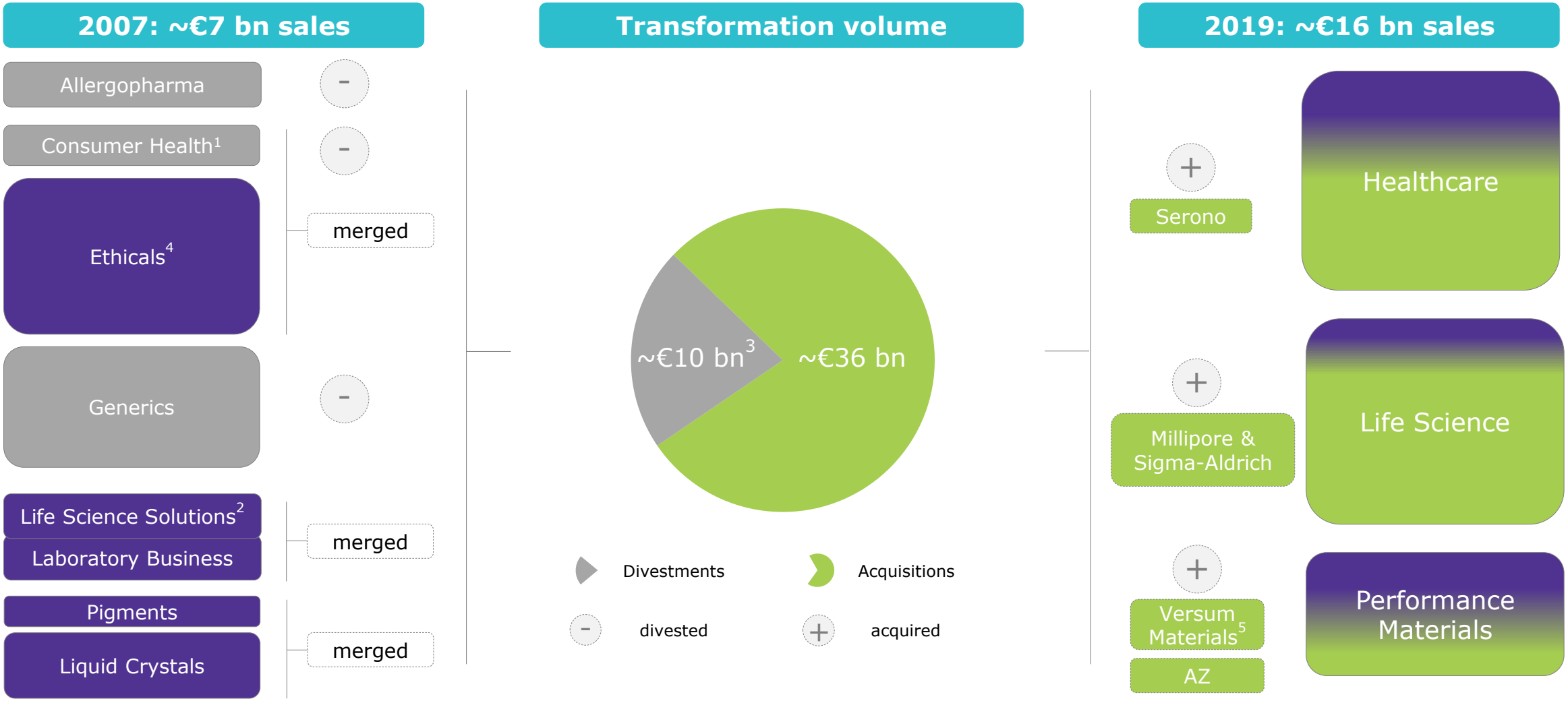
Life Science:
Sustaining **profitable above-market growth** strategy through portfolio focus, customer-centric services and innovation

Performance Materials:
Transitioning from trough-year to **mid-term growth trajectory** supported by roll-out of Bright Future program

Merck KGaA, Darmstadt, Germany – steady earnings growth at high margins and a low risk profile

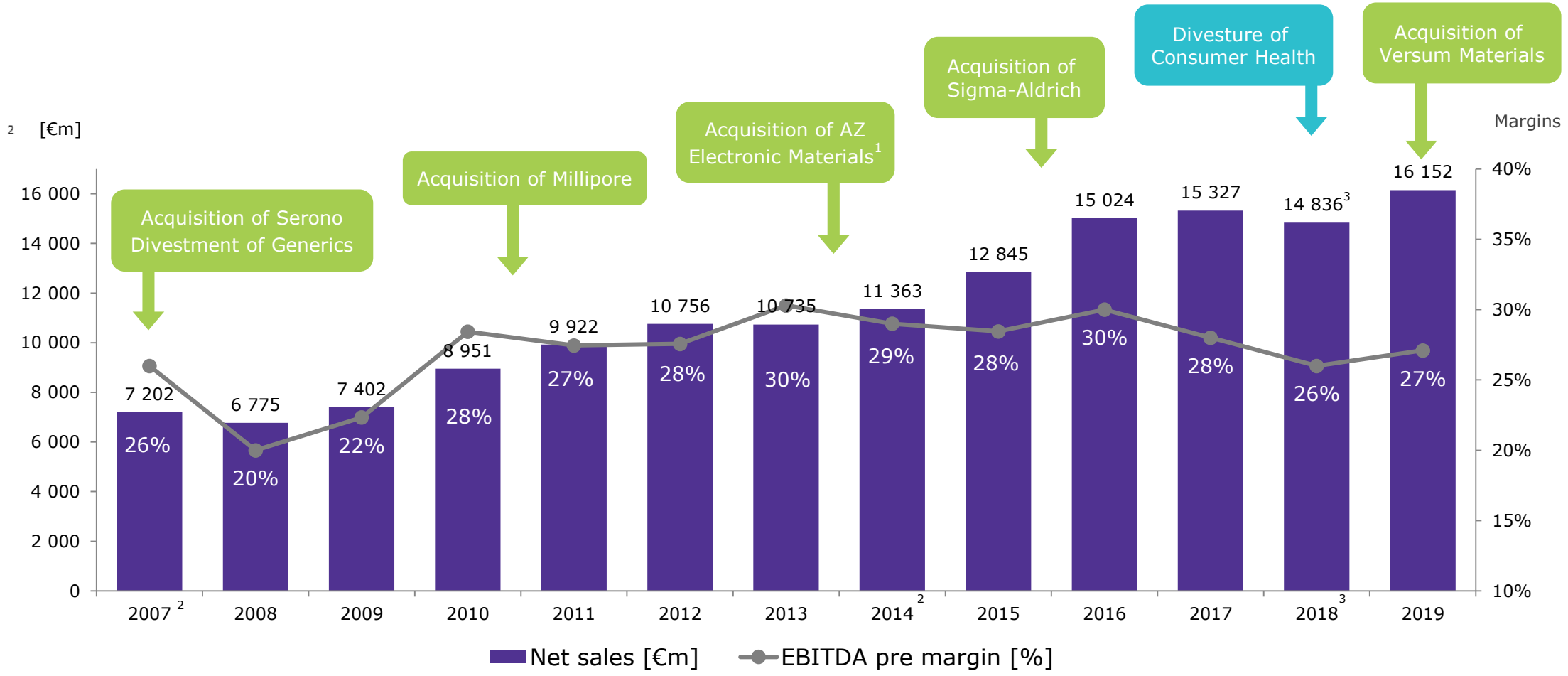
02 TRANSFORMING THE COMPANY

Group
We have added scale and strengthened the attractiveness of our portfolio



[1]Closing of sale of Consumer Health at a cash purchase price of €3.4 bn completed as of December 1, 2018; [2]Excluding "Crop Bioscience", which was divested; [3]Profroma divestment volume includes cash proceeds for Consumer Health; [4]Excluding "Theramex", which was divested; [5]Closing of acquisition of Versum Materials at a purchase price of €5.8 bn completed as of October 7, 2019

Group
Continue to transform to a science and technology focused company

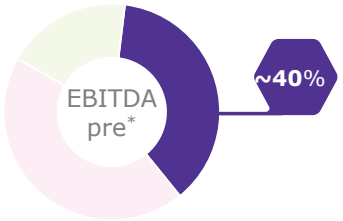


[1]Included since 2 May 2014; [2]2007 and 2014 EBITDA pre margin adjusted for comparability; [3]2018 net sales reflect Consumer Health divesture (reduction of ~€1 bn net sales p.a.)

Group

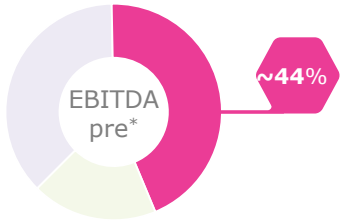
Clear set of priority goals

Healthcare



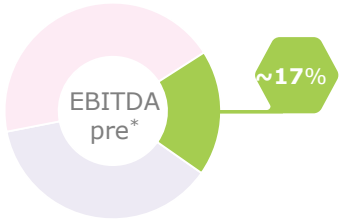
- **Deliver on ambition to keep core business at least stable until 2022**
- **Transition from investment to earnings phase by 2019**
- **Foster successful Bavencio® and Mavenclad® ramp up**
- **Stringent pipeline execution**

Life science



- **Strengthen position as differentiated player in a highly attractive market**
- **Maintain consistent above-market growth trajectory and superior profitability**

Performance Materials



- **Deliver ambition of 2-3% CAGR***
- **Implement 5-year transformation program and focus on seamless integration of Versum and Intermolecular; to deliver financial ambition of 30% margin**
- **Maintain strong cash generation and cash conversion**

*pre Versum

Group

Strategic capital allocation until 2022 newly defined

portfolio guardrails

- Three balanced pillars with no business marginalized
- Leading market positions in attractive markets
- Clear portfolio roles assigned

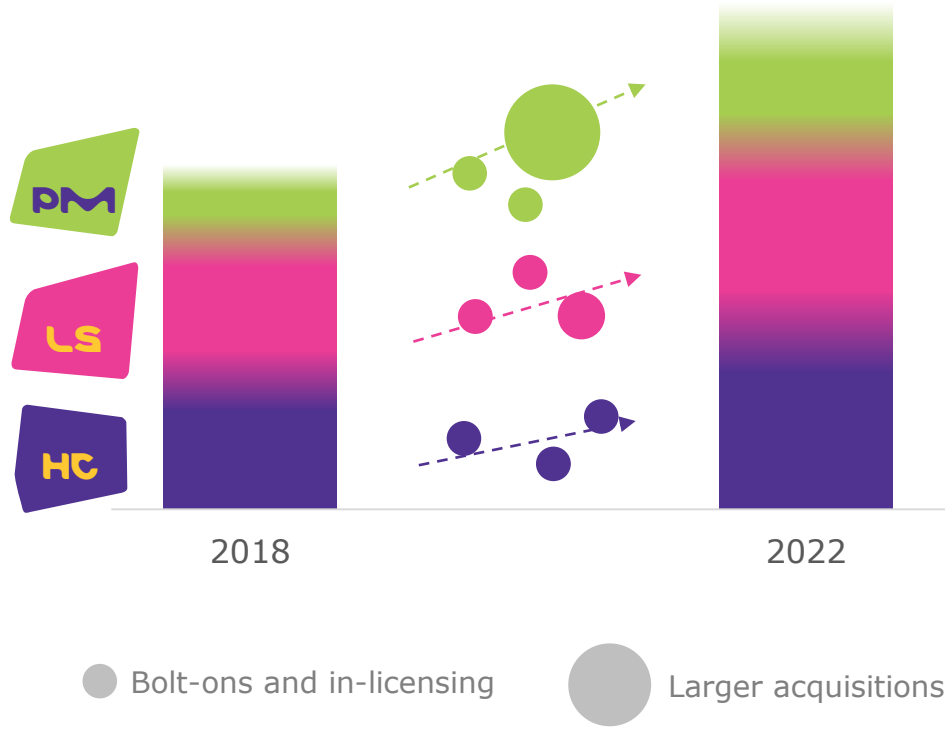
defining portfolio criteria

- Market attractiveness & capabilities
- Best strategic owner
- Risk profile

clear financial M&A criteria

- IRR > WACC
- EPS pre accretive
- Maintain investment-grade credit rating

Illustration Group's sales and earnings drivers



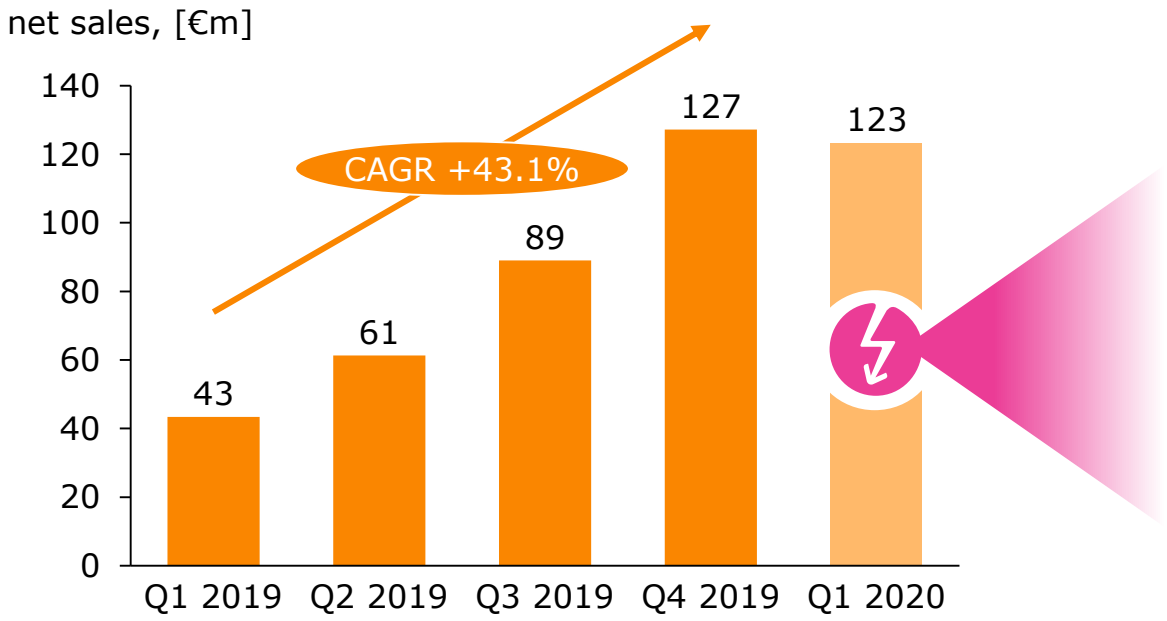
Regular portfolio review and disciplined capital allocation will continue to ensure sufficiently diversified and value-creating structure of three strong pillars

03 HEALTHCARE

Fully leveraging pipeline potential

Mavenclad® - Global launch continues to make progress, with Q1 showing initial impact of COVID; regaining of momentum expected in H2 2020

Global: First signs of COVID-19 related slow-down visible as of March, impacting Q1 2020



- Approved in **78 countries**
- **Launches progressing well, with momentum into early Q1 across the U.S. and EU4**
- **Number of prescribers increasing** +70% in the US, with **average depth increasing** +50%[1]
- COVID-19 has **restricted HCP access** and forced **pivot to digital engagement only**
- Significant decline of patient consults with neurologists, leading to **fewer treatment initiations and fewer treatment switches**

1: MSLL SRF data; Internal data on file/March 2020; Acronyms: HCP = Healthcare Professional; EU4 = Germany, UK, Spain, Italy

Bavencio® - Enhancing its foundation in GU cancers with transformative OS data from JAVELIN Bladder 100 trial featured at ASCO 2020 plenary session

sBLA under review

Urothelial Cancer 1L (UC)

(~90% of bladder cancers, 10th most prevalent cancer globally)

- **First immunotherapy to significantly prolong OS vs standard of care** in 1L locally advanced or metastatic urothelial carcinoma, and first to demonstrate OS benefit **regardless of PD-L1 status**
- **Breakthrough Therapy Designation**, **completion of sBLA submission, and review under the FDA's Real-Time Oncology Review (RTOR) program** announced on April 9, 2020
- New treatment paradigm offered by the **unique JAVELIN Bladder 100 Regimen, potential to be practice changing**, offering benefit beyond chemotherapy, the standard of care for the last 20+ years
- Launch to **leverage existing RCC resources and experiences**

Launch mode

Renal Cell Carcinoma 1L (RCC)

- Approved by **U.S. FDA** in May 2019, by the **European Commission** in October 2019, and by the **Japanese PMDA** in December 2019
- Participating in the **establishment of IO–TKI as the leading class** in 1L mRCC
- Expected to **benefit from strong 1L UC data**:
  - Enhanced overall brand value (first demonstrated OS benefit for Bavencio®)
  - Greater efficiency (75-80% overlap with UC and RCC prescribers in key markets)

In development

NSCLC 1L

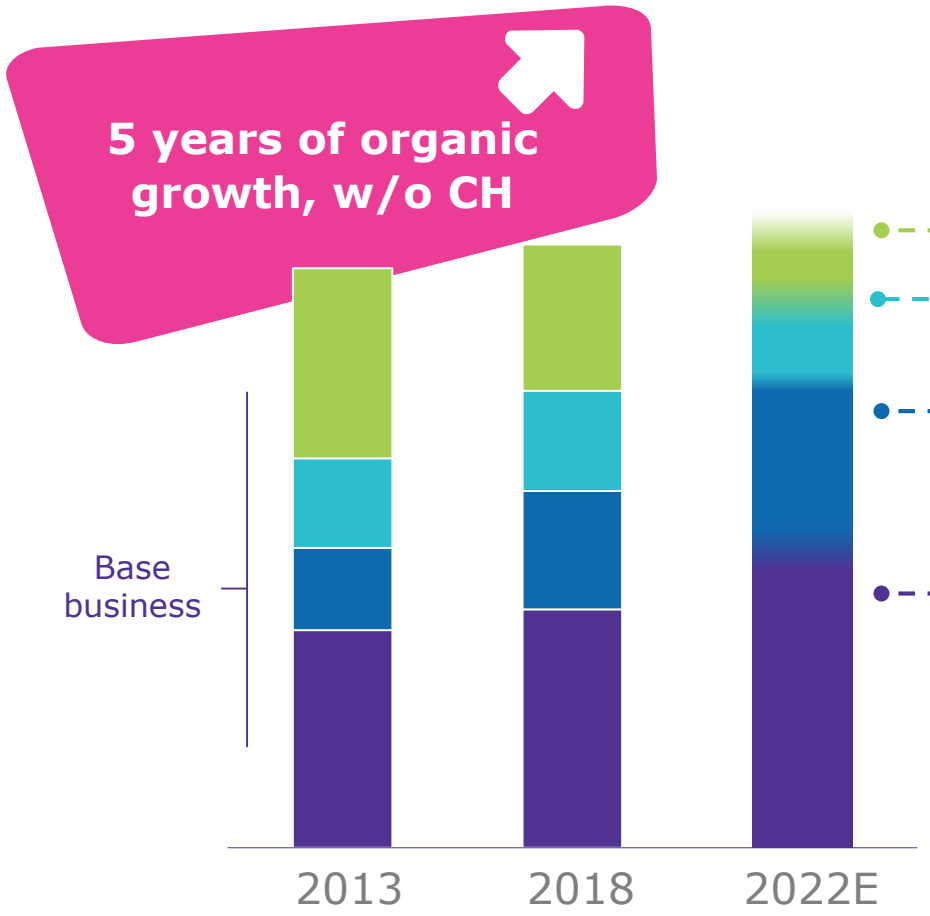
- Ph III data **read-out expected in 2021**
- Core tumor for IO, **1L NSCLC remains a large indication**
- Highly competitive landscape – Complex study design (e.g. multiple arms) **might provide differentiated data in patient subgroups**

Acronyms: EMA = European Medicines Agency, FDA = Food and Drug Administration, GU = genitourinary, IO = Immuno-Oncology, mRCC = Metastatic Renal Cell Carcinoma, OS = Overall Survival, PMDA = Pharmaceuticals and Medical Devices Agency, sBLA = supplemental Biologics License Application, TKI = Tyrosine Kinase Inhibitor

Healthcare

Ambition to keep core business sales organically stable until 2022

Healthcare core business net sales until 2022



Rebif®
Decline in line with interferon market

- Maintaining solid track record of patient retention
- Integration into joint franchise strategy with Mavenclad®

Erbitux®
Stable to slightly growing

- Driving emerging markets growth
- Inclusion in China's NRDL
- Mitigate price and competitive pressure in EU by clear Erbitux® franchise positioning

Fertility
Mid single-digit growth

- Drug demand driven by emerging markets growth and demographics
- Differentiation due to coverage of the entire ART portfolio[1]
- Sustainable growth through innovation (e.g. Pergoveris® pen)

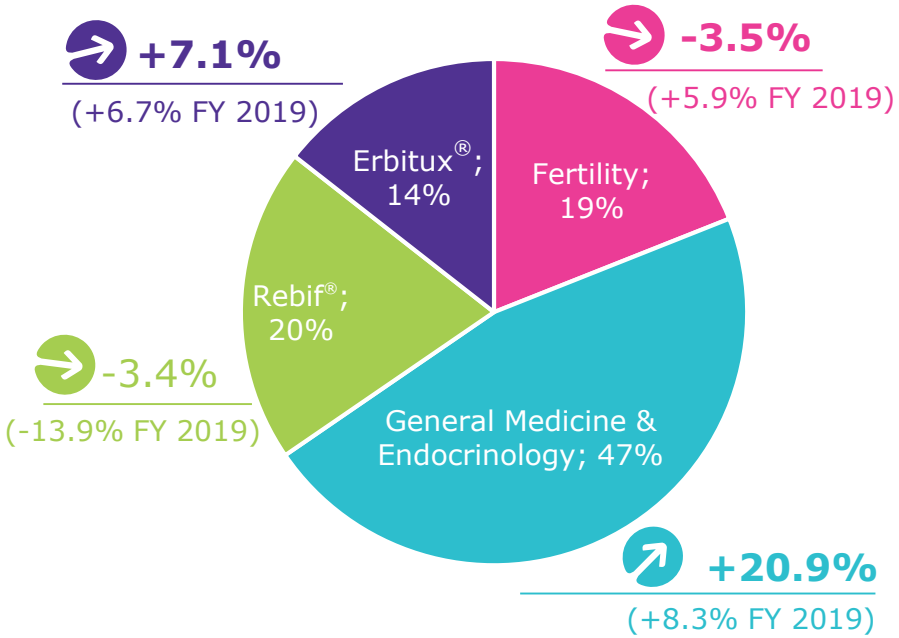
General Medicine[2]
Mid to high single-digit growth

- Increasing prevalence of diabetes and cardiovascular diseases
- Emerging markets growth
- Effective lifecycle management

[1]ART: Assisted Reproductive Technology; [2]includes General Medicine, CardioMetabolic Care (CMC), Endocrinology & Allergopharma

Core business - Q1 growth rates reflect initial effects of COVID-19 and indicate future developments

Q1 2020 net sales contribution[1] & org. growth (%) in Q1 2020 (FY 2019)



Expected Impact of COVID-19

General Medicine & Endocrinology

- Q1 supported by COVID-19 related moderate stocking effects across the globe, suggesting **phasing impact in upcoming quarters**
- **Rx duration for Glucophage® and Concor® extended** in most Chinese provinces to reduce frequency of hospital visits
- **Chinese VBP roll out expected to continue** despite COVID-19

Fertility

- Medical societies issued **guidance for suspension of new, non-urgent treatments**[2] in late Q1, leading to **temporary closure of clinics** globally
- Situation now improving, >90% of Chinese centers reopened at reduced capacity, several APAC and EMEA clinics reopening in line with newly published guidance on recommencing of ART[3]
- **Catch-up effects expected** post-recovery

Rebif®

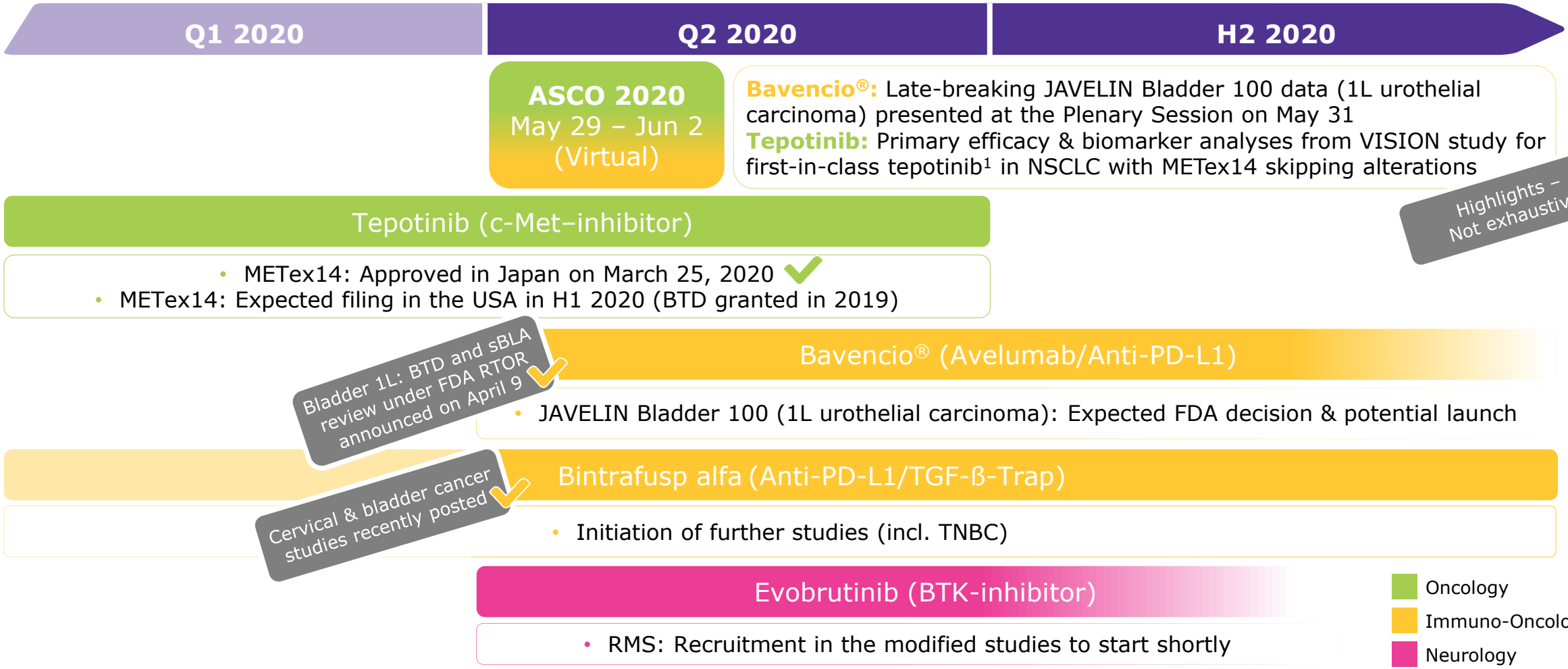
- **Potential benefit** from changed treatment patterns:
  - **Decreased switches** from Rebif® to High-Efficacy drugs due to guidelines and less frequent patient visits
  - **Increased new patient numbers** due to greater preference for platform therapies

Erbitux®

- **Decreased diagnosis rates** due to lower physician/hospital access given prioritization of COVID-19 treatment

1: Net sales contribution reflected in pie chart; 2: https://www.asrm.org/news-and-publications/news-and-research/press-releases-and-bulletins/asrm-issues-new-guidance-on-fertility-care-during-covid-19-pandemiccalls-for-suspension-of-most-treatments/, 3: published by ESHRE and ASRM on April 23 2020, https://www.eshre.eu/Press-Room/ESHRE-News; Acronyms: ART = Assisted Reproductive Technology, ASRM = American Society for Reproductive Medicine, ESHRE = European Society of Human Reproduction and Embryology, VBP = Volume Based Procurement

Pipeline - 2020 characterized by developmental progress of innovative Oncology, Immuno-Oncology and Neurology assets



1: not yet approved in any markets outside of Japan; Acronyms: BTD = Breakthrough Therapy Designation, EMA = European Medicines Agency, FDA = U.S. Food and Drug Administration, NSCLC = Non-Small-Cell Lung Carcinoma, RMS = Relapsing Multiple Sclerosis, RTOR = Real-Time Oncology Review, sBLA = Supplemental Biologics License Application, TNBC = Triple-Negative Breast Cancer, UC = Urothelial Cancer

04 LIFE SCIENCE

Focus on profitable growth

The Life Science tools market is attractive and dynamic

Attractive market…

€170 Bn

4-6%[10]
CAGR

23-25%
average margin

…with robust trends

Research

~€45-50 bn
~2-3% CAGR[9]

- Increase in **NIH Funding and Pharma R&D**[1,2]
- Increase in **novel technologies**[3]
- Increase in **research outsourcing**[4]

Process

~€55-60 bn
~8% CAGR[9]

- Increase in **biologics pipeline**[5]
- More **novel modalities** (>30% CAGR)
- Greater **production outsourcing**[6]

Applied

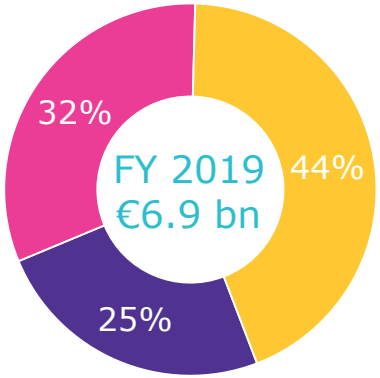
~€60-65 bn
~4-5% CAGR[9]

- Higher **Drug standards** (e.g. in China)[7]
- Tighter **F&B regulations** (e.g. U.S. FSMA[8])
- More **novel assays/diagnostics**

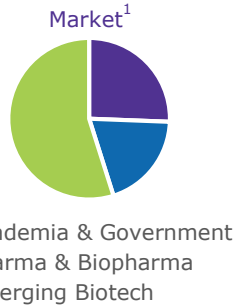
[1]CAGR 2015-2019; [2]PhRMA members, CAGR 2013-2017; [3]CAGR 2014-2018 VC investment into platform technologies; [4]CAGR 2015-2022. Discovery outsourcing market; [5]CAGR through 2020; [6]CAGR 2016-2020; [7]International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use; [8]Food Safety Modernization Act implementation through 2024; [9]Total market CAGR; [10]Company estimate based on industry forecast over 5 year horizon;
Acronyms: NIH = National Institutes of Health, U.S. FSMA = FDA Food Safety Modernization Act

Life Science
Business is on track to deliver above-market organic growth

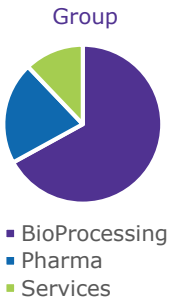
Life Science



Research Solutions
Low single digit growth



Process Solutions
High single digit growth



Applied Solutions
Mid single digit growth

Long-term growth drivers

- **Research activity**: >3,000 projects in research pipelines[2], rising number of experiments and newly emerging therapies/technologies backs healthy growth in biotech and CROs[3]
- **Public and private funding**: availability, access and predictability drive demand from academia and emerging biotech customers
- **Regulation**: rising requirements foster long-term customer partnerships

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- **Biologics**: mAbs production[5] growing by ~11-15% p.a. for 2018-2024 driven by new molecules and biosimilars
- **Diversification**: contribution by top 10 molecules will decline to ~20% until 2024 from 60% today[6]
- **Noval modalities**: innovation in complex-to-deliver therapies, e.g. gene and cell therapy, will drive demand for single-use, end-to-end and new technology solutions

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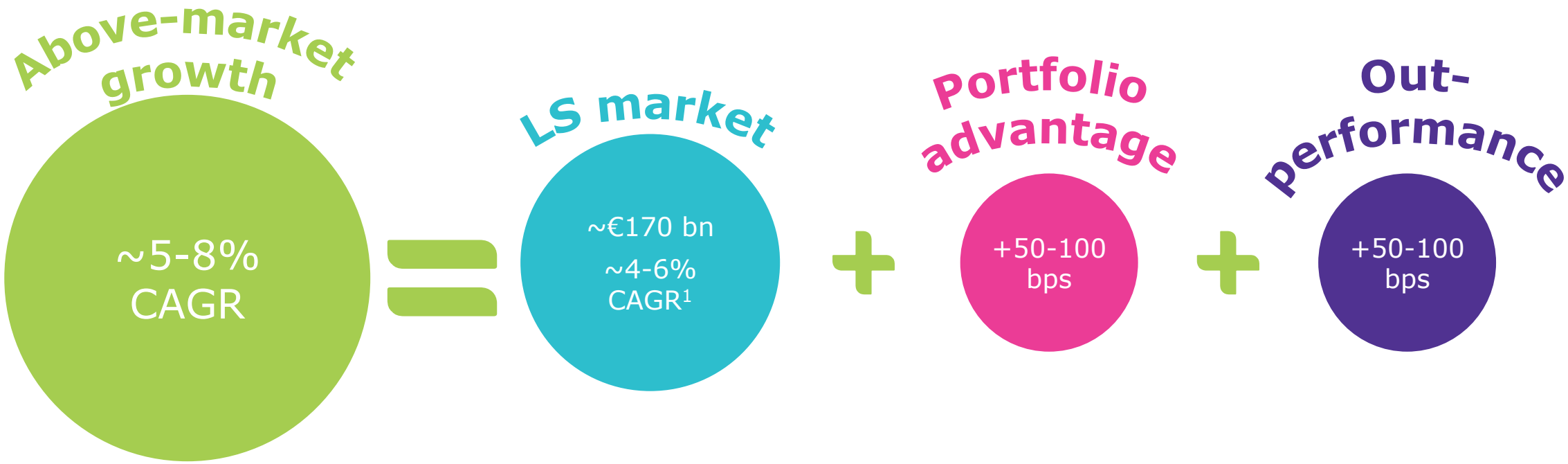
- **Regulation**: testing volumes overall are rising globally rise in quality standards and increased demand for testing across customer segments
- **Population and economic growth**: demand for access to more sophisticated products and services rises, e.g. in emerging markets
- **Speed**: need for fast testing results raises requirements for Applied customers, esp. in clinical testing and food & beverage testing

[1]Source: Merck KGaA, Darmstadt, Germany Factbook; [2]Source: PhRMA; [3]CRO = Contract Research Organization; [4]Indicative only; [5]mAbs = monoclonal antibodies; [6]Source: EvaluatePharma September 2018

Life Science

Above-market growth continues to be driven by portfolio focus



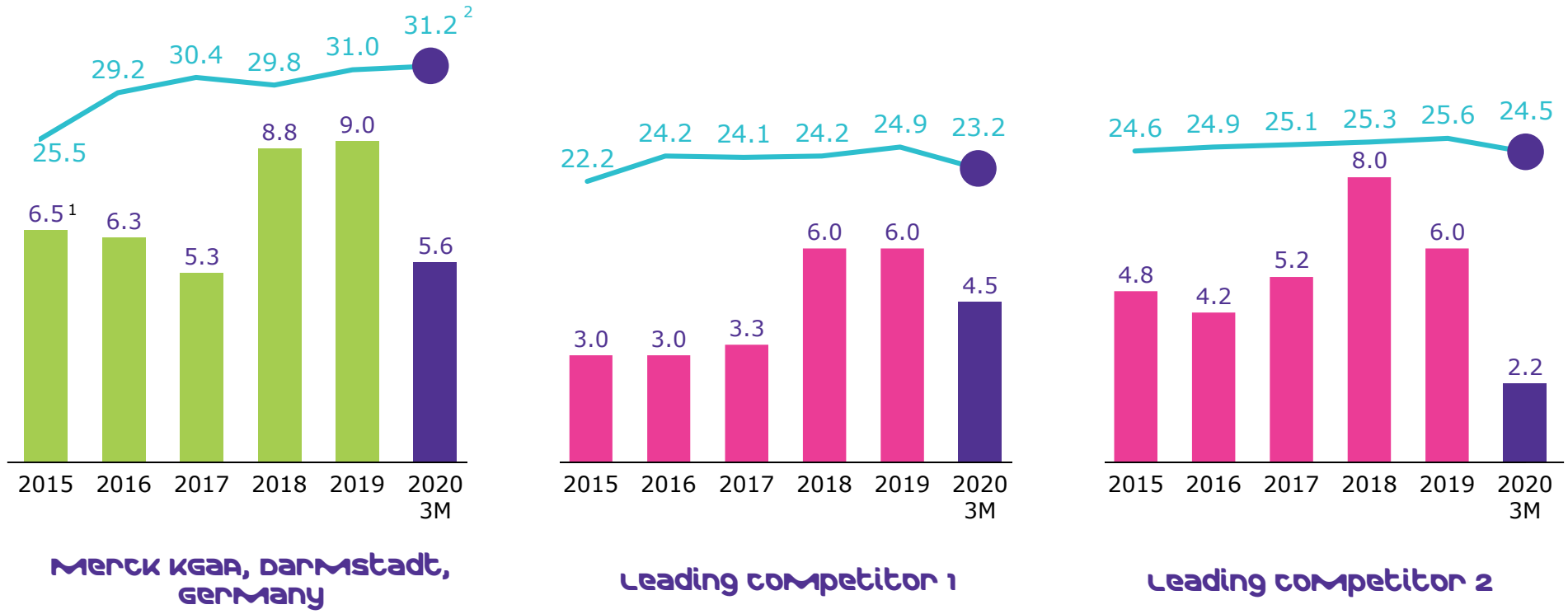
[1]Company estimate based on industry forecast over 5 year horizon

Life Science

Continuing to set the benchmark for industry performance

EBITDA pre margin, % of sales (actual)

Organic sales growth, YoY %



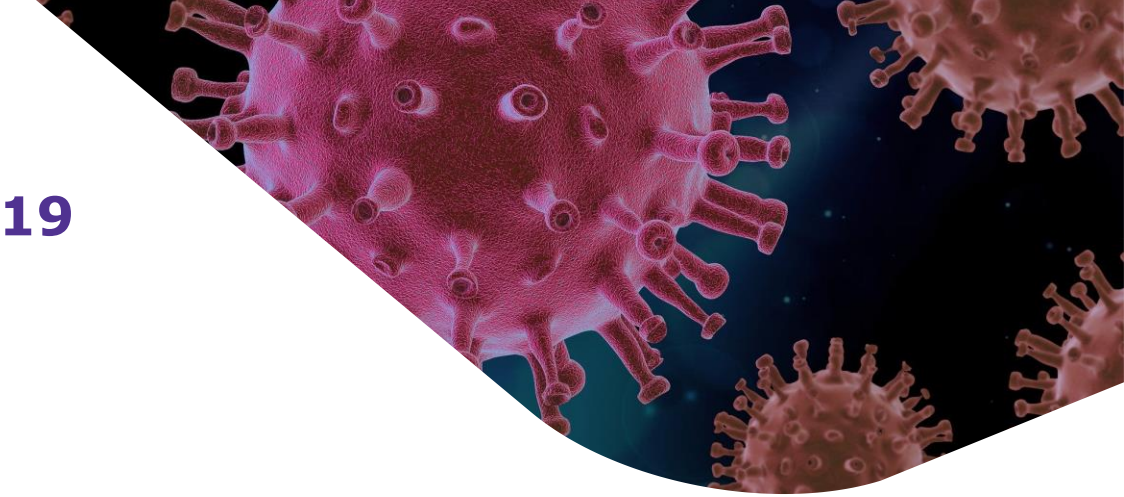
Objective

- Grow **above market**
- Maintain **industry-leading profitability with 20-30 bps underlying margin progression**
- Sustain **leading market position**

[1]6.5% for EMD Millipore; 6.0% for SIAL calculated from first 9 months of 2015; [2]excl. CO

Life Science

Critical offering in the fight against COVID-19



PRODUCTS feed into...

www.sigmaaldrich.com/covid-19

VIRUS DETECTION

- **Leading critical component provider for Molecular and Serological diagnostic kits**
- **PCR reagents, kits and tools for all stages of assay development**

VIRUS CHARACTERIZATION

- **Offering is among largest biologic reagents and hardware portfolios**
- **Effective vaccines and therapies start with reliable virus characterization**
- **Highest quality reagents needed for understanding of viral attachment, genomics, or proteomics**

VACCINE & THERAPY PRODUCTION

- **Supporting global COVID-19 vaccine and therapy response effort:**
  - **Upstream and downstream research and scaling**
  - **End-to-End solutions**
  - **Biosafety Testing Services**

05 PERFORMANCE MATERIALS

Maintaining leadership and innovation

Performance Materials
Strong setting to capture attractive value in the electronics market

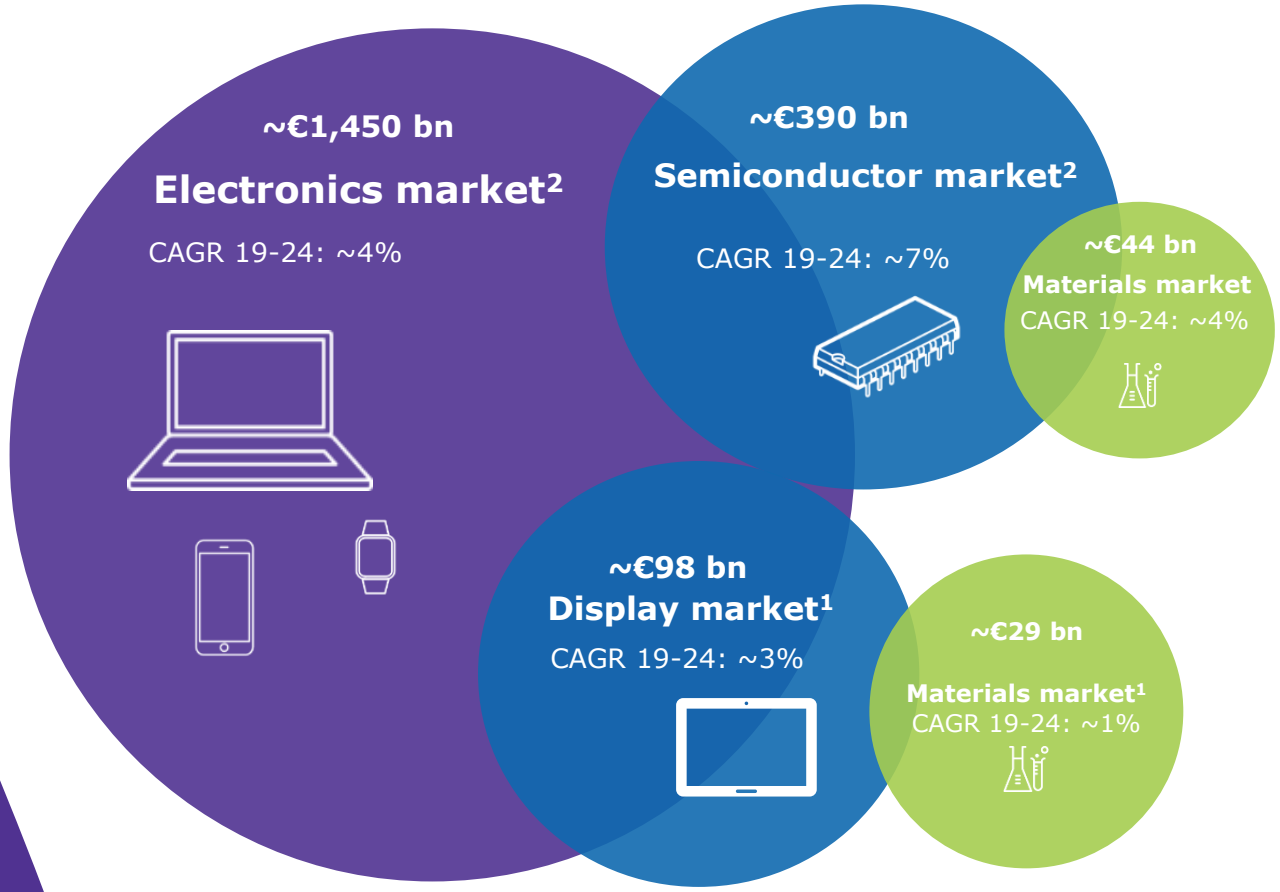
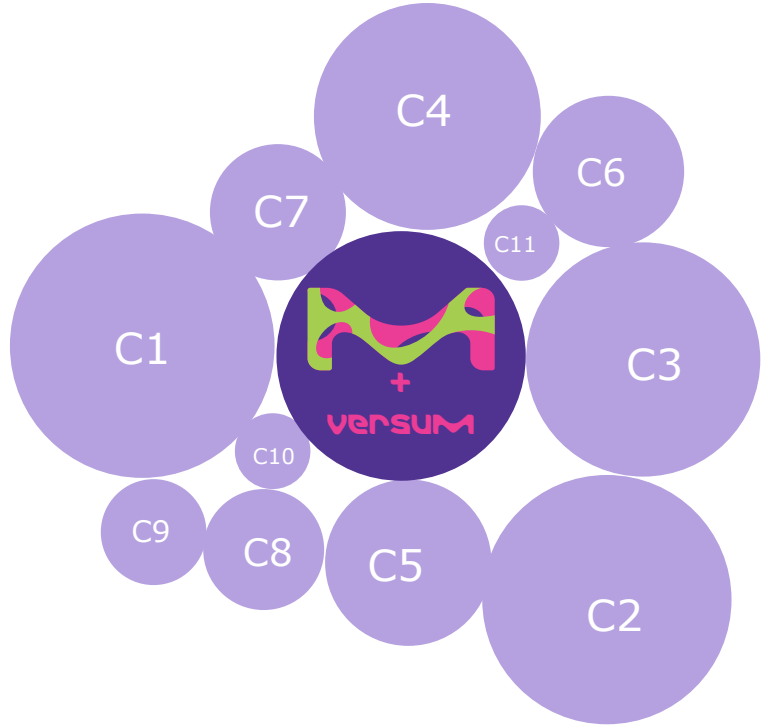


Illustration of the electronics market and thereof its selected sub markets

Source: [1]Prismark 2019; [2]McClean/IC Insights 2020

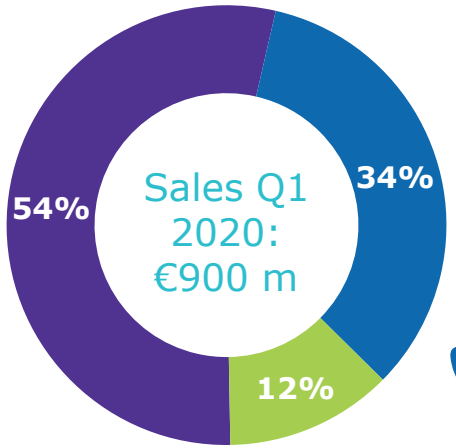
Electronic materials competitor landscape[1]



[2]Bubble size in competitive landscape illustrates share of electronics material sales of indicated competitors (C1 – C11)

Merck KGaA
Darmstadt, Germany

Performance Materials: Attractive underlying market trends and business conditions to deliver the turnaround in 2020



Mid term outlook

semiconductor solutions

Mid- to high single-digit growth

- Continued market growth due to technological advances (Artificial intelligence, 5G, Big Data and cloud, Internet of Things) serving customers in **Logic, Memory, Packaging and others**
- Delivery Systems and Services representing ~15% of Semiconductor Solutions net sales is driven by investments in new semiconductor fabs as well as a safe and reliable supply of high-purity materials
- Semiconductor market expected to **grow ~7% CAGR**[1]

display solutions

Low single-digit decline

- Driven by trend to bigger TV size, higher resolutions, more mobile devices
- Maturing **LC** market expected to decline in **mid to high single-digit**, driven by ~3% CAGR[2] (2018-2023) of LCD area shipment more than offset by ongoing price pressure
- **OLED** display shipment area[3] [km²] to grow **~28% CAGR** (2018-2023) with OLED material market[4] to exceed LC material market by 2022

surface solutions

Low single-digit growth

- Surface Solutions well balanced exposure to **automotive** and **cosmetics** market
- Drivers are raising living standards, higher disposable income in growing markets and increasing demand for high value products at reasonable prices
- **CAGR ~3%** volume growth[5] for pearlescent pigments

Source: [1]McClean 2020; [2 & 3] IHS display long term demand forecast Q3 2019; [4]Internal Business Intelligence; [5]Smithers Rapra, Merck KGaA, Darmstadt, Germany-internal analysis, McKinsey

Performance Materials

5-year transformation program Bright Future is well on track

- Site closures in Atsugi, Japan (2021) and Chilworth, UK (2019) announced
- Outsourcing progressing; reduction of LC production capacity in Darmstadt until 2022 announced
- Cost saving measures ahead of plan; target of approx. 500 FTE worldwide until 2022

Portfolio Management

- Acquisition of Versum Materials and Intermolecular successfully closed

Cultural change

- Significant changes in composition of leadership team
- Cultural change addressed in three dedicated initiatives focused on customer centricity, market-driven innovation and corporate culture

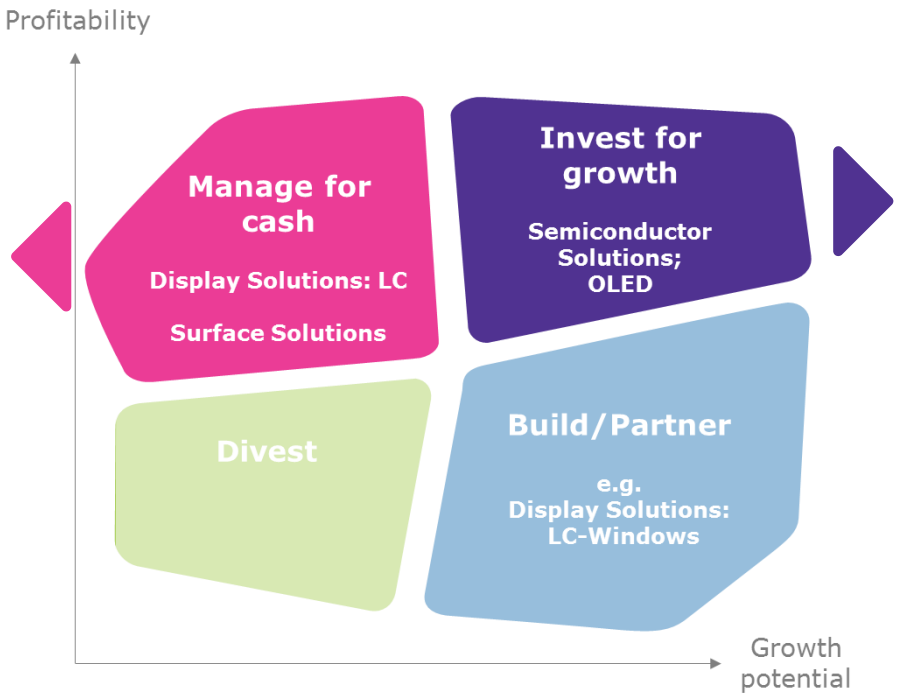
Performance Materials
Strategic roadmap starting to materialize…

Measures for a bright future

Darmstadt
- In Darmstadt focus on R&D and production
- Immediate bottom line contribution from 2019 onwards
- Reduce the number of FTEs by ~15% = ~400 FTEs

Chilworth
- Chilworth site during September 2019 successfully closed

Atsugi
- Shut down of Performance Materials activities at Atsugi site started (to be completed during 2021)
- R&D and production activities in Atsugi transferred and consolidated in other PM locations in Asia
- Consolidation of site structure in Japan



VERSUM MATERIALS
- Leading supplier of high-purity process chemicals, gases and equipment serving semiconductor manufacturers
- Track record of accelerated growth and industry leading profitability
- ➢ Creating a **leading electronic materials player** with **attractive long-term prospect**

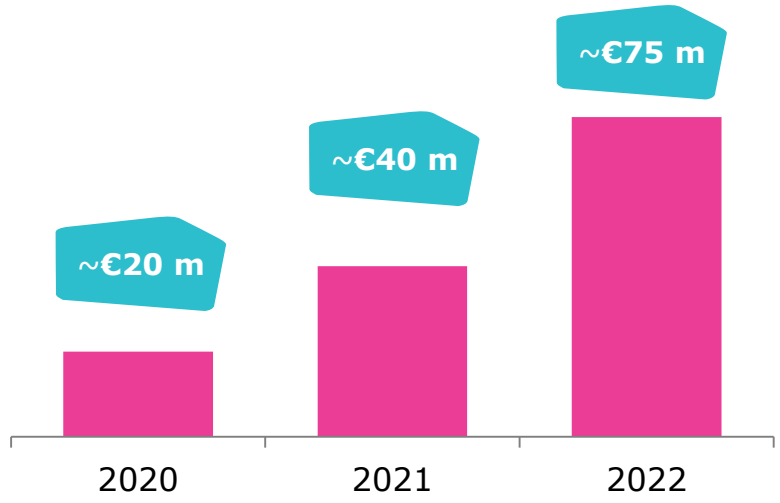
INTERMOLECULAR®
- Leading in advanced materials innovation
- Acquisition to strengthen semiconductor technology offering
- ➢ Application specific **materials expertise with** that **perfectly complement** Group's business and technology portfolio

Bottom-line management to support margin ambition of 30% in the long-term

Both transactions successfully closed

Performance Materials: Versum integration and synergy realization in focus

cost synergies on EBITDA pre



- **Cost synergy target of ~€75 m from 2022 onwards confirmed as P&L effective**
  - Integration measures on track
  - Integration costs of €125 m in line with previous expectations, mostly in 2020 and 2021
- **Cost synergies represent 6%[1] of acquired net sales**

source of synergies

business optimization

- Transform country setup
- Streamline duplicate structures

procurement and supply chain

- Optimize production and supply chain network
- Achieve savings through joint procurement

corporate and administrative functions

- Integrate corporate & administrative functions
- Cost savings due to U.S. company delistings

[1]Assumes LTM Dec-2018 Versum Materials Revenue of €1,233 m and 1.12 USD to EUR exchange rate.

06 EXECUTIVE SUMMARY AND GUIDANCE

Our assumptions regarding the development of COVID-19 have changed significantly post pandemic classification by WHO and subsequent events

Previous Assumptions (disclosed in March)

- Impact mainly in **China**
- Outbreak **peaks in Q1**
- Situation **eases in Q2**
- Situation **normal in H2**

Current assumptions (disclosed in May)

- Impact **across all regions**
- Cases expected to **peak in Q2**
- Situation **eases in H2**
- Pandemic crisis **lasts for FY**

+

- **Stressed** health systems
- Some countries have a **less effective** response than China
- However, **no major resurgences**

Group

COVID-19 Update: new assumptions on financial impact of COVID-19

Group

- **Mid single-digit percentage Sales impact**
  - Global impact across many businesses
  - Strong Q2 impact, also from Q1 pull-in
  - Lasting until at least Q3

Healthcare

- **Highest** anticipated impact in absolute terms
- Biggest impact anticipated in Fertility due to discretionary nature of treatment

Life Science

- **Lowest** anticipated impact in absolute terms
- Process Solutions largely unaffected, main impact in Applied and Research Solutions

Performance Materials

- Semiconductor expected to show strong growth despite COVID-19
- COVID-19 additionally weighs on Display decline
- High impact on Surface's end markets

We assume a top-line impact of around mid single digit and thereof 50% to 60% hitting EBITDA pre

Beyond focusing on the health & safety of our employees and on business continuity, we have contributed to help face global COVID-19 pandemic

Our Business:

- Supplying **critical** raw materials, components, and manufacturing products for vaccine production & diagnostics
- **Life Science** continues to **keep global supply chain operational** by implementing additional safety precautions to provide **indispensable** products and services to aid COVID-19 response

Collaborations:

- Part of pharma and Life Science **consortium together with the Bill & Melinda Gates Foundation**
- Life Science actively collaborating with leading institutions, to speed up development, production & delivery of **diagnostics, vaccines and treatment of COVID-19.**

Research Grants:

- **2019:** €1 m Future Insight Prize for outstanding **research in field of pandemic preparedness**
- **2020:** up to €500,000 p.a. for 3 years and extension option for **technological solutions for pandemic outbreak preparedness** and fighting viral infections

Donations:

- **290,000 units of interferon (Rebif®) to WHO** for global SOLIDARITY trial, investigating therapies for treating COVID-19
- **Liquid Handling Center of Life Science**, increasing capacity to produce and donate **250,000 liters of disinfectant**
- **Donated 2,000,000 FFP2-Masks** to local communities in U.S. and Europe

Key earnings drivers to remember for 2020

EBITDA[1]-supporting factors

- Increasing sales contribution from Mavenclad® and Bavencio®
- Stringent M&S and R&D cost management in HC (decrease YoY absolute and as % of sales)
- Ongoing strength in Life Science with above-market sales growth
- Recovery of Semiconductor Solutions and cost savings from Bright Future program related initiatives
- High level of cost consciousness and prioritization
- Four quarters of Versum

EBITDA[1]-reducing factors

- No more support from Pfizer deferred income (€191 m in 2019)
- Lower income from pipeline management
- Continued decline of Liquid Crystals and Rebif®
- COVID-19 related sales and earnings effect

[1]EBITDA pre

Group

Full-year 2020 guidance

Net sales:
Slight to moderate organic sales growth, Versum growth contribution in the mid-single digits %
FX between +1% to -2% YoY
~€16.8 – 17.8 bn

EBITDA pre:
Organically about stable, mid-single digit % growth from Versum
FX headwinds of 0% to -3% YoY
~€4,350 – 4,850 m[1]

EPS pre:
~€5.50 – 6.35

[1]CO guidance 2020: Slightly higher than last year

Group

2020 business sector guidance[1]

Healthcare

Net sales

- Organically about stable
- COVID-19 significantly impacting fertility performance
- Sustained performance of new products

EBITDA pre

- Slight organic decline due to COVID-19
- Slight to moderate adverse FX impact

Life Science

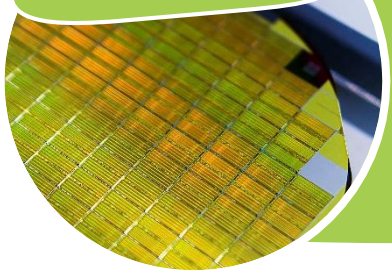
Net sales

- Strong organic growth
- Process Solutions strength offsets weakness in academic and applied end markets

EBITDA pre

- Strong organic growth
- Neutral to moderate adverse FX impact

Performance Materials



Net sales

- Moderate to strong organic decline
- COVID-19 weighing on Display and Surface, while Semiconductor Solutions growing strongly
- Display declining, driven by LC
- Low to mid-thirties % contribution from Versum

EBITDA pre

- Low- to mid-teens % organic decline
- Moderate support from FX
- Low to mid-thirties % contribution from Versum

[1]Divisional guidances are only support to the group guidance and do not have to add up

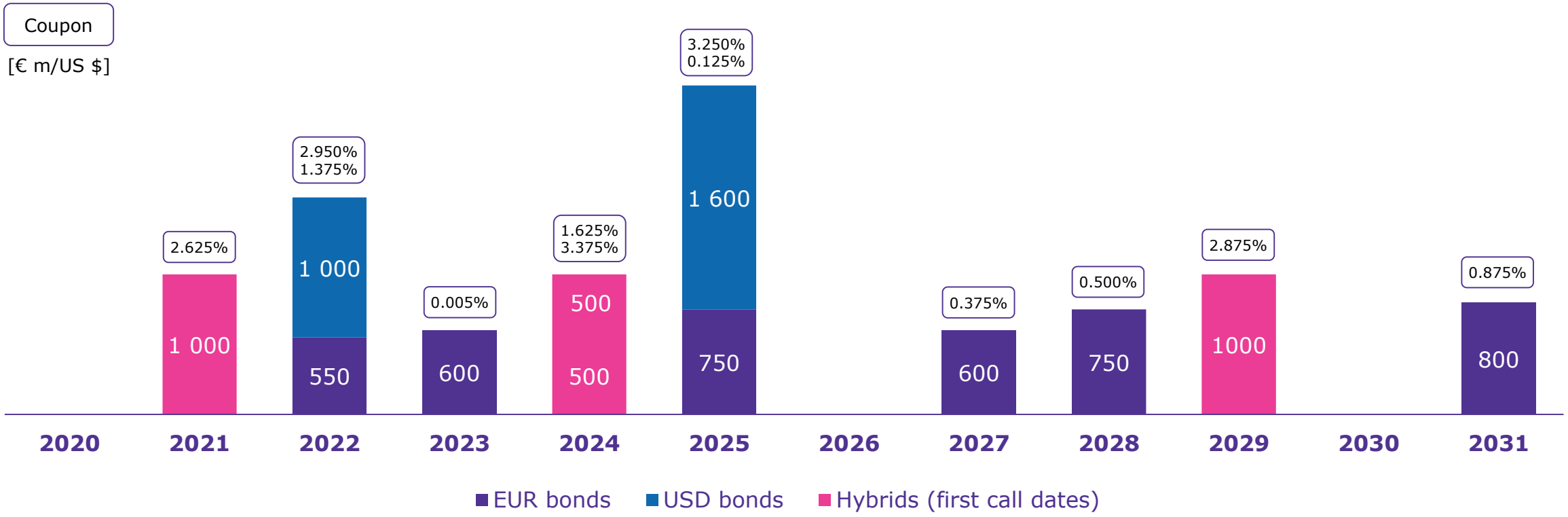
Additional financial guidance 2020

Further financial details

Corporate & Other EBITDA pre	**slightly higher than last year**
Interest result	**~ -245 to -275 m**
Effective tax rate	**~24 % to 26%**
Capex on PPE	**~1.1 bn to 1.2 bn**
Hedging/USD assumption	**FY 2020 hedge ratio ~50% at EUR/USD ~1.18**
2020 Ø EUR/USD assumption	**~1.08 to 1.12**

Maturity profile reflects Sigma-Aldrich and Versum financing transactions

Maturity profile as of March 31, 2020

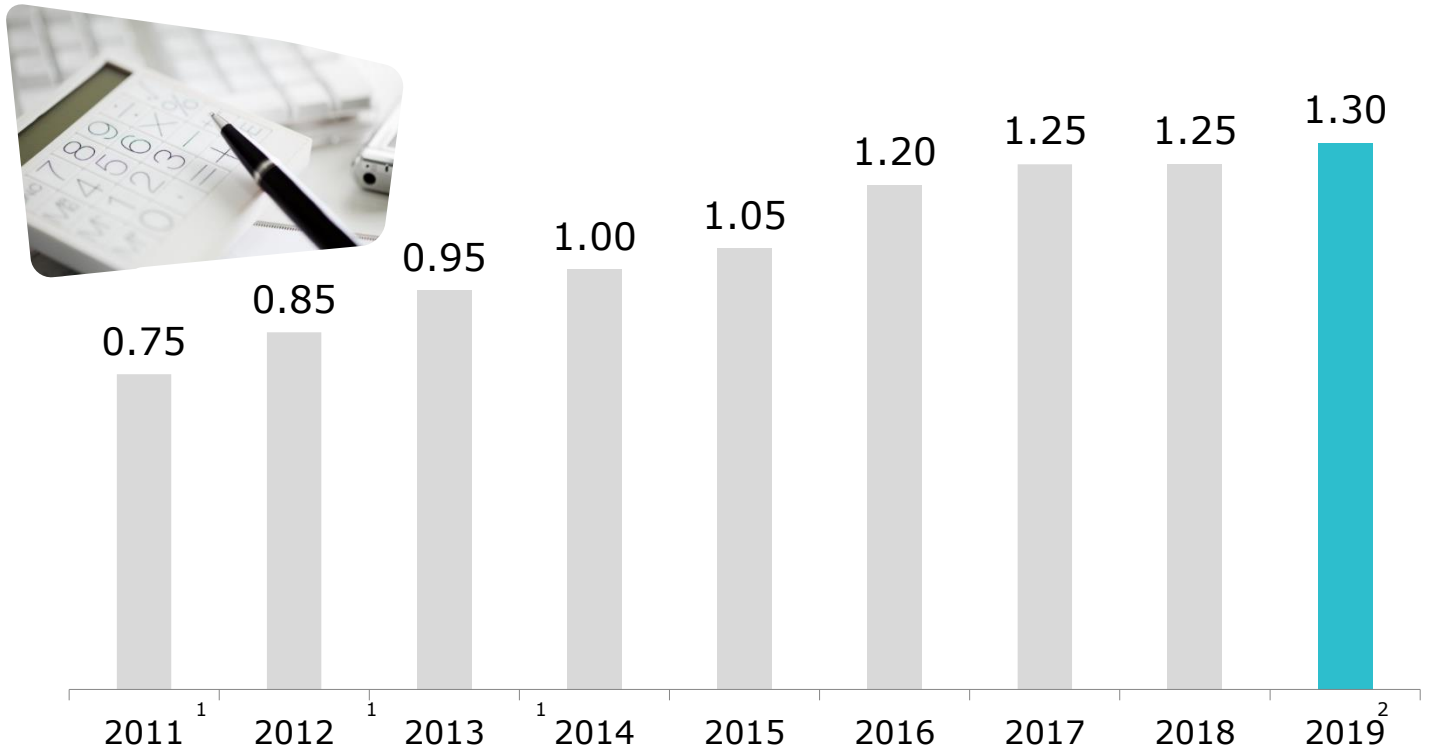


Balanced maturity profile in upcoming years avoids refinancing risks; Merck KGaA, Darmstadt, Germany will become a more frequent issuer

Totals may not add up due to rounding

Sustainable dividend growth

Dividend[1] development 2011-2019



2019 dividend

- Dividend of €1.30 (+4% YoY) per share proposed[2] for 2019
- Payout ratio of 23.4% of EPS pre in 2019; we aim at 20–25% of EPS pre
- Dividend yield[3] of 1.2%

[1]Adjusted for share split, which has been effective since June 30, 2014; [2]Final decision is subject to Annual General Meeting approval; [3]Calculated with 2019 year-end share price of € 105.35 per share.

Clinical Pipeline

April 30, 2020

Phase I

berzosertib (M6620)
ATR inhibitor
Solid tumors

peposertib (M3814)
DNA-PK inhibitor
Solid tumors[1]

M1774
ATR inhibitor
Solid tumors

M3258
LMP7 inhibitor
Multiple myeloma

M4344
ATR inhibitor
Solid tumors

M8891
MetAP2 inhibitor
Solid tumors

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Solid tumors

M9241 (NHS-IL12)
Cancer immunotherapy
Solid tumors[1]

M5049
TLR7/8 antagonist
Immunology

M6495
anti-ADAMTS-5 nanobody
Osteoarthritis

M5717
PeEF2 inhibitor
Malaria

Phase II

peposertib (M3814)
DNA-PK inhibitor
Rectal cancer

tepotinib
MET kinase inhibitor
Non-small cell lung cancer

abituzumab
pan-αv integrin inhibiting mAb
Colorectal cancer 1L

avelumab
anti-PD-L1 mAb
Merkel cell cancer 1L

avelumab
anti-PD-L1 mAb
Solid tumors[2]

avelumab
anti-PD-L1 mAb
Non-small cell lung cancer[2]

avelumab
anti-PD-L1 mAb
Urothelial cancer[2]

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Non-small cell lung cancer 1L

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Non-small cell lung cancer 1L/2L

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Locally advanced non-small cell lung cancer

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Biliary tract cancer 1L

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Biliary tract cancer 2L

bintrafusp alfa
TGFbeta trap/anti-PD-L1
Cervical cancer 2L

atacicept
anti-BlyS/APRIL fusion protein
Systemic lupus erythematosus

atacicept
anti-BlyS/APRIL fusion protein
IgA nephropathy

sprifermin
fibroblast growth factor 18
Osteoarthritis

M1095 (ALX-0761)[3]
anti-IL-17 A/F nanobody
Psoriasis

Phase III

avelumab
anti-PD-L1 mAb
Non-small cell lung cancer 1L

evobrutinib
BTK inhibitor
Multiple sclerosis

Registration

tepotinib
MET kinase inhibitor
Non-small cell lung cancer, *MET*ex14 skipping[4]

avelumab
anti-PD-L1 mAb
Urothelial cancer 1L-M[5]

- Oncology
- Immuno-Oncology
- Immunology
- Neurology
- Global Health

1L, first-line treatment; 1L-M, first-line maintenance treatment; 2L, second-line treatment.

[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 Merck KGaA, Darmstadt, Germany. [4] As announced on March 25, 2020, tepotinib was approved in Japan for the treatment of patients with non-small cell lung cancer harboring *MET*ex14 skipping. [5] As announced on April 09, 2020, a supplemental Biologics License Application (sBLA) has been submitted to the U.S. Food and Drug Administration (FDA) for avelumab for first-line maintenance treatment of patients with locally advanced or metastatic urothelial carcinoma.

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.

Tepotinib: Significant unmet need

Tepotinib is a highly selective oral, once daily, MET TKI that blocks MET-mediated signaling pathways

- Preclinical and clinical evidence support MET activation as a **primary oncogenic driver in lung cancer subsets** and as a **secondary driver** of acquired resistance to targeted therapy in other lung cancer subsets[1]
- Higher **prevalence of MET alterations amongst elderly patients in Lung** (median age of patients with METex14: 72.5 years)
- Evidence exists to support the **role of MET in cancers and resistance settings other than lung cancer**

Adressable Patient Population

Total global NSCLC patients
(2 million new cases/year)[2]

- METex14: ~3%
- METamp: ~2%
- EGFRm+: US/EU: ~12% Asia: ~35%
- Other genetic alterations

15 – 20% with METamp

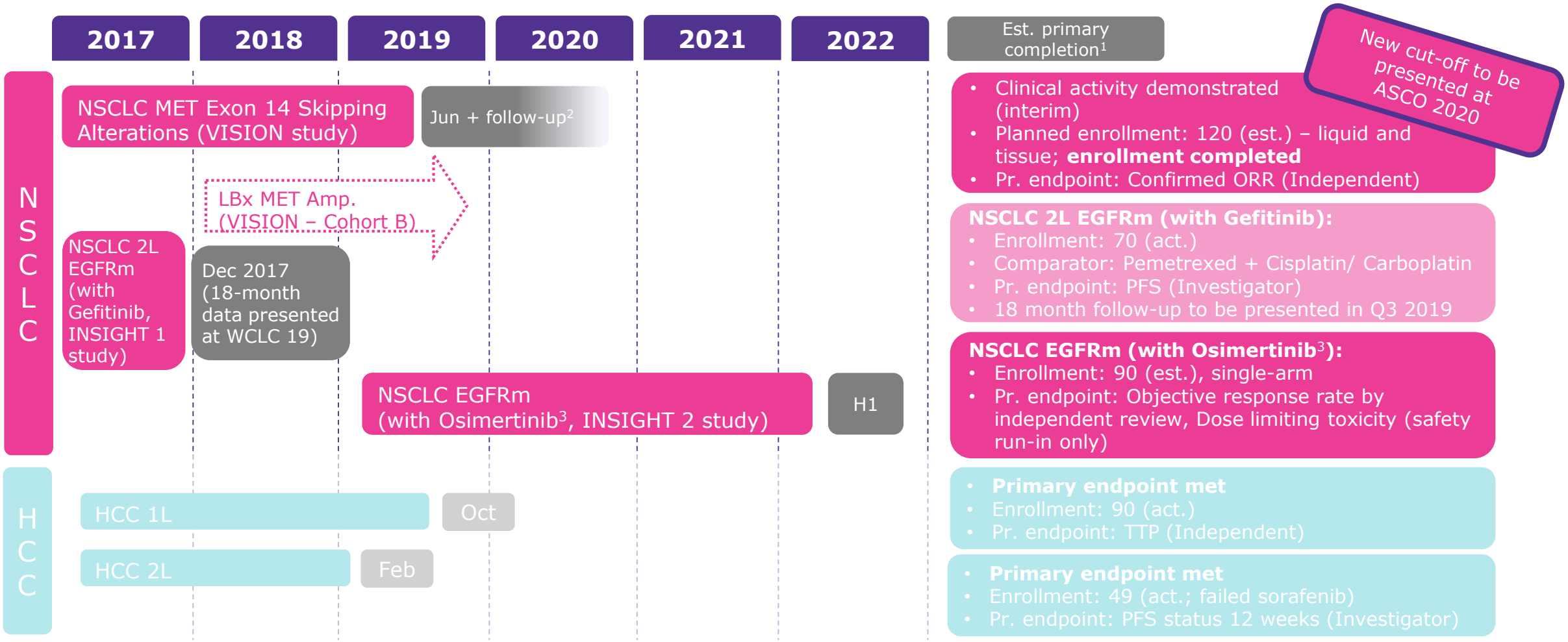
- METex14: ~3%, METamp: ~2% → ~3-5% of total NSCLC population → VISION Trial
- EGFRm+: US/EU: ~12% Asia: ~35% → 2-5% of total NSCLC population → INSIGHT 2 Trial

Key Achievements

- **SAKIGAKE designation** awarded in Japan, **Breakthrough designation** awarded by US FDA
- **Validated liquid biopsy and/or tissue biopsy test** used to prospectively recruit in both trials
- **METex14:** Approved in Japan in March 2020, On track for filing in H1 2020 in USA
- **EGFRm+/METamp:** INSIGHT 2 program started in 2019

[1]Drilon A et al., J Thoracic Oncol. 2016; [2]Bray F, et al. CA Cancer J Clin. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. 2018;68(6):394–424. https://doi.org/10.3322/caac.21492 PMID:30207593

Tepotinib: Program overview
Development focused on biomarker enriched patient populations



[1]Timelines are event-driven and may be subject to change; [2]Confirmed ORR expected approx. in June 2019, subsequent durability of response/follow-up period pending outcome of discussions with health authorities; [3]brand name: Tagrisso®

Data presented at ASCO 2019
Promising data from VISION (NSCLC, MET Exon 14 cohort) study

New cut-off to be presented at ASCO 2020

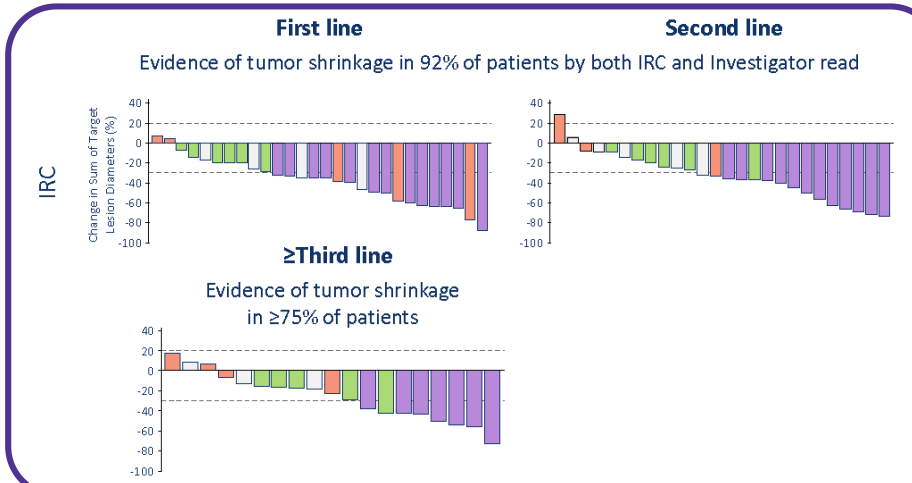
Durable clinical activity across treatment lines[2]

	Other leading MET inhibitor[1]		VISION (tepotinib)[2]	
			Liquid biopsy analysis set (L+)	Tissue biopsy analysis set (T+)
	Oral		Oral	Oral
Cut off date	(15 Apr 2019)		(18 Feb 2019)	(18 Feb 2019)
	IRC		IRC	IRC
Overall	N=97		n=48	n=51
ORR, % [95% CI]	48.5%* Not reported		50.0% [35.2, 64.8]	45.1% [31.1, 59.7]
mDOR, months [95% CI]	Not reported		**12.4** [5.8, ne]	**15.7** [9.0, ne]
1L	N=28		n=17	n=18
ORR, % [95% CI]	67.9% [47.6, 84.1]		58.8% [32.9, 81.6]	44.4% [21.5, 69.2]
≥2L	N=69		n=31	n=33
ORR, % [95% CI]	40.6% [28.9, 53.1]		45.2% [27.3, 64.0]	45.5% [28.1, 63.6]
mDOR, months [95% CI]	9.7 [5.6, 13.0]		**12.4** [5.6, ne]	**12.4** [3.7, ne]
PFS	**1L n=28**	**2L/3L n=69**	n=57	n=58
mPFS, months [95% CI]	9.7 [5.5, 13.9]	5.4 [4.2, 7.0]	**9.5** [6.7, ne]	**10.8** [6.9, ne]

Favorable safety profile[2]

- Grade 3 TRAEs reported in **19% of patients**
- **No grade 4 or grade 5** TRAEs
- **Discontinuations** due to treatment-related adverse events in **only 4.6% of patients**

Consistent tumor shrinkage across lines[2]



[1]J. Wolf et al., Capmatinib (INC280) in METΔex14-mutated advanced non-small cell lung cancer (NSCLC): Efficacy data from the phase II GEOMETRY mono-1 study, presented at ASCO 2019; [2]P. Paik et al., Phase II study of tepotinib in NSCLC patients with METex14 mutations, presented at ASCO 2019; *Data not reported in the oral presentation. Manually calculated from 1 CR, 18 PRs in Cohort 5b (1st line) and 28 PRs in Cohort 4 (+2nd line).

Clinical Efficacy in Met-amp EGFR-mutant Population
INSIGHT 2 study follows from encouraging INSIGHT 1 data

Data from INSIGHT 1 study (18-months follow-up presented at WCLC 2019)[1]

- **MET-amp population:**

Endpoint	Tepotinib + gefitinib	Chemotherapy
Primary - PFS (HR 0.13 [90% CI 0.04, 0.43])	16.6 m	4.2 m
Secondary - ORR (OR 2.67 [90% CI 0.37, 19.56])	66.7%	42.9%
Secondary - OS (HR 0.09 [CI 0.01, 0.54])	37.3 m	13.1 m

- **METamplification** can be considered a **suitable biomarker for treatment with tepotinib**
- **Safety:** generally well-tolerated, most AEs mild to moderate
- Enrollment halted due to low recruitment

INSIGHT 2 study

Study Design:
- Locally advanced/metastatic EGFR + NSCLC
- MET amplification
- Acquired resistance to prior EGFR TKI therapy
- N = 90

Dose:
- Tepotinib 500mg QD + Osimertinib 80mg QD (21-day cycles until PD)

Primary endpoints:
- Objective response rate by independent review
- Dose limiting toxicity (safety run-in only)

[1]Yi Long Wu et al., Long term outcomes to tepotinib plus gefitinib in patients with EGFR mutant NSCLC and MET dysregulation: 18 month follow up, presented at WCLC 2019

Biomarker focused development program in NSCLC with potential beyond NSCLC **MET exon-14; Met-amp; and EGFR-mutant populations**

NSCLC MET exon-14 alterations (VISION study)

- **SAKIGAKE designation** awarded by Japanese Ministry of Health, Labour and Welfare in March 2018
- **Promising ORR, durable responses and long PFS** reported across treatment lines presented at ASCO 2019
- **Favourable safety profile** with 19% treatment-related grade 3 events, no grade 4 events and **only 4.6% treatment related discontinuations**

NSCLC harboring EGFR-mutations (INSIGHT study)

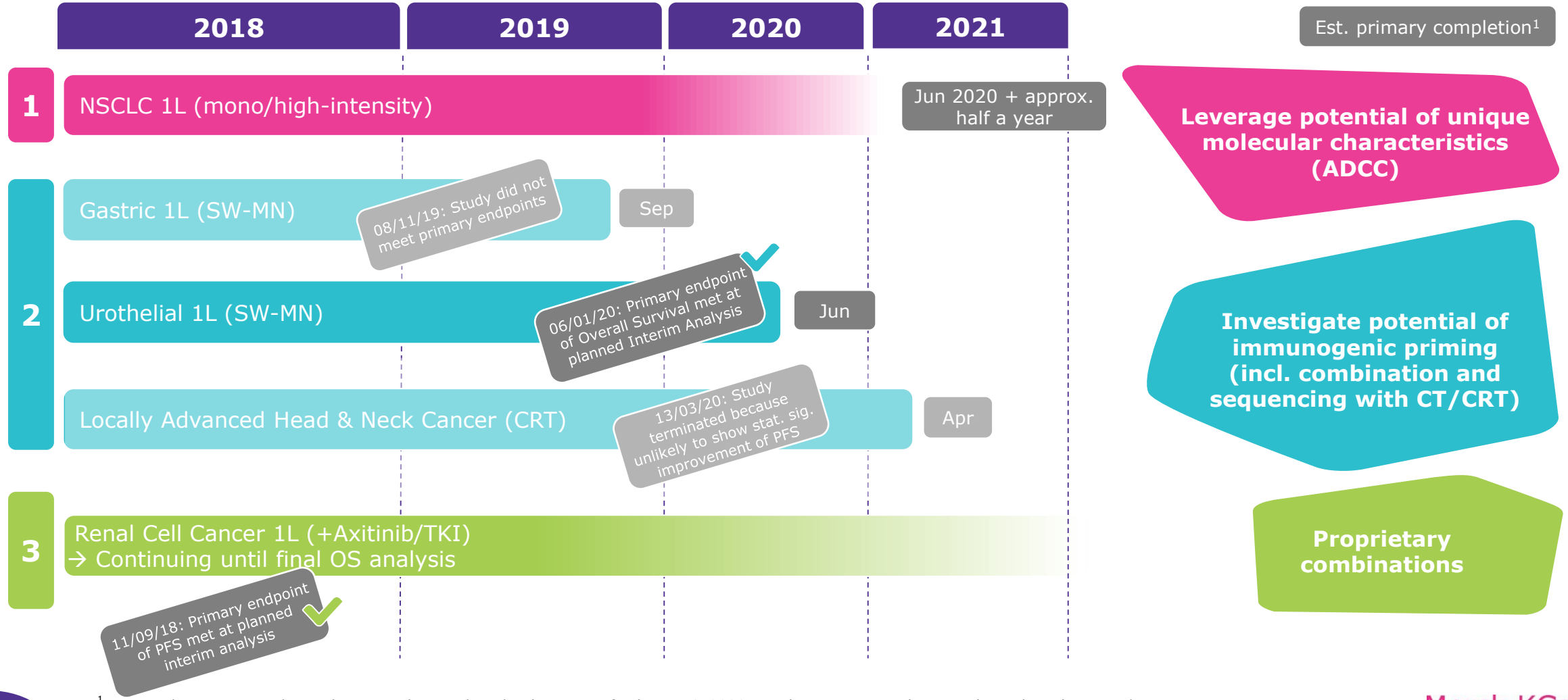
- Encouraging data seen in INSIGHT 1 trial, triggering **recent initiation of INSIGHT 2** (Tepotinib + Osimertinib)
- **Liquid biopsy testing (LBx)** integrated into INSIGHT 2 to help mitigate the limited availability of tissue in this tumor indication and treatment setting

Patients prospectively recruited with validated liquid biopsy (LBx) test in VISION

1. **Less invasive** (i.e. than tissue based testing) → appropriate for **elderly patients**, **rapid study recruitment**
2. **Increased selectivity/identification** → improved recruitment numbers/**greater identification**

Avelumab: Program overview

Ongoing studies –Javelin Bladder 100 data (UC 1L) presentation confirmed for ASCO 2020 plenary session

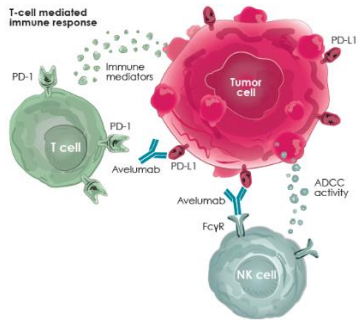


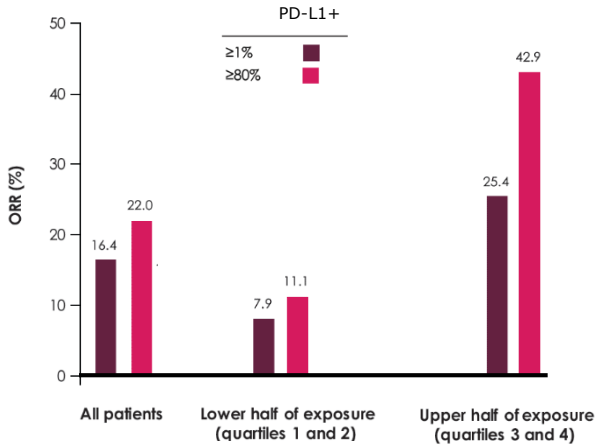
[1]Estimated primary completion date according to clinicaltrials.gov as of February 6, 2020, timelines are event-driven and may be subject to change;
Acronyms: NSCLC = Non-small Cell Lung Cancer, CT = Chemotherapy, CRT = Chemoradiotherapy, DMC = Data Monitoring Committee (DMC), MN = Maintenance, PFS = Progression-Free Survival, SW = Switch, TKi = Tyrosine Kinase inhibitor

Avelumab: NSCLC 1L

Assessing potential efficacy upside in mono-therapy[1]

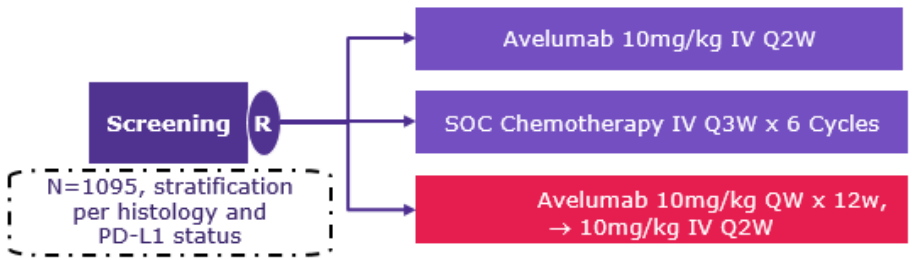
NSCLC 2L+: exposure response





NSCLC 1L: testing hypothesis of higher efficacy/intensity correlation

- **Hypothesis:** higher drug intensity may result in greater efficacy (potentially driven by ADCC)
- Potential association between **higher ORR** and **higher avelumab exposure**
- ORR highest in patients with both higher avelumab **exposure** and tumors with higher levels of **PD-L1 expression**
- **NSCLC 1L phase III trial amended** to leverage high-intensity hypothesis (est. primary completion June 2020)



- **Primary endpoints:** PFS & OS @ high PD-L1-expression
- **Secondary endpoints:** PFS & OS @ moderate and low PD-L1-expression (BOR, DOR, Safety, QoL)
- **Hierarchical ordered hypothesis**

[1]Abstract No. 9086. Presented at the 53rd ASCO Annual Meeting; June 2-6, 2017; Chicago, IL, USA: Exposure–response and PD-L1 expression analysis of second-line avelumab in patients with advanced NSCLC: data from the JAVELIN Solid Tumor trial; Acronyms: ORR = Overall Response Rate

Avelumab: UC 1L

Transformative OS data featured a ASCO 2020 plenary session

JAVELIN Bladder 100 Study Design – Phase III switch-maintenance[1]

1L treatment

1L maintenance treatment until confirmed disease progression, unacceptable toxicity, or other protocol-defined criteria for withdrawal

Locally advanced or metastatic UC not progressed following 1L chemotherapy[2]

N=700

R 1:1

- **Avelumab** 10 mg/kg 1h IV Q2W + BSC[4]
- **Best Supportive Care (BSC) alone**[4]

Primary endpoint: OS
Secondary endpoints: progression-free survival, anti-tumor activity, safety, pharmacokinetics, immunogenicity, predictive biomarkers and patient-reported outcomes in the co-primary populations

Primary objective of superior OS versus standard of care met at planned IA in January 2020

- First immunotherapy to significantly prolong OS vs standard of care in 1L locally advanced or metastatic urothelial carcinoma, and first to demonstrate OS benefit regardless of PD-L1 status
- **Breakthrough Therapy Designation**, completion of sBLA submission, and **review under the FDA's Real-Time Oncology Review (RTOR)** program announced on April 9, 2020
- **New treatment paradigm offered by the unique JAVELIN Bladder 100 Regimen**, potential to be practice changing, offering benefit beyond chemotherapy, the standard of care for the last 20 years
- **Launch to leverage existing RCC resources** and experiences

Bladder cancer is the **10th most common cancer worldwide**

UC = **~90% of bladder cancers**

Poor prognosis for patients with advanced bladder cancer whose disease progresses after 1L chemotherapy

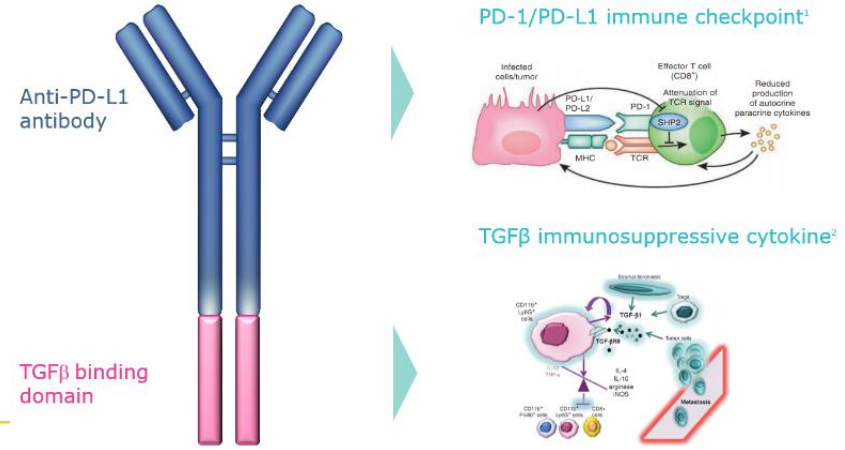
1: NCT02603432, 2: 4-6 cycles of gemcitabine + cisplatin or carboplatin; 2: 4: BSC comprises administered as deemed appropriate by the treating physician, and could include treatment with antibiotics, nutritional support, correction of metabolic disorders, optimal symptom control and pain management etc. Acronyms: SD =

Bintrafusp alfa[1] (M7824)

An innovative first-in-class bifunctional fusion protein discovered in-house leading the TGF-β immuno-oncology field

Mode of action

- Innovative **first-in-class bifunctional fusion protein** designed to simultaneously target two immune suppressive pathways (blocking PD-L1 and reducing TGF-β signaling)
- Demonstrated **superior anti-tumor activity in pre-clinical study** compared to anti-PD-L1 alone, and anti-PD-L1 and TGF-β given in combination as separate agents
- **Great excitement in IO community** about M7824 uniquely addressing TGF-ß biology widely accepted as key resistance factor for anti-PDx therapies



clinical development achievements

- Tested in **14 Phase Ib expansion cohorts** across >700 patients in more than 10 tumor types
- Shown clinical anti-tumor activity across multiple hard-to-treat cancers including **advanced NSCLC, biliary tract cancer, HPV-associated cancers, and gastric cancer**
- PhII study **M7824 monotherapy versus pembrolizumab 1L**, advanced NSCLC high PD-L1-tumor expressers started in October 2018

clinical development plans

- **Multiple high priority immuno-oncology clinical development studies** ongoing or expected to commence shortly, including **studies in non-small cell lung and biliary tract cancers with registrational intent** and most recently **advanced, unresectable cervical cancer**
- Further plans to be communicated at a later stage

[1]proposed International Nonproprietary Name (INN)
Acronyms: NSCLC = Non-small Cell Lung Cancer, IO = Immuno-Oncology

Strategic Alliance with GlaxoSmithKline (GSK)
Attractive payment terms rewarding developmental success

Effective as of March 27, 2019

upfront & Milestone payment structure

Total deal volume: €3.7 bn

Upfront payment: €300 m

Milestone payments: €3.4 bn

- Development (up to €500 m)
- Approval
- Commercial

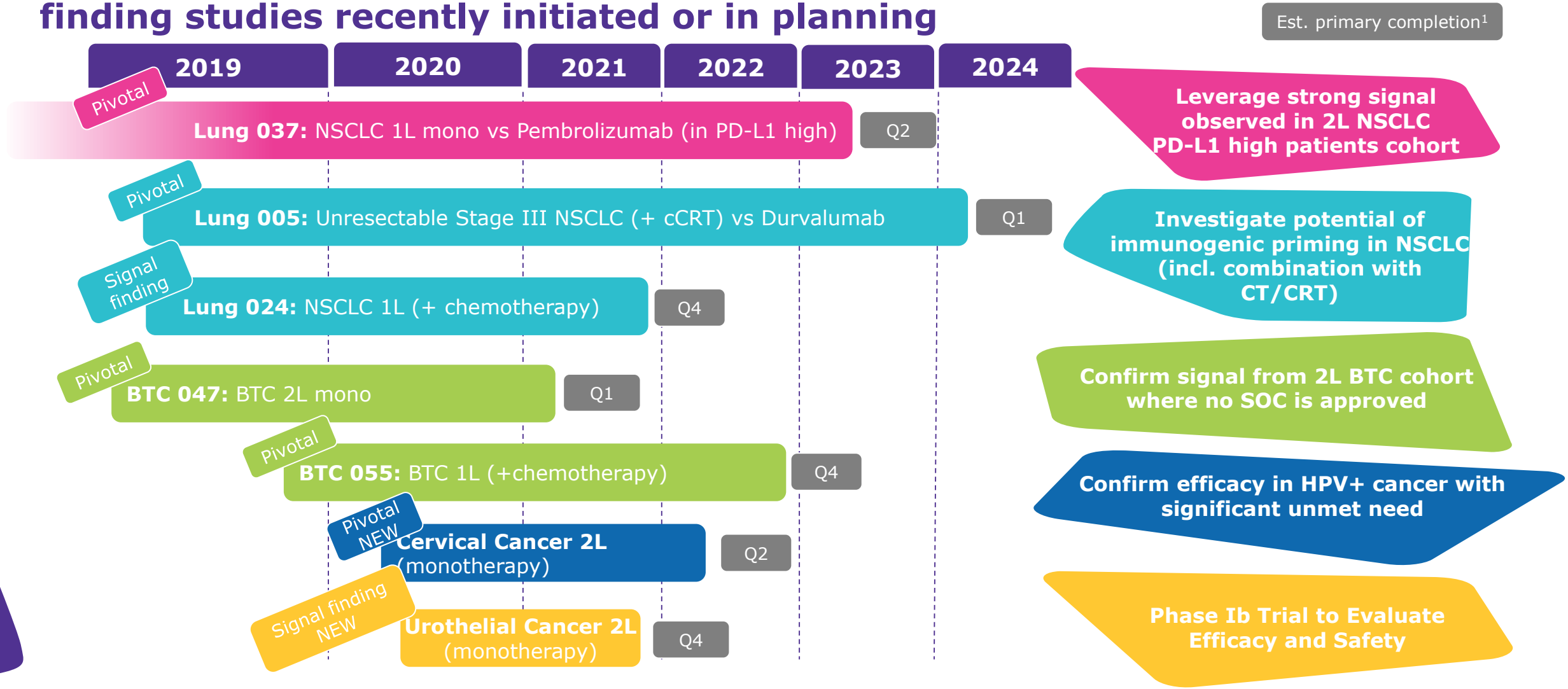
Development milestones: Up to €500 m triggered by data from the M7824 lung cancer program

profit & cost sharing

- **Profits & Costs:** Shared equally on a global basis
- **Sales:** Merck KGaA, Darmstadt, Germany to recognize sales in the United States, GSK to recognize sales ex-U.S.

Development Strategy

Program overview: Five pivotal studies on track, several safety and signal finding studies recently initiated or in planning



[1]Estimated primary completion date according to clinicaltrials.gov as of May 5, 2020, and internal estimates for upcoming studies; timelines are event-driven and may be subject to change; Acronyms: NSCLC = Non-small Cell Lung Cancer, BTC = Biliary Tract Cancer, CT = Chemotherapy, cCRT = Chemoradiation therapy

Developmental Progress
2L Biliary Tract Cancer (BTC) monotherapy trial recently initiated

M7824 BTC data presented at ESMO 2018

- **Need:** Few available treatment options (no 2L standard of care)[1]
- **Results: Encouraging activity[2]** in 30 Asian patients with pretreated biliary tract cancer
- **ORR[2]:** 20% (IRC assessment). Median DoR was NR (range, 8.3–13.9 months) with confirmed responses ongoing in all patients
- **Overall Survival by IRC: mOS:** 12.7 months (6.7 – NR), comparing favorably with historical data in pretreated patients receiving second- or later line treatment (<7 months mOS in 2L[1])
- Responses observed **irrespective of PD-L1 expression levels[2]**
- **Orphan Drug Designation** granted by FDA in December 2018

Leading PDx data presented at ASCO 2019[3]

- **ORR:** 5.8% (PhII, 2L); 13.0% (PhI)
- **OS:** 7.4 months (PhII, 2L); 6.2 months (PhI)

INTR@PID BTC 047

INTR@PID CLINICAL TRIALS
BTC 047

Locally advanced or metastatic BTC 2L N = 141 → M7824 1200 mg IV, Q2W, up to 24 months

Endpoints

Primary endpoint: ORR

Secondary endpoints: DOR, DRR ,PFS, OS, Safety

Biomarker endpoints: PDL1 expression MSI status, comprehensive genomic profiles

[1]Lamarca A, et al. Ann Oncol. 2014;25(12):2328–2338; [2]Yoo et al., Poster presented at the 43rd European Society for Medical Oncology Annual Meeting, Munich, October 19–23, 2018; [3]Bang et al., "Pembrolizumab (pembro) for advanced biliary adenocarcinoma: Results from the KEYNOTE-028 (KN028) and KEYNOTE-158 (KN158) basket studies", presented at ASCO 2019; Acronyms: DoR = Duration of Response, NSCLC = Non-small Cell Lung Cancer, NR = Not Relevant, MSI = Microsatellite Instability Status , OS = Overall Survival, PFS = Progression-Free Survival

Developmental Progress
NSCLC Stage III cCRT Combo trial recently initiated

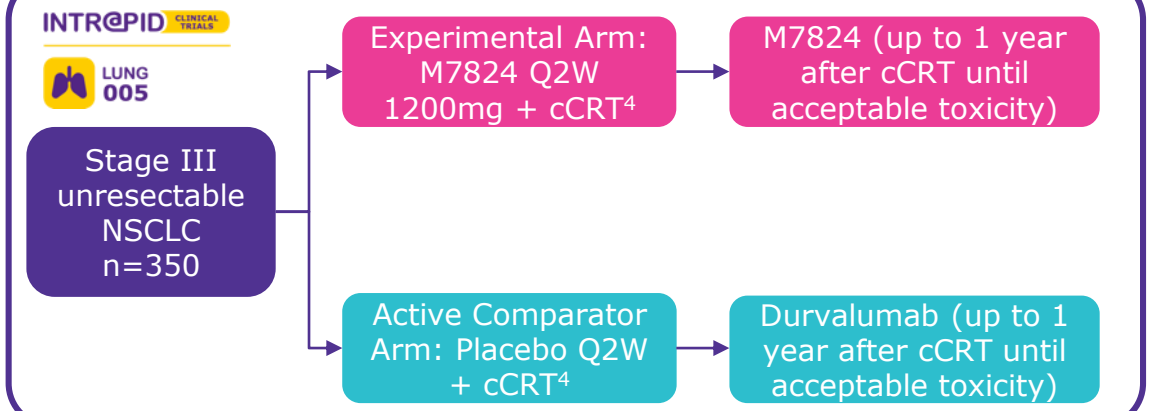
NSCLC 2L data presented at ESMO 2018

- **Need:** NSCLC accounts for 80-85% of all cases of lung cancer[1]
- **Results: Encouraging efficacy comparing favorably** to established PDx-inhibitor monotherapy (IRC)[2,3]:
  - **ORR (all-comers):** 25.0%
  - **ORR (PD-L1-positive):** 37.0%
  - **ORR (PD-L1-high):** 85.7%
- **Progression free survival by IRC** (PD-L1 ≥ 1%):
  - M7824: **mPFS = 9.5 months**, competitor: 4.0 months[2,3]
- **Overall Survival by IRC** (PD-L1 ≥ 1%):
  - M7824: **mOS not reached**, competitor: 12.7 months[2,3]

Pre-clinical data on M7824 + RT combo[5]

- M7824 and RT combination therapy **enhances antitumor activity relative to mono-therapies** in mouse models
- EMT, VEGF, and RT-induced fibrosis gene signatures are decreased with M7824 and combination therapy, and **M7824 reduces RT-induced fibrosis**
- Results **support evaluation of M7824 + RT in the clinic**

INTR@PID LUNG 005



Endpoints

Primary endpoint: PFS

Main secondary endpoints: OS, Safety, Pulmonary function, Association of PD-L1 expression at base line and efficacy

[1]Jemal A et al., Cancer statistics, 2007, CA Cancer J Clin 2007;57:43-66; [2]Paz-Ares et al., Poster presented at the 43rd European Society for Medical Oncology Annual Meeting, Munich, October 19–23, 2018, data shown for 1200mg Q2W dose; [3]Herbst et al.; Pembrolizumab versus docetaxel for previously treated, PD-L1-positive, advanced non-small-cell lung cancer (KEYNOTE-010): a randomised controlled trial (www.thelancet.com Published online December 19, 2015 http://dx.doi.org/10.1016/S0140-6736(15)01281-7); [4]Cisplatin/Etoposide or Carboplatin/Paclitaxel or Cisplatin/Pemetrexed concomitant with Intensity Modulated Radiation Therapy (IMRT); [5]Lan et al., Combination of M7824 and radiation therapy enhances antitumor activity, increases immune response, and modulates radiation-induced fibrosis in cancer models, 2018

Developmental Progress
Data shown at AACR 2019 highlights opportunity in HPV-related cancers

Efficacy variable	HPV-associated cancer (n=43)	HPV+* (n=36)
Confirmed BOR, n (%)		
CR	2 (4.7%)	2 (5.6%)
PR	10 (23.3%)	9 (25%)
SD	6 (14.0%)	5 (13.9%)
PD	20 (46.5%)	17 (47.2%)
Not evaluable	5 (11.6%)	3 (8.3%)
Delayed PR†	3 (7.0%)	3 (8.3%)
ORR per RECIST v1.1, n (%) [95% CI]	12 **(27.9%)** [15.3–43.7]	11 **(30.6%)** [16.3–48.1]
Total clinical response rate†, n (%)	15 **(34.9%)**	14 **(38.9%)**
DCR, n (%)	18 (41.9%)	44.4%

Prevalence: >630,000 new cases of HPV-related cancer are reported worldwide annually[1]

Response Rates:

- Bintrasfusp alfa response rates **compared favorably to those with anti–PD-1 inhibitors** (ORRs of 13%–24%)[1-7]
- **ORR was 27.9% and 30.6% in HPV-associated and HPV+ cancers, respectively**
- Including three additional patients with delayed PRs after initial PD: **Total response rate was 34.9% and 38.9% in HPV-associated and HPV+ cancers, respectively**

Long-term Benefit:

- **Most responses durable** with 4 responses having DoR >18 months and 11/15 responses ongoing at the data cutoff
- Responses to bintrafusp alfa occurred **irrespective of tumor type** or PD-L1 expression
- **Safety profile was similar to anti–PD-(L)1 therapy[1,5]** except for SCC/KAs and low grade mucosal bleeding which are anticipated AEs with TGF-β inhibition[8,9]

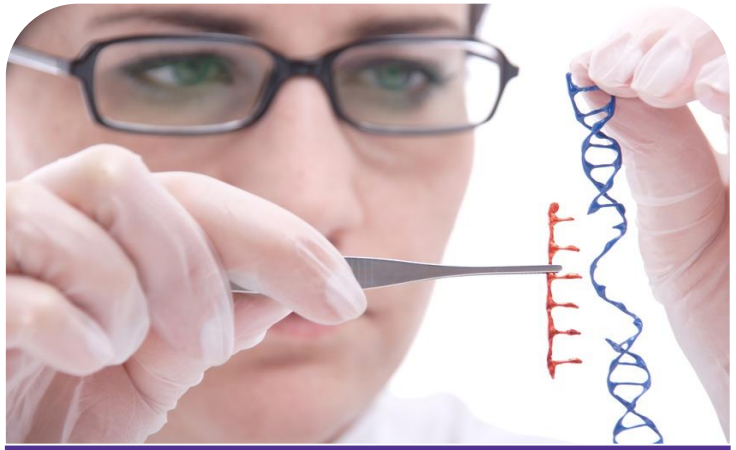
Cervical Cancer 2L study recently posted on ct.gov NEW

†Due to confirmed PD before onset of response, these patients did not meet response criteria by RECIST v1.1; *HPV status was determined from prior documentation, or by using cobas® 4800 HPV Test (Roche) in the dose escalation phase or RNA sequencing (RNASeq) in the expansion phase.

[1]Bauml J, et al. J Clin Oncol. 2017;35:1542–49; [2]Ott PA, et al. Ann Oncol. 2017;28:1036–41; [3]Hollebecque A, et al. J Clin Oncol. 2017;35(Suppl):Abstract 5504; [4]Chung HC, et al. J Clin Oncol. 2018;36(Suppl):Abstract 5522; [5]Ferris RL, et al. N Engl J Med. 2016;375:1856–67; [6]Mehra R, et al. Br J Cancer. 2018;119:153–59; [7]Morris VK, et al. Lancet Oncol. 2017;18:446–53; [8]Lacouture ME, et al. Cancer Immunol Immunother. 2015;64:437–46; [9]Trachtman H, et al. Kidney Int. 2011;79:1236–43

Merck KGaA
Darmstadt, Germany

DNA Damage Response (DDR)
Leadership in next generation assets beyond PARP



DNA Damage Response

A Core Research Innovation Cluster

- DDR defects are an **"achilles heel" of cancer cells**
- **ATR, ATM and DNA-PK are the trinity of targets** that orchestrate cellular response DNA damage and replication stress
- **Leading clinical portfolio** with 6 assets (in Phases 1 and 2) targeting ATR, ATM and DNA-PK
- Rich pre-clinical and translational science driving **biological innovation and patient selection**
- Ideally placed to drive **novel combinations within DDR portfolio and broader immuno-oncology portfolio**
- Multiple **early signal finding studies** allow for **evidence-based decision making** & **focus** in future development

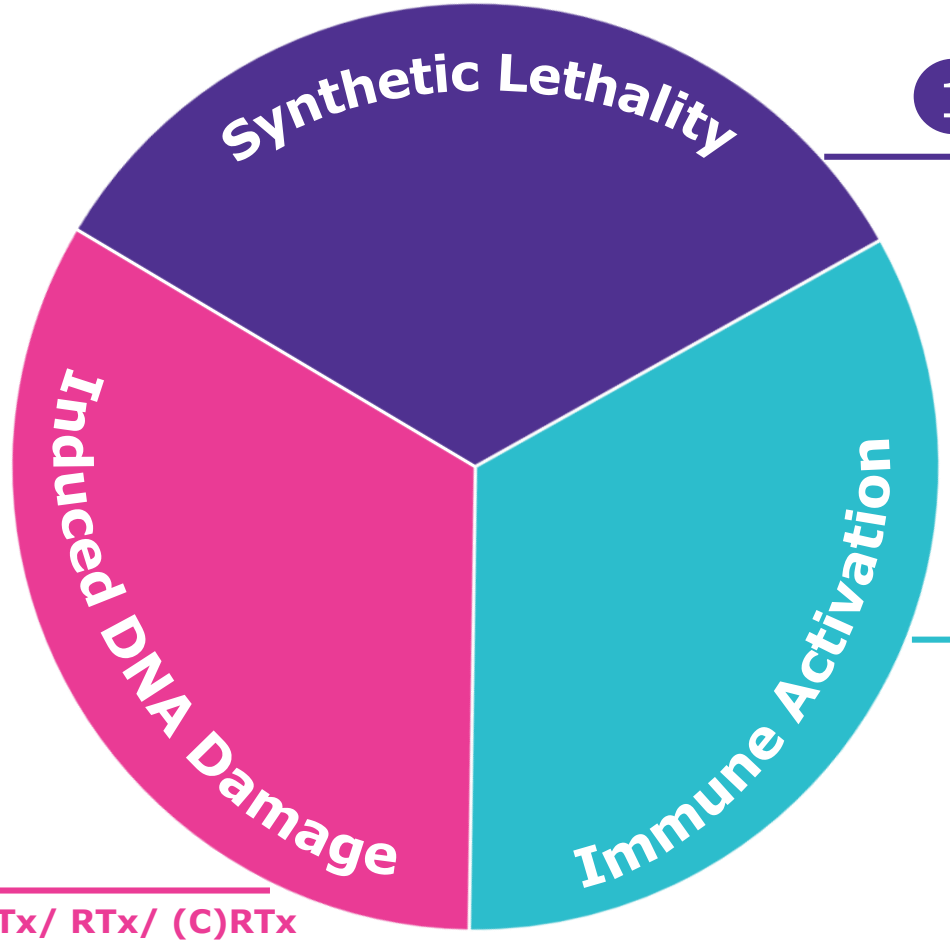
Acronyms: ATM = Ataxia-Telangiectasia Mutated, ATR = Ataxia Telangiectasia and Rad3, DNA-PK = DNA-dependent Protein Kinase, PARP = Poly ADP Ribose Polymerase

DNA Damage Response (DDR)
Development is focused on three foundations

Differentiating aspects of cancer DDR that can be targeted therapeutically[1]:

- **Loss of one or more DDR pathways**
- **Increased levels of replication stress**
- **Increased levels of endogenous DNA damage**

Increased Immunogenicity



1
Monotherapy
DDRi + DDRi (incl. PARP)
Grow the DDR class, building on PARPs

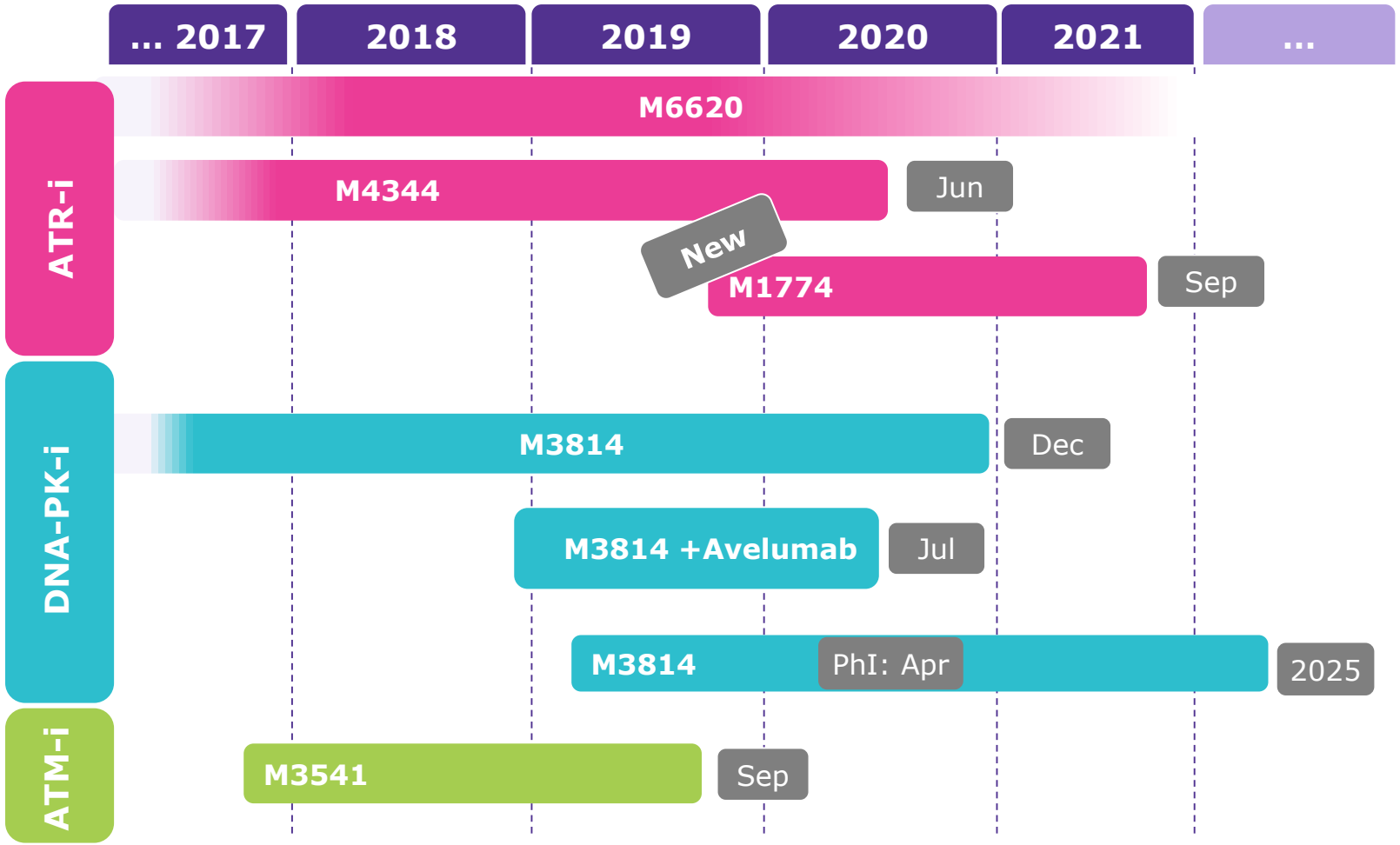
2
DDRi + IO
Differentiate future IO treatments

3
DDRi + CTx/ RTx/ (C)RTx
Improve efficacy in post-IO landscape

[1]adapted from M. O'Connor, Targeting the DNA Damage Response in Cancer, *Molecular Cell Review*, November 2015;
Acronyms: IO = Immuno-Oncology, CT = Chemotherapy, DDRi = DNA Damage Response inhibitor, RT = Radiotherapy, (C)RT = Chemo-radiotherapy

DNA Damage Response (DDR)

Clinical program targets three major DDR pathways, in mono- and combination (incl. Avelumab)



Estimated primary completion[1]

- M6620 CT combinations in various settings
- Phase I dose escalation ongoing for mono- and combination therapy (with CT)
- Phase I dose escalation in metastatic or locally advanced unresectable solid tumors
- One study completed (mono), one study ongoing (Phase I + Ib expansion, combination with RT/ CRT)
- Phase I dose escalation initiated (+Avelumab with/without palliative RT), advanced solid tumors
- Phase I/II study initiated for locally advanced rectal cancer (with CRT)
- Phase I dose escalation ongoing in combination with RT

Neurology & Immunology

Broad portfolio positions Merck KGaA, Darmstadt, Germany as a growing Multiple Sclerosis player

core portfolio

Rebif®

- **Stable market share:** within declining interferon class
- **Renewed HCP interest:** driven by updated pregnancy & lactation label
- **Continued blockbuster status in 2020**

Launch

MAVENCLAD® (cladribine) tablets 10 mg

- **Growth:** Continued growth within the high efficacy and oral class dyamic share
- **Focused execution:** Driving depth and 2nd year returns
- **Global peak sales: €1 - 1.4 bn**

Development

Evobrutinib (BTK-inhibitor)

- **Advancing on benefit-risk in high efficacy oral category**
- **Blockbuster potential**

Acronyms: HCP = Healthcare Professional

MAVENCLAD® (cladribine) tablets 10 mg

Mavenclad

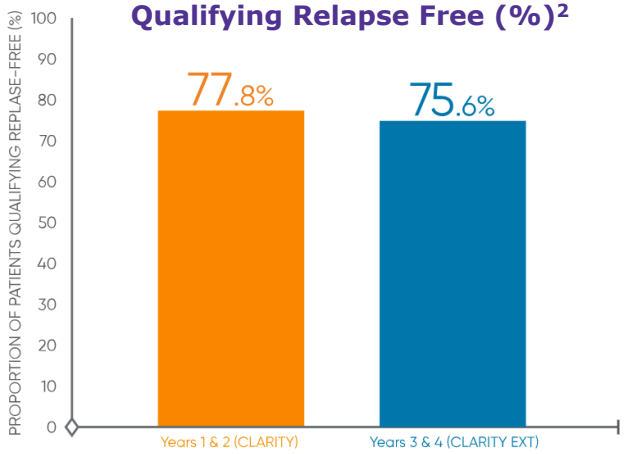
Mavenclad could change the MS treatment paradigm

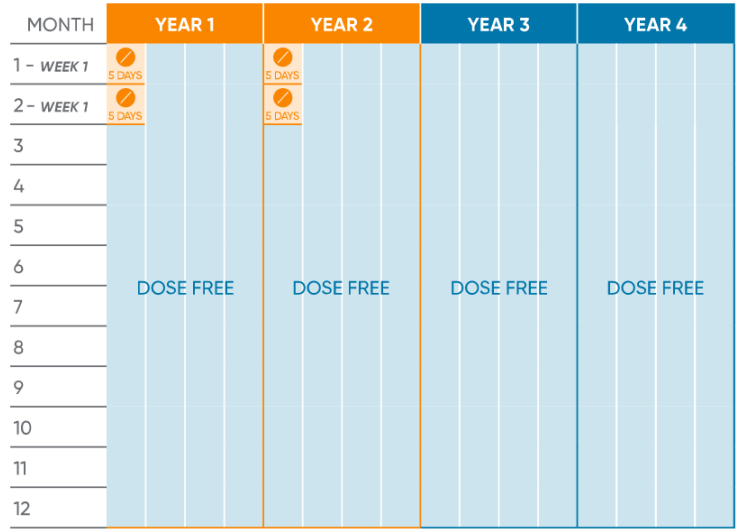
Consistent efficacy: High efficacy[1] across all relevant clinical and radiological endpoints

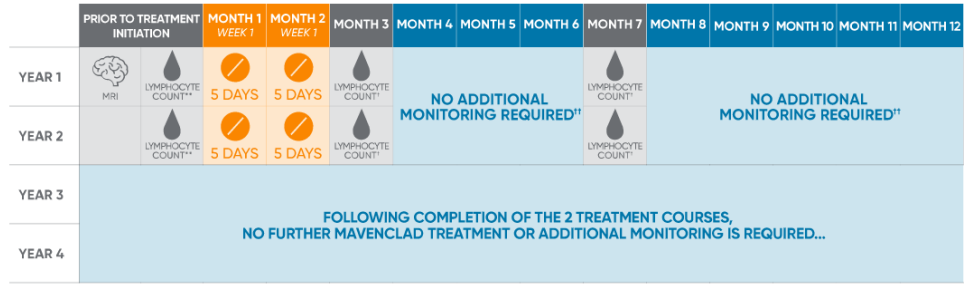
- 58% reduction in annualized relapse rate[2]
- 47% reduction in 6-month confirmed disability progression[3]
- 86% reduction in T1 Gd+ lesions[2]
- 73% reduction in T2 lesions[2]

Durability : Relapse-free for 4 years with no treatment in years 3 and 4[2]

Proportion of Patients Qualifying Relapse Free (%)[2]







Unique posology: Weight-based, max. 20 days of oral treatment[2,3]

Lowest monitoring requirements across all currently approved high-efficacy DMDs in a 4-year horizon

[1]Vs. placebo. The term 'high efficacy' is generally accepted in MS literature; [2]Giovannoni G et al. N Engl J Med 2010; 362:416–426. [3]Cook S et al. AAN 2016; [P3.058].
[3]MAVENCLAD SmPC, 2018

Merck KGaA
Darmstadt, Germany

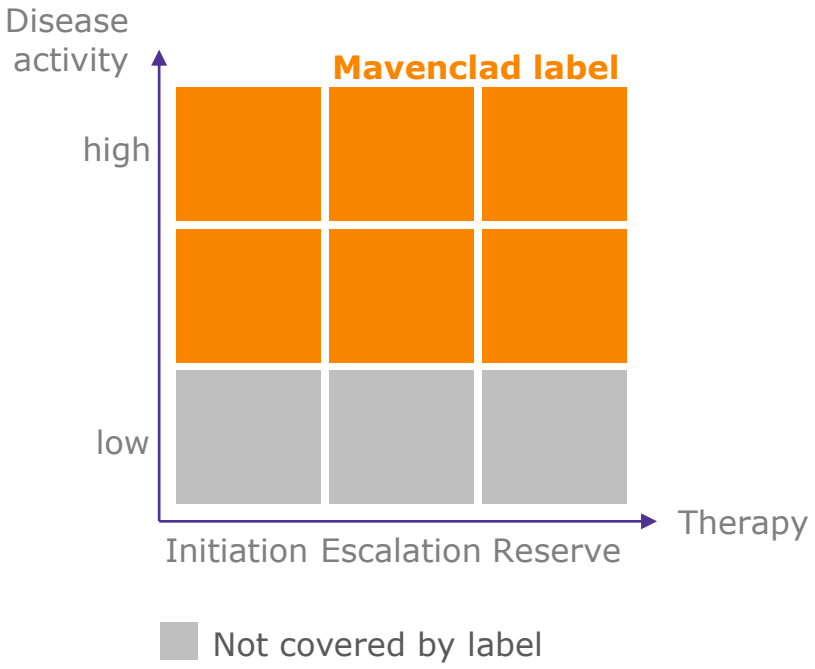
Mavenclad's attractive label in Europe supports integrated franchise strategy

Mavenclad label covers 60-70% of patients with RRMS[1] within the MS[1] patient population in Europe

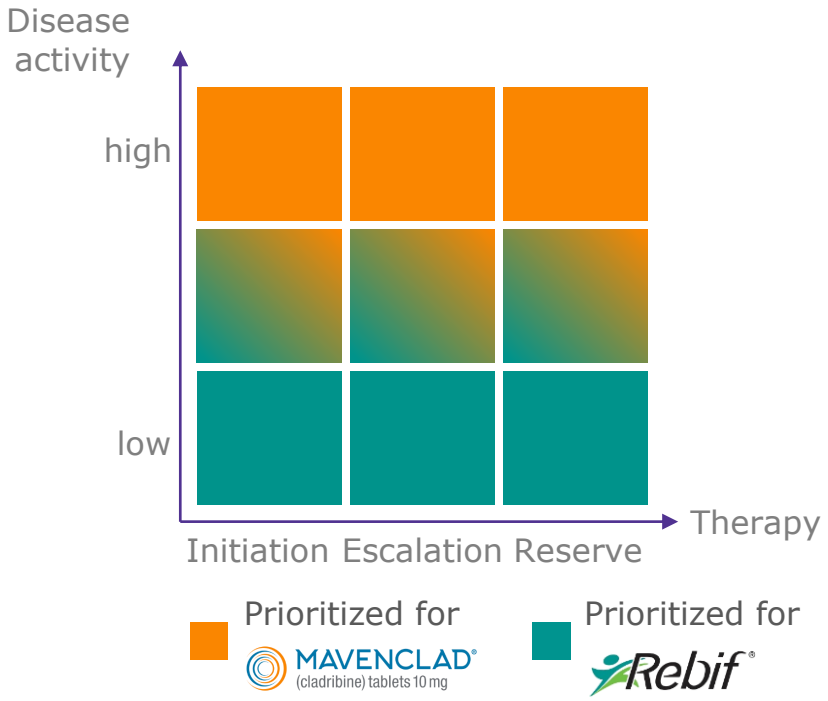
Group's overall NDD franchise will cover a broad MS patient pool

Integrated franchise strategy

MS patient population[2]



RRMS patients, EU-5[3]



- At patient level: Rebif and Mavenclad are **highly complementary**
- At physician level: High overlap
- Franchise infrastructure investment benefits both brands

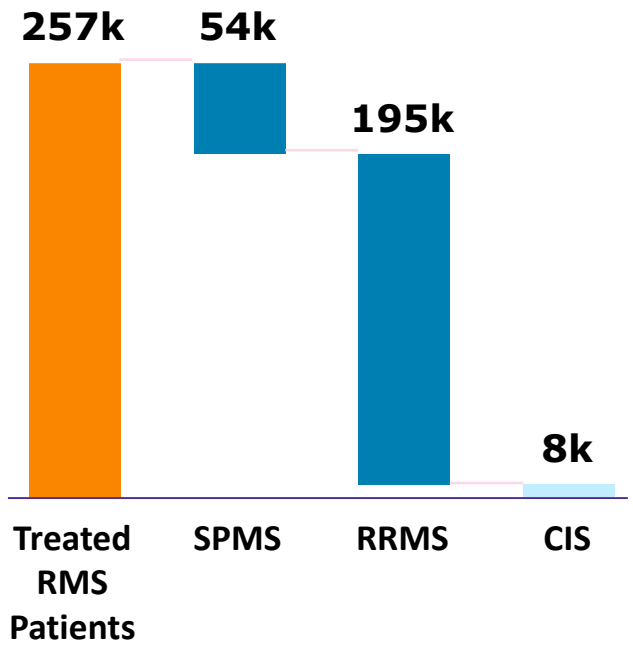
[1]Approved by EMA for treatment of highly active relapsing multiple sclerosis; Abbreviations: RRMS = Relapsing-Remitting Multiple Sclerosis; [2]Source: Merck KGaA, Darmstadt, Germany [3]Source: Merck KGaA, Darmstadt, Germany, Ipsos; As of May 2019, Mavenclad was approved in 55 countries globally and reimbursed in half

MAVENCLAD® (cladribine) tablets 10 mg

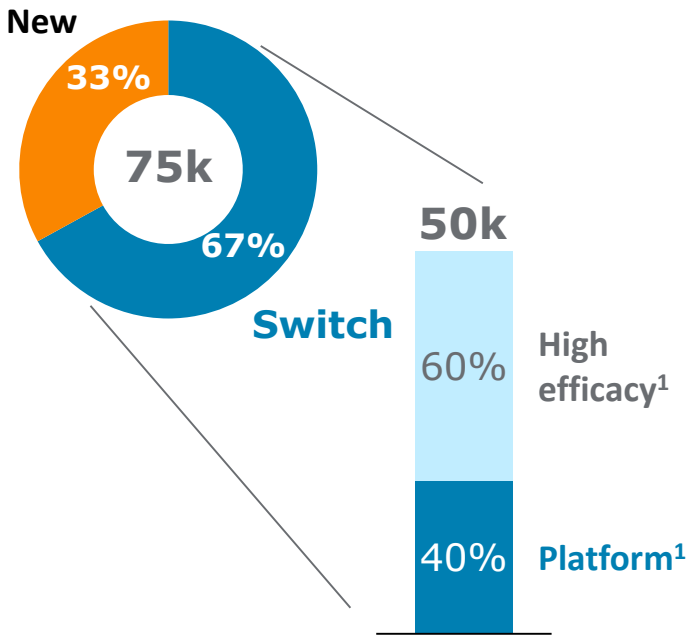
Mavenclad

On March 29, the FDA approved Mavenclad for the treatment of adults with relapsing-remitting (RRMS) and active secondary progressive disease (SPMS)

Treated RMS patients in US



Dynamic RMS treated patients



Mavenclad addresses clear medical needs

- **Previously treated** patients represent the vast majority of the dynamic patient pool
- **Lack of efficacy** is the predominant driver of switching, hence observed "high-efficacy" share of switches
- **Intolerance** also drives switching, though to a lesser degree, and results in switches between classes

→ Novel mechanism and unique oral short-course regimen of **Mavenclad addresses these needs**

Source: Decision Resource Group, MS Epidemiology Overview, October 2017; [1]High efficacy includes Ocrevus, Tysabri, Lemtrada, Gilenya – platform includes all other approved agents

Merck KGaA
Darmstadt, Germany

MAVENCLAD® (cladribine) tablets 10 mg

Mavenclad
Dosing regimen and revenue recognition

Simplified for illustrative purposes

	Year 1	Year 2	Year 3	Year 4
Treatment	**Maximum of 20 days of oral treatment** spread over 2 years (# of tablets weight-based)		**No treatment**	
	Week 1: max. 10 tablets **Week 2-4:** no treatment **Week 5:** max. 10 tablets **Week 6-52:** no treatment	**Week 1:** max. 10 tablets **Week 2-4:** no treatment **Week 5:** max. 10 tablets **Week 6-52:** no treatment		
Payment	**Rx:** Max 20 tablets prescribed across Week 1 & Week 5 followed by immediate payment	**Rx:** Max 20 tablets prescribed across Week 1 & Week 5 followed by immediate payment	**No payment** **No revenue**	

Physician issues one SRF per year, pharmacy registers 2 TRx per 1 SRF

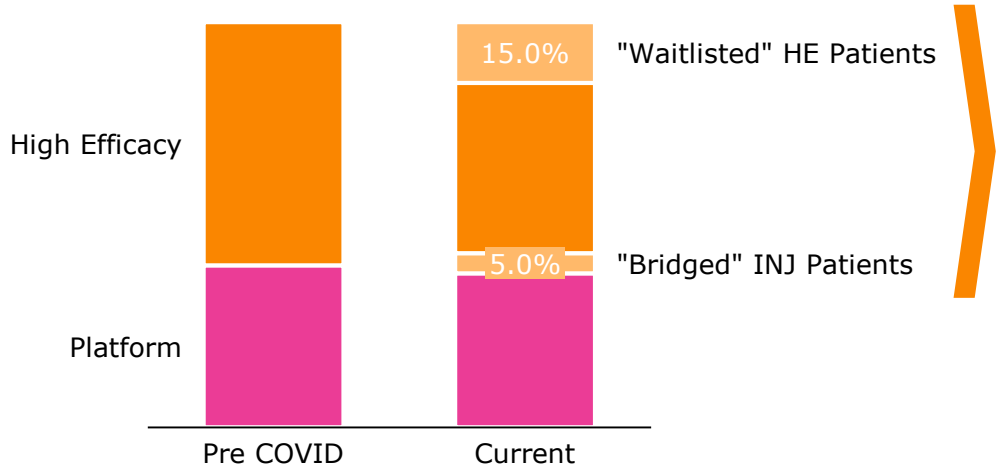
Acronyms: Rx = Prescription, SRF = Service Request Form,

Mavenclad
Aiming to capitalize on "waitlisted" patient opportunity amid COVID-19 pandemic

HE MS market: Significant opportunity for rebound in H2

- Diverse guidelines published – KOL debate ongoing
- **Infection risk number 1 choice driver**
- 15% of HE patient starts put on hold and a further 5% "bridged" to platform therapies[1]

US dynamic market[2]:



Mavenclad® : Profile suited to evolved choice drivers

- **Lack of continuous immunosuppression[3]**
- **Transient preferential targeting** of B and T lymphocytes[4]
- Specifically important for viral defense …
  - **Moderate T cell reduction** with lower impact on CD8+[4]
  - **Minimal impact on innate immunity[5-7]**
- Mavenclad® is **easy to use**, with **short-course at-home oral dosing** and a **low monitoring burden[3]**
- **High efficacy that is sustained** beyond total lymphocyte recovery[3]

1: "Monitoring the Impact of COVID-19 on the Pharmaceutical Market", IQVIA; 2: IQVIA weekly data; 3: Mavenclad® EU SmPC, 2020; 4: Comi G, et al. Mult Scler Relat Disord. 2019;29:168–174; 5: Rieckmann P, et al. ECTRIMS 2009 [P816]; 6: Sorensen PS et al. ECTRIMS-ACTRIMS 2017 [P1141]; 7: Giovannoni G et al. N Engl J Med 2010;362:416–26 (and suppl. info).;
Acronyms: HE = High Efficacy, INJ = Injectables, KOL = Key Opinion Leader

Evobrutinib
Comprehensive development plan across immune-mediated diseases

Phase I/ Iia safety data-set	Robust phase II program to enable differentiated phase III	Est. primary completion
SLE (Ib) **Safety** • **24 patients** • Double-blind, Randomized, Placebo-controlled Study	**RMS** • Randomized, double-blind, placebo-controlled study in **patients with RMS** • **267 patients** • **5 arms study:** placebo vs. 3 drugs-arms (low, mid, high dose) incl. **active control reference arm** (Dimethyl fumarate)	• **48 wks data** presented at AAN 2019 ✔ • **~96 weeks data** presented at **Evobrutinib Strategy Update** call in February 2020 ✔ • **Start of recruitment** in modified studies • **Detailed cinical data from 2+ years (RMS)** to be shared at a future scientific conference
	SLE • Randomized, double-blind, placebo-controlled **dose-ranging study** in subjects with SLE • **451 patients** • **4 arms study:** placebo vs. 3 drugs-arms (low, mid, high dose)	• **Study completed** ✔ Primary efficacy endpoint not met, development deprioritized • Data to be shared at a future conference
RA (IIa) **Signal Finding** • **65 patients** • Randomized, double-blind, placebo-controlled trial in subjects with RA on stable Methotrexate therapy	**RA** • Randomized, double-blind, placebo-controlled **dose-ranging study** in subjects with RA • **360 patients** • **4 arms study:** placebo vs. 3 drugs-arms (low, mid, high dose)	• **Study completed** ✔ Primary efficacy endpoint not met, development deprioritized • Data to be shared at a future conference

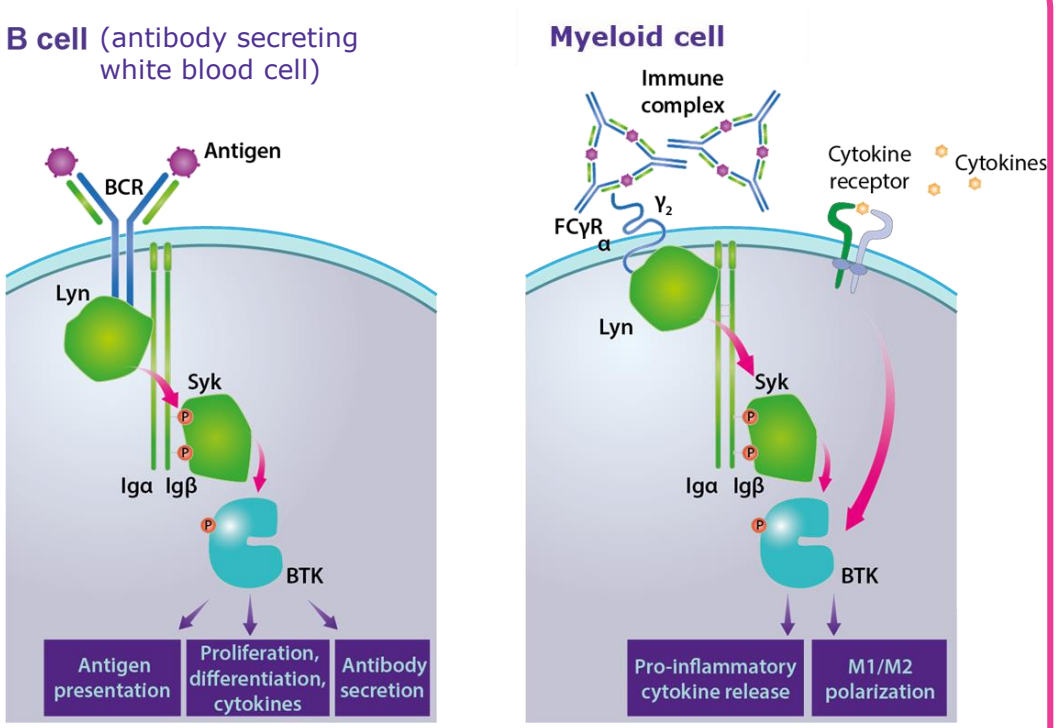
All timelines are event-driven and may be subject to change

Evobrutinib
BTK inhibitor with a dual mode of action

Dual Mechanism of Action

- **Bruton's tyrosine kinase inhibitors (BTKi's)** are traditionally used in oncology but are now also **being evaluated in immunology**
- B-cell depletion studies have shown that antibody-independent **B-cell functions play an important role in MS pathogenesis** (development)[1-3]
- An **altered innate immune system contributes to progression in MS**[4,5]
- **Evobrutinib has a dual mode of action**, impacting on B-cells, macrophages and pathways involved in inflammation in MS; this has been confirmed in animal models[6-11]

Involvement of BTK in immune cell function



[1] Bar-Or A, et al. Ann Neurol 2010; [2]Fraussen J, et al. Autoimmun Rev 2016; [3]Jelcic I, et al. Cell 2018; [4]Rawji KS, et al. Front Cell Dev Biol 2016; [5]Vogel DY, et al. J Neuroinflammation 2013; [6]Data on file: EMD Serono M2951 Investigator's Brochure July 2015; [7]Haselmayer P, et al. EULAR 2016; [8]Data on file: EMD Serono Internal Study Report Aug 2012; [9]Alankus YB, et al. ECTRIMS 2018; [10]Torke S, et al. ECTRIMS 2018; [11]Boschert U, et al. ECTRIMS 2017

Evobrutinib in RMS

Significant unmet medical need remains in RMS

Unmet needs in RMS …

Need for new Mechanisms to control disease

- **Approx. 50% of patients with RMS continue to have ongoing disease activity** over 2 years even when treated with the most effective agents[1]
- Therapies addressing adaptive and innate pathobiology **peripherally and in the CNS**

Need for higher efficacy oral therapies

- 5 approved therapeutic classes considered "higher efficacy"[2], **only 2 of which are oral**
- No approved oral therapy with **efficacy on progression vs. an active control**

opportunity to advance on benefit-risk

- **Systemic side effects** of therapies limit patient acceptance and compliance
- All approved higher efficacy therapies **associated with elevated risk of infection**

… addressed by Evobrutinib in RMS

- **Well Tolerated**, **no new safety signals** identified up to ~96 weeks
- Long term exposure of Evobrutinib did **not result in increase of serious infections nor lymphopenia**, consistent with Evobrutinib's mechanism of action
- Evobrutinib is **not associated with systemic side effects** (e.g. GI disturbances)
- **LFT elevations in a minority of patients restricted to first 6 months** enabling patient management through appropriate monitoring
- **Comprehensive safety characterization** based on exposure to Evobrutinib across RMS, RA and SLE studies

≥1,200 patient data base

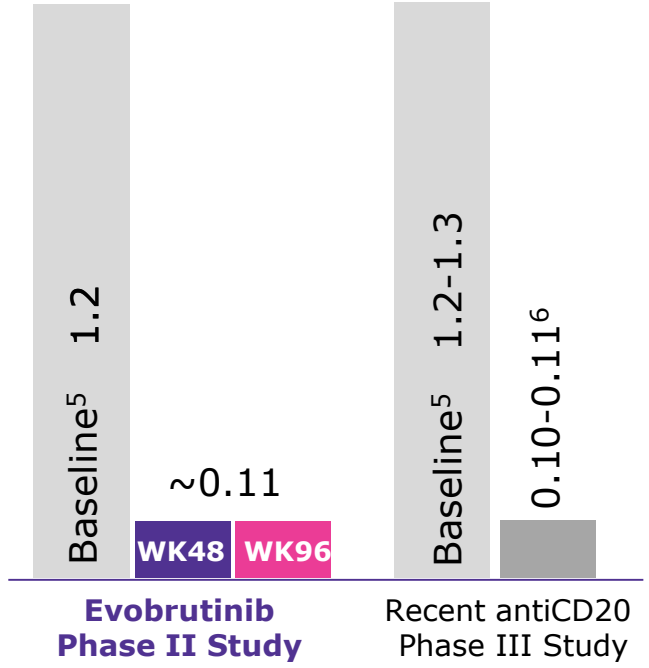
2 years+ in RMS

[1]Disease activity based on NEDA/No Evidence of Disease Activity; [2]5 Higher efficacy classes: VLA-4 (Natalizumab, IV), CD52 (Alemtuzumab, IV), CD-20 (Ocrelizumab, IV), S1PR (Fingolimod & Siponimod, Oral), Cd-ATP (Cladribine tablets, Oral); Acronyms: CNS = Central Nervous System, RMS = Relapsing Multiple Sclerosis

Evobrutinib
~96 weeks data from Phase II confirms potential for mAb like efficacy with a rapid onset of action

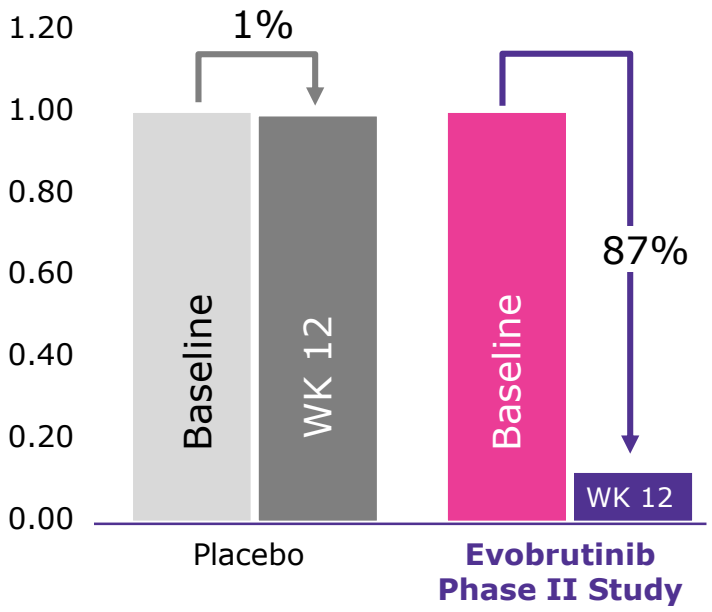
UPDATED DATA

"mAb like" Efficacy[4]



Annualized Relapse Rate

Rapid Onset of Action



Mean Number of T1 Gd+ lesions by visit[2] (Week 12 Indexed vs. Baseline)

Direct CNS and Peripheral Effects

- **Impacts B-Cells and Myeloid Cells**, which play a key role in the pathophysiology of MS
- **Crosses the blood-brain barrier[1]**
- Achieves **Brain BTKi occupancy[3]**
- **Potential to impact CNS** resident innate immunity as well as peripheral immune components

[1]Experiment in Healthy Mice (Data on file); [2]Exploratory analysis; [3]Boschert U et al. ECTRIMS 2017 [P678]; [4]Aspirational indirect comparison, no H2H studies performed; [5]Mean number of relapses in last 12 months; [6]Flexible duration, maximum duration for up to 30 months; Acronyms: BTKi = Bruton's Tyrosine Kinase inhibitor, CNS = Central Nervous System, mAb = monoclonal Antibody, Gd+ = Gadolinium Enhancing Lesions, WK = Weeks

Evobrutinib
mAb like efficacy data drives modification of Phase III study design

Initial Design
- Evobrutinib 48 wk data
- No data from H2H studies vs. Aubagio®

Modified Design
- Evobrutinib ~96 wk data
- Data from 2 H2H studies vs. Aubagio®

Impact

- Studies vs Avonex® will be replaced by **2 new studies vs Aubagio®**
- **Fundamentally unchanged study design**, POS, and cost
- **Broad network of sites selected** for study vs. Avonex® ready to pivot to modified design
- Goal is to have **Phase III RMS data in-house in Q4 2023, and filing shortly thereafter**

Acronyms: aSPMS = active Secondary Progressive Multiple Sclerosis, CIS = Clinically Isolated Syndrome, H2H = head-to-head, mAb = monoclonal Antibody, wk = weeks, POS = Probability Of Success, RRMS = Relapsing-Remitting Multiple Sclerosis; Avonex® is a registered trademark of Biogen; Aubagio® is a registered trademark of Sanofi

Life Science

Capitalizing on three key life science trends

1 COMPLEX BIOLOGICS

Single Use / End to End

Opened Wuxi site in 2018, and expanded Danvers facility

Viral Vectors

Expanded Carlsbad viral vector manufacturing site in 2016; further doubling of capacity planned for 2021

Antibody Drug Conjugates (ADC)

Launched ADC Express™ for the rapid production of ADCs

2 DIGITAL UNIVERSE

#1 eCommerce site in Life Science[1]

- **>90%** of Millipore products on eCommerce platform
- **x2** net sales growth of eCommerce vs. non-eCommerce[2]

3 ASIA

Manufacturing/Distribution

Nantong, Wuxi Single use

Commercial expansion

Tier 2 cities

eCommerce partnership

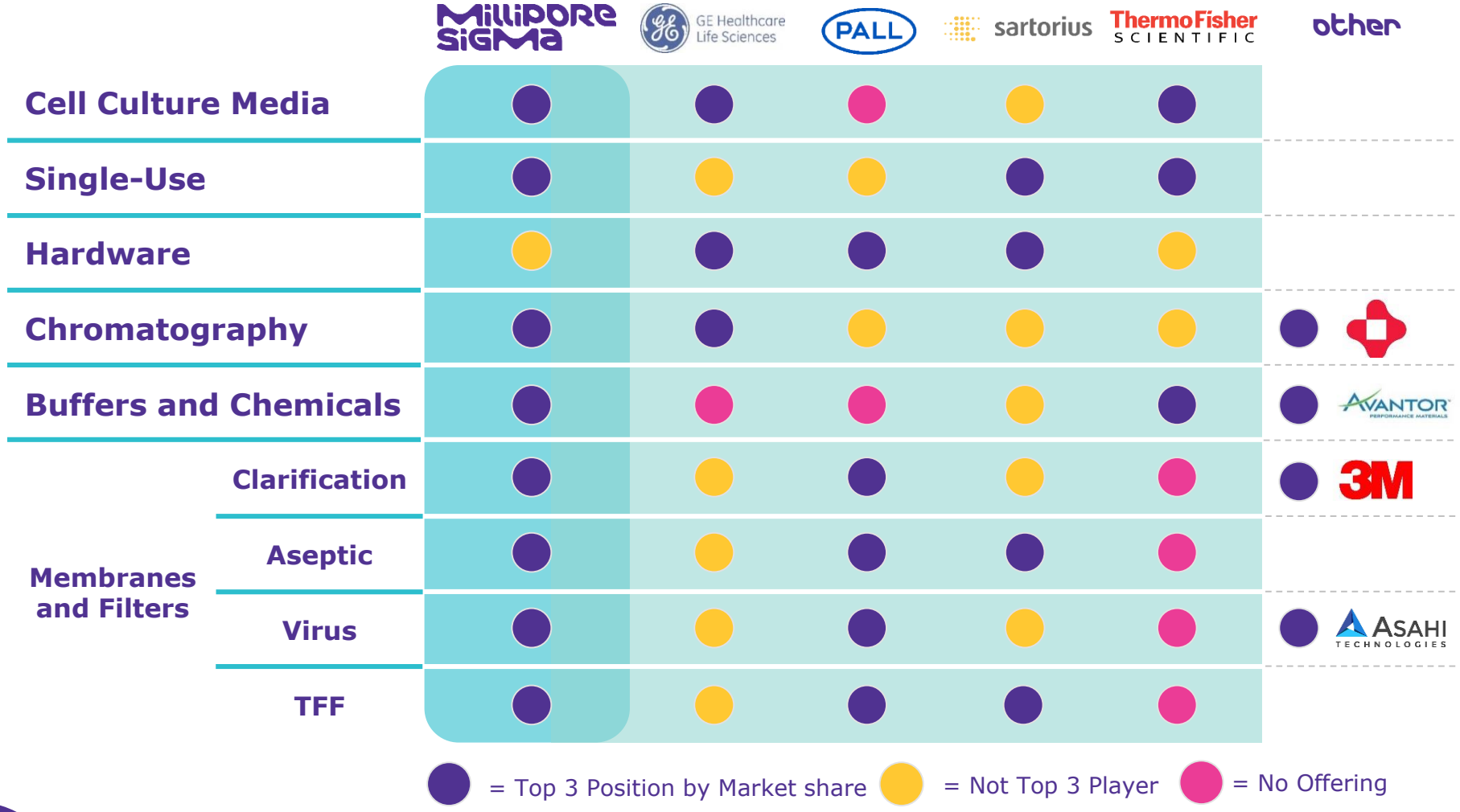
Alibaba Group 阿里巴巴集团

[1]measured by traffic, rated by external service SimilarWeb; [2]by business segment within Life Science

Process Solutions

We are the only company to span the entire value chain of our customers

2018 Market share position estimate[1]



Life science has a leading position in 8 out of 9 critical steps

[1]Based on internal Life Science market research; TFF = tangential flow filtration

Process Solutions

Next-generation bioprocessing on the cards

Today's process & portfolio

Make

purify

CHOZN Cell Line

Ex-Cell® Advanced™ media

Mobius® bioreactor

Clarisolve® Depth Filters

Eshmuno® Chrom. resin

Viresolve® Pro Solution

ProSep® Ultra Plus Resin

Opticap® Filters

Launched 2018

Pellicon® Ultrafiltration Cassettes

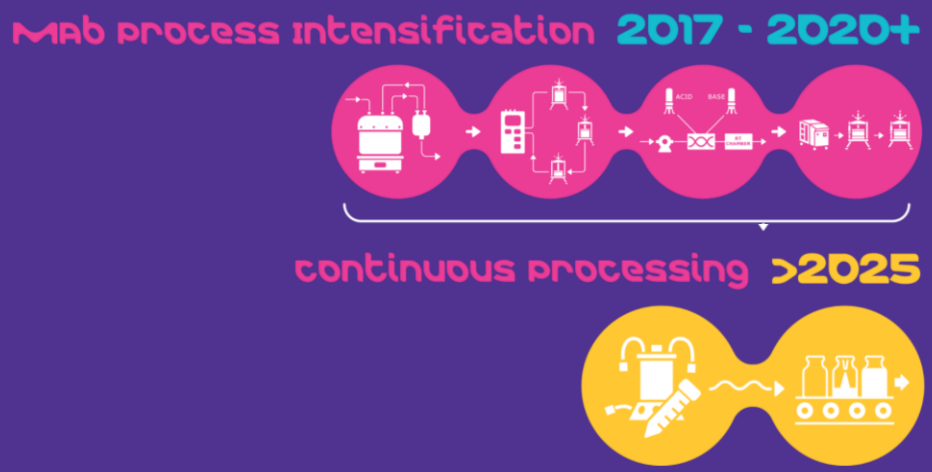
Durapore® Filtration

Launched 2018

Millipak® Final Fill Filter

BioReliance ® | **cGMP SOLUTIONS & SERVICES** | **EMPROVE®**

Tomorrow's process

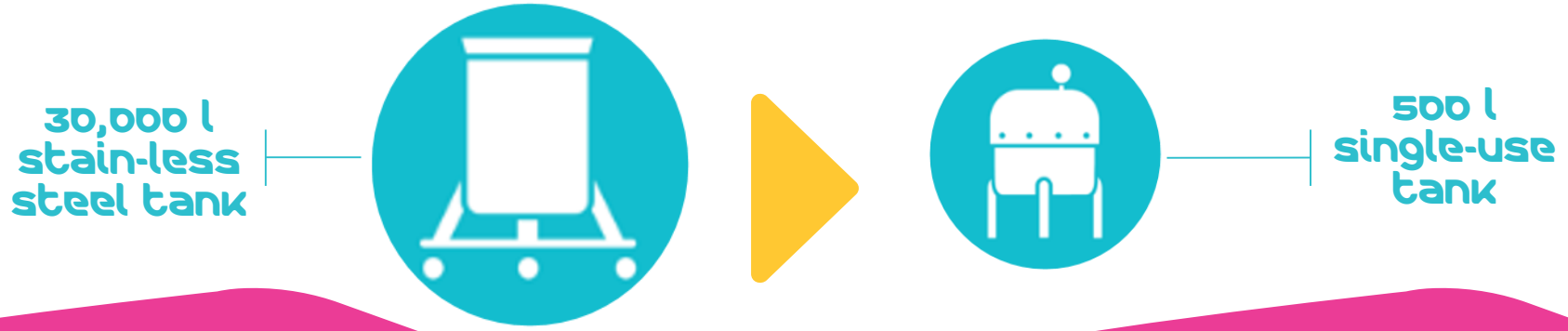


Continuous bioprocessing will …

- be an evolution in mAb bioprocessing
- take time to establish
- leverage the present
- lead to hybrid solutions

Process Solutions

Our single-use technologies drive flexibility in modern bioprocessing



Traditional Multi-use facility	
CAPEX* required	**~$500 m to $1 bn**
Time to construct	**5 to 10 years**
Change over time	**4 weeks**
Footprint	**~>70,000 m²**

Innovative single-use facility	
CAPEX required	**$20 m to $100 m**
Time to construct	**1.5 years**
Change over time	**0.5 days**
Footprint	**~11,000 m²**

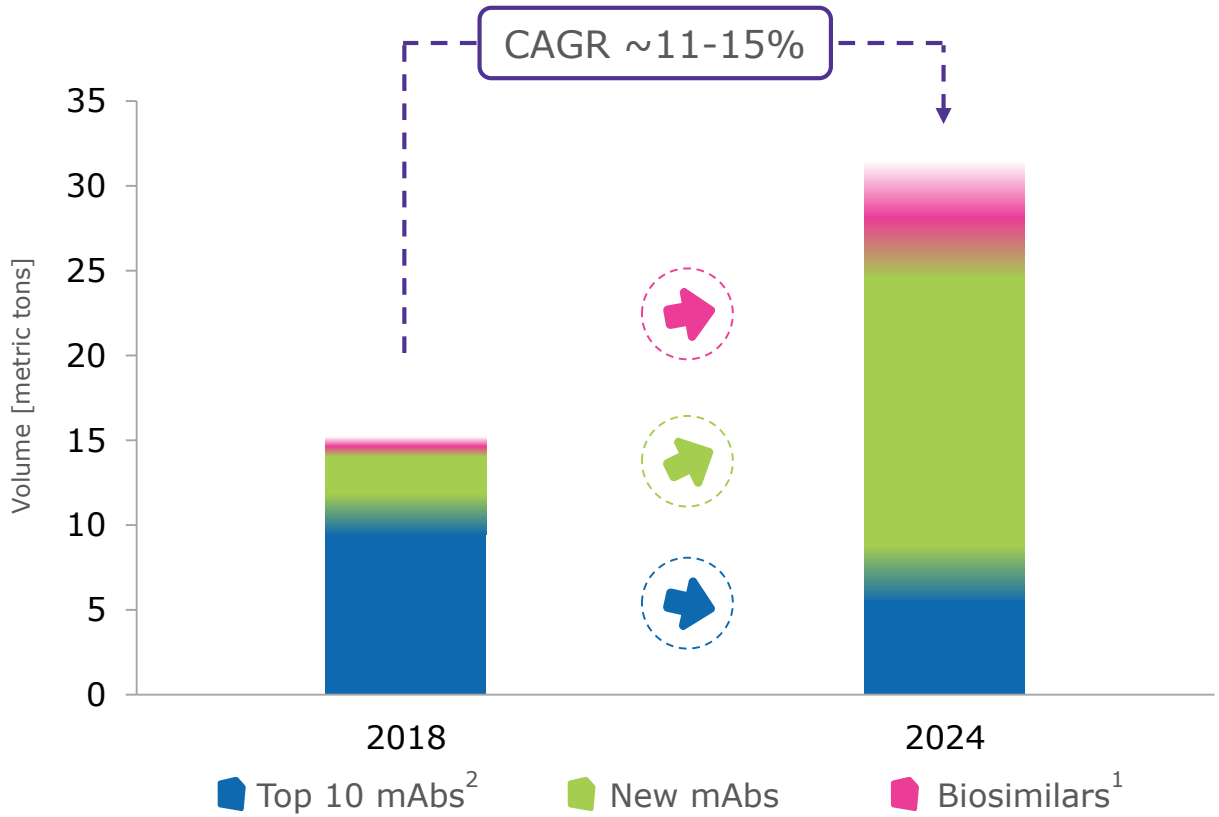
Strong demand for single-use technologies and Process Solutions' broad offering was and will remain a key source of growth for Life Science

*CAPEX = Capital Expenditure

Life Science

Democratization of mAbs market will drive diversification, change, variability

mAb volume projections 2018 to 2024



Market development

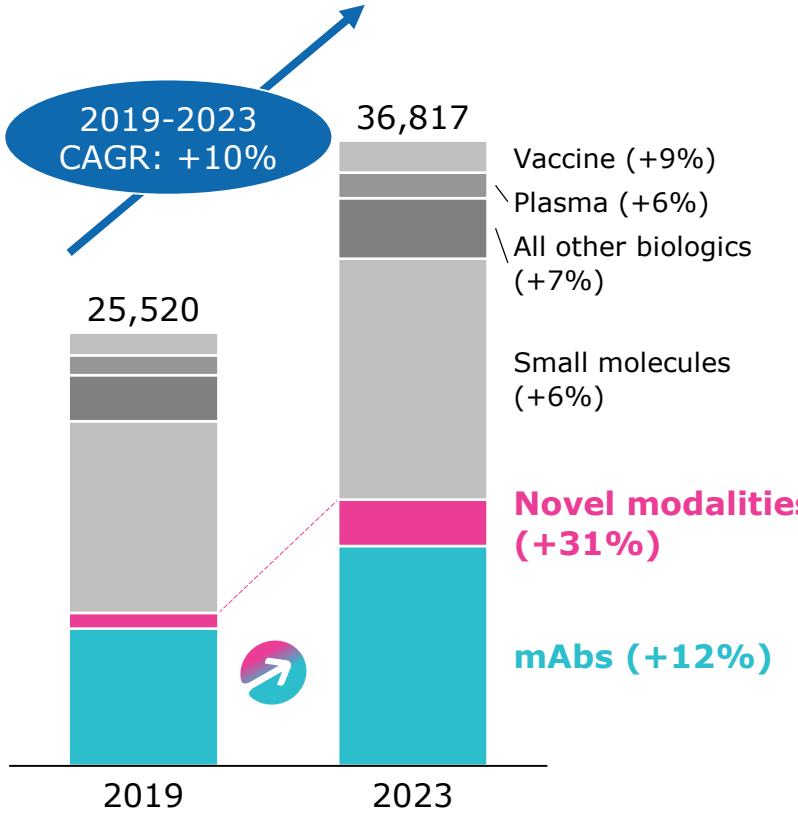
- Overall mAbs market will grow ~11-15% CAGR
- Top 10 originator mAbs represent ~ 60% of market volume today and will decline to ~20% in 2024
- Biosimilars will gain share

[1]Biosimilars scaling factor = 2.8 based off internal estimates and McKinsey analysis; [2]Top 10 mAbs by 2017 volume, includes Enbrel.
Source: EvaluatePharma | Sept 2018; mAbs = Monoclonal antibodies

Life Science

Proccess Solutions: Growth opportunities beyond mAbs

Growth potential by segment
Accessible market [€m], 2019-2023 CAGR[1]



- **Diversifying products and services** in line with the new modalities coming to the market: fusion biologics, viral and gene therapies, cellular therapies
- **Leading technologies:** investments over 15 years, 20 granted CRISPR patents
- **Services:** investments in CDMO capacity for Viral Vector Manufacturing, and HP-API

- **Leading technologies:** Single Use and BioContinuum™ for intensified and continuous bioprocessing
- **Services:** Contract manufacturing for biotechs at 3 global sites

Growth market - China

- **Half of world-wide early stage mAb market** by 2022
- **A leading country** in clinical trials

- **Increased investments** into **Nantong and Wuxi manufacturing sites**
- **China's first BioReliance® End-to-End Biodevelopment Center** opened in Shanghai in 2017

[1]Evaluate Pharma market research; Novel modalities include VGT, Cell Therapy and Stem Therapy; Acronyms: CDMO = Contract Development and Manufacturing Organization, CRISPR = Clustered Regularly Interspaced Short Palindromic Repeats, HP-API = Highly Potent Active Pharmaceutical Ingredients
ased on internal Life Science market research; TFF = tangential flow filtration

Applied Solutions

Broad offering across the dynamic cell and gene therapy value chain

understand → prove → deliver

Group offering

Develop **cutting-edge tools** for scientists to

- Uncover **foundational understanding**, e.g. CRISPR patent grants in 7 geographies
- **Modify** genetic functions, e.g. CRISPR/Cas 9 tools, library and reagents, ZFN

Create **cell lines and cell models** for testing **safety and efficacy**

- Pharmacokinetics (ADME)
- Toxicology testing
- Potency model
- Examples: primary human hepatocytes, Intestine, liver and kidney assays

- Offer cGMP clinical and commercial manufacturing, e.g. manufacture **viral vectors**
- Improve the **supply chain of cell therapy**, e.g. cell and gene therapy products and services

Merck KGaA, Darmstadt, Germany is a supplier of novel products and services with a strong IP portfolio to meet the rapidly growing demand for novel therapies

Abbreviations: CRISPR = Clustered Regularly Interspaced Short Palindromic Repeats; VGT = Virology and Gene Therapy, ZFN = zinc finger nuclease; ADME = absorption, distribution, metabolism, and excretion; GMP = good manufacturing practice

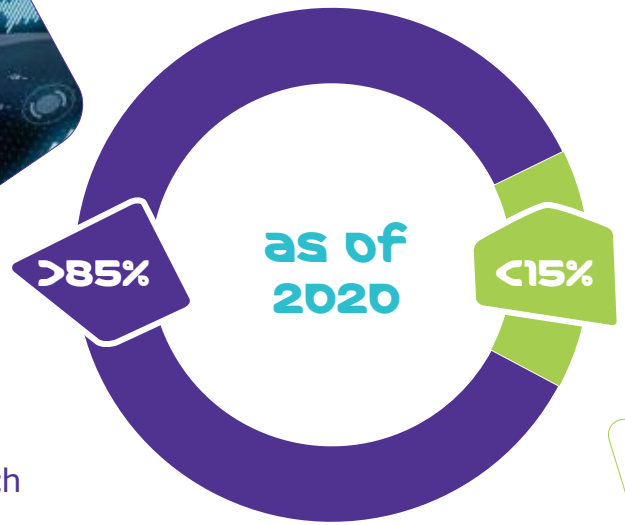
Performance Materials targets attractive markets – especially in the electronics space

Electronics Market

Market size:
~€1,450 bn
CAGR 19-24:
~4%

- Driven by digital disruptions and megatrends such as digitalization
- Heterogeneous end-user applications
- Semiconductors as the engine of all electronic systems

Performance Materials sales by end market



Automotive Market

- Driven by world GDP growth
- Increasing demand in emerging markets

Market size:
~€2,000 bn

Cosmetics Market

- Driven by world GDP growth
- Rising living standards and higher disposable income

Market size:
~€400 bn

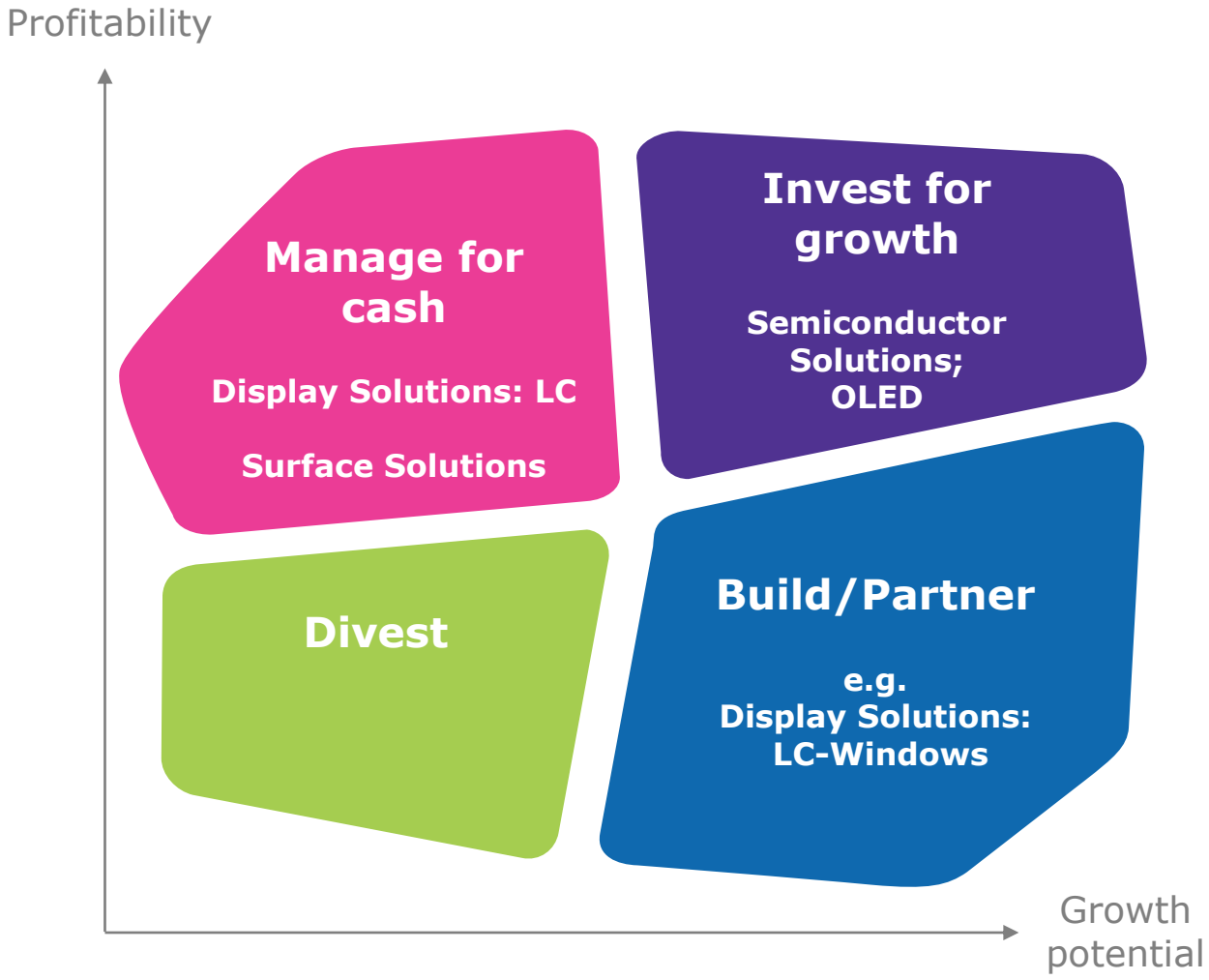
Performance Materials
Three high-tech pillars serving a diverse customer base

Business allocation within Performance Materials	% of sales[1]	Products
 semiconductor solutions	 ~54%	• Dielectrics, colloidal silica, lithography materials, yield enhancers, edge-bead removers • Polyimide raw materials, printing materials and specialty gases • Delivery equipment for gas, chemicals and CMP slurries, installation services and parts & support
 display solutions	 ~34%	• Liquid crystals (LC) and photoresists for TVs, smartphones and tablet computers • Other display and non-display applications (e.g. LC Windows) • Organic and inorganic light emitting diodes
 surface solutions	 ~12%	• Effect pigments and functional materials for coatings, plastics, printing and cosmetics • Functional materials for cosmetics & special applications • Functional materials for electronics and energy solutions

[1]based on Q1 2020

Performance Materials

Business portfolio management drives capital allocation and enables future value creation



Invest for growth

- Strong and sustainable market growth
- Leading positions and attractive growth opportunities

Manage for cash

- Mature and lucrative market segments
- Invest in extension, while managing for profit

Build or Partner

- Early industry cycles with strong potential
- Strictly prioritize and diversify risk

Divest

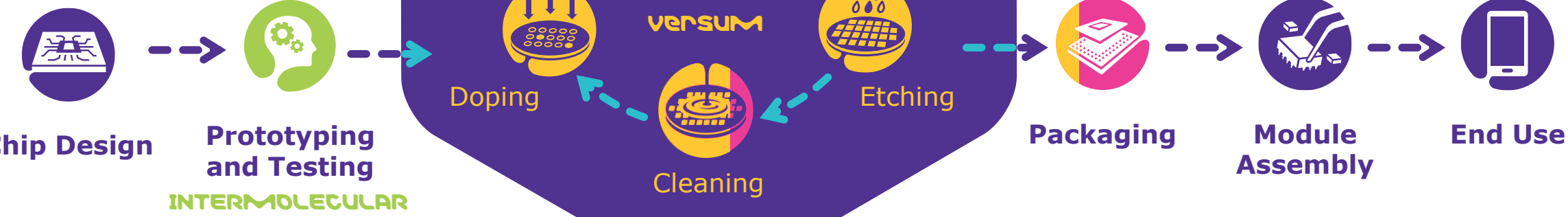
- Regular review for better strategic owner

Performance Materials

Semiconductor Solutions even stronger with Versum and Intermolecular

Newly combined portfolio offers **End2End solutions** with leading positions in **high growth segments**

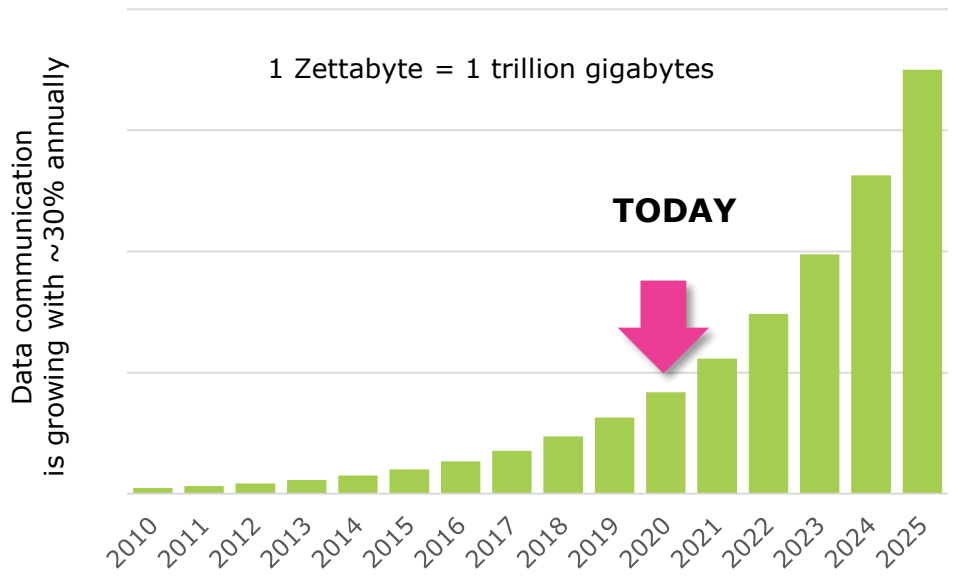
Wafer processing offers **highest value creation potential** along the semiconductor value chain



Semiconductor Solutions – Data explosion driving secular growth

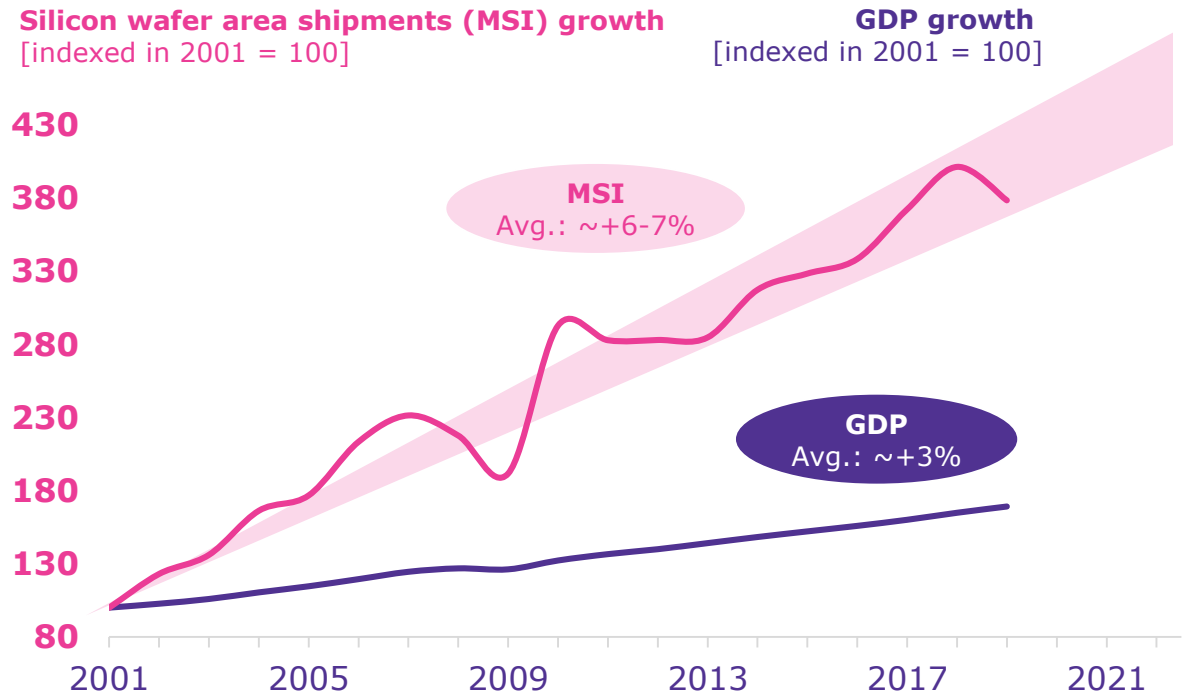
End-market – Data driving growth of electronics industry[1]

Size of global data sphere in zettabytes[1]



- Data **volumes growing at ~30% annually**
- **Driving the digital revolution** as semiconductors are required for data processing and storage

Silicon wafer area shipments– Sustainable long-term growth[2]

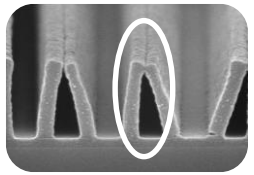


- Silicon wafer area shipments (MSI) **strongly correlated with semiconductor market growth**
- **Opinions on MSI development during 2020 vary**

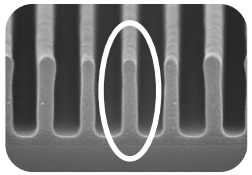
[1] IDC DataAge 2025 Whitepaper; [2] SEMI Silicon Manufacturers Group; Semi.org; ESF July 2019; Prismark; Linx June/July 2019, Silicon wafer area shipments are for semiconductor applications only and do not include solar applications; Acronyms: GDP = Gross Domestic Product, MSI = Million of Square Inches

Expanding the limits of how small you can go

Pattern collapse

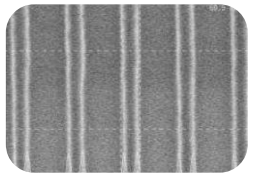


AZ FIRM® rinse materials



As lines get narrower and closer together in advanced chip generation, lines tend to “stick” due to surface tension.

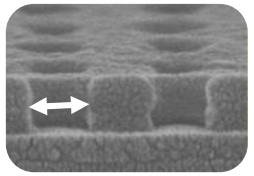
Lithography limitation



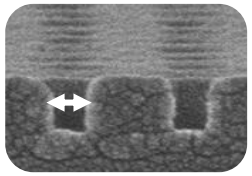
Directed self-assembly (DSA)

Block copolymer can generate small lines or contact holes by self-assembly. This allows miniaturization without expensive new equipment.

Wide features



AZ Relacs® shrink materials



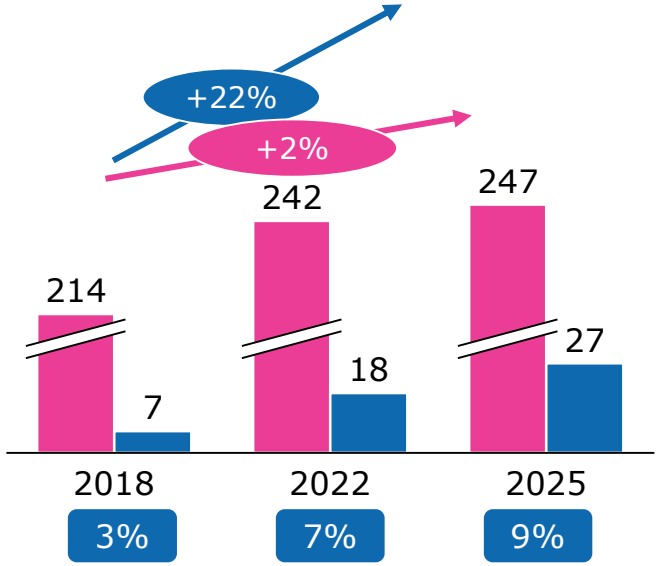
Shrink materials “shrink” the gap between lines and, hence, allow the manufacture of narrower features otherwise not possible.

Merck KGaA, Darmstadt, Germany delivers highly innovative solutions for complex customer problems

Display Solutions - OLED material market to exceed LC material market by 2022

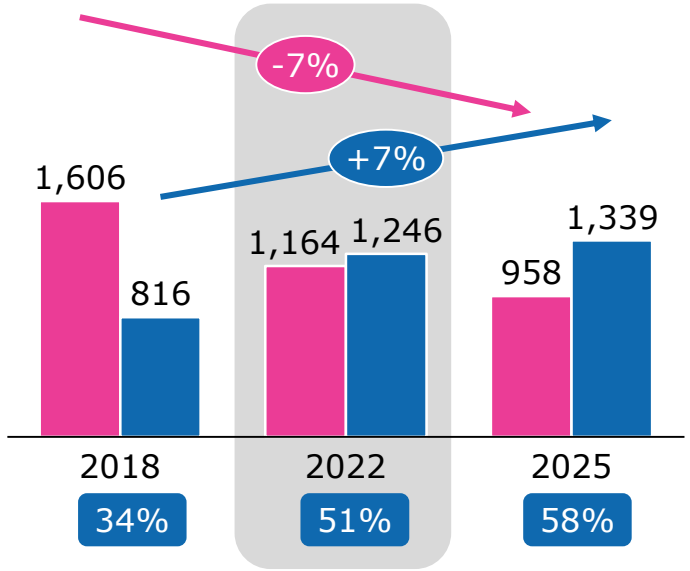
Liquid Crystals OLED

Display shipment area[1] [km²]



- **Continued growth** across all technologies
- **OLED growing faster than LCD,** but **LCD to command 90+% area share** for forseeable future

Addressable material market[2] [€m]



- **Material value** per OLED display **higher** than in LCD
- **OLED material market** to **exceed LC material market by 2022**, but market split between **many more players**

x% OLED shipment area / addressable material market [in % of total]

Portfolio Role

Manage for cash

Liquid Crystals
Surface Solutions

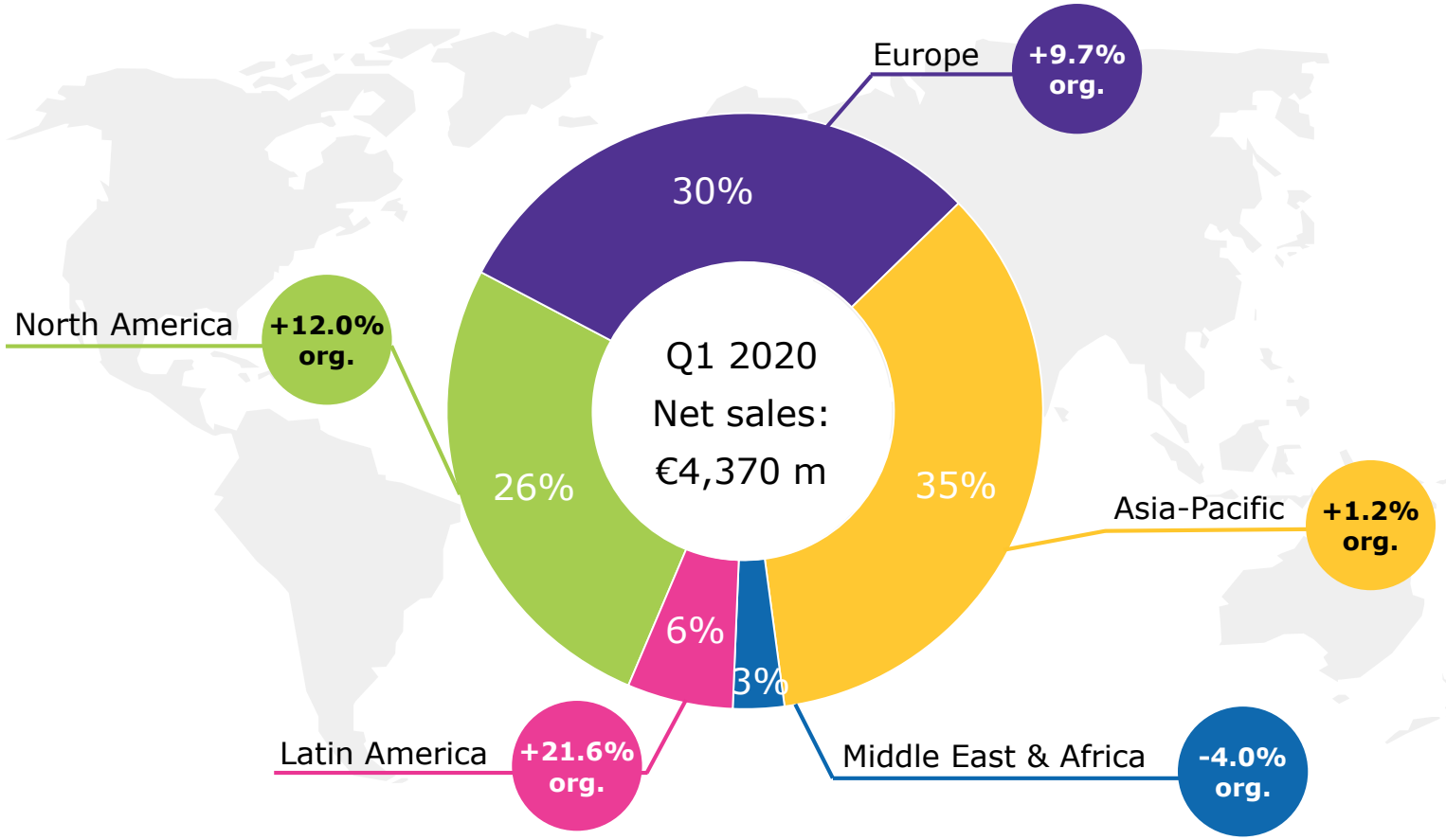
Invest for growth

Semiconductor Solutions
OLED

[1]OMDSIA; [2]Internal Business Intelligence; Acronyms: LCD = Liquid-Crystal Display, OLED = Organic Light Emitting

Organic growth driven by North America, Europe and Latin America

Regional breakdown of net sales [€m]



Regional organic development

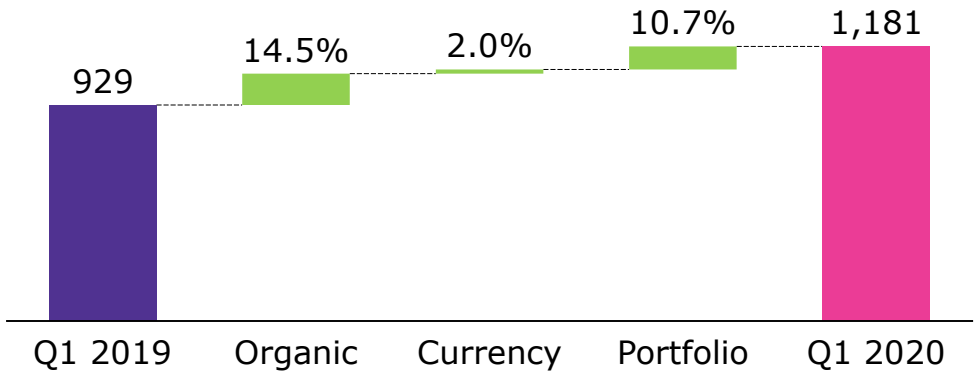
- About stable APAC due to double-digit growth of General Medicine, more than offsetting COVID-19 related flat Life Science and decline in Display Solutions
- Strong Europe driven by double-digit growth in General Medicine and Process Solutions and support from Mavenclad®
- North America reflects robust demand in Life Science and strong uptake of Mavenclad®
- Double-digit growth in LATAM from strong Healthcare & Life Science demand
- Middle East and Africa with moderate decline due to phasing in Healthcare

Healthcare and Life Science fuel strong organic top- and bottom-line performance; significant portfolio effect from Versum

Q1 YoY Net Sales	Organic	Currency	Portfolio	Total
Healthcare	15.3%	-0.4%	0.0%	14.9%
Life Science	5.6%	0.9%	0.0%	6.5%
Performance Materials	-5.4%	2.4%	52.1%	49.0%
Group	**7.6%**	**0.6%**	**8.4%**	**16.7%**

- Healthcare with double-digit growth from strong General Medicine (in parts supported by COVID-19 driven pull-in effect), continued Mavenclad® ramp-up, and strong demand for Oncology
- Life Science reflects double-digit growth of Process Solutions overcompensating temporarily lower demand for Applied and Research Solutions amidst COVID-19 pandemic
- Performance Materials shows expected strong uptake of Semiconductor Solutions offset by declining market demand in Display and in Surface Solutions impacted by COVID-19

Q1 YoY EBITDA pre



- EBITDA pre growing twice as fast as net sales organically fueled by strong top-line growth, and cost consciousness further benefitting from reduced travel & events during COVID-19 pandemic
- Positive FX tailwinds on EBITDA pre mainly from U.S. dollar and major Asian currencies

Totals may not add up due to rounding

Q1 2020: Overview

Key figures

[€m]	Q1 2019	Q1 2020	Δ
Net sales	3,746	**4,370**	16.7%
EBITDA pre	929	**1,181**	27.2%
Margin (in % of net sales)	*24.8%*	*27.0%*	
EPS pre	1.13	**1.50**	32.7%
Operating cash flow	493	**516**	4.9%

[€m]	Dec. 31, 2019	March 31, 2020	Δ
Net financial debt	12,363	**12,285**	-0.6%
Working capital	3,944	**4,392**	11.3%
Employees	57,071	**57,451**	0.7%

Comments

- Net sales driven by organic growth of Healthcare and Life Science, further fueled by portfolio effect from Versum
- EBITDA pre & margin increase due to strong operating leverage in Healthcare and Life Science
- EPS pre growing faster than EBITDA pre supported by better financial result
- Higher operating cash flow reflects strong business performance partially compensated by trade account receivables build-up due to COVID-19
- Working capital follows business activity

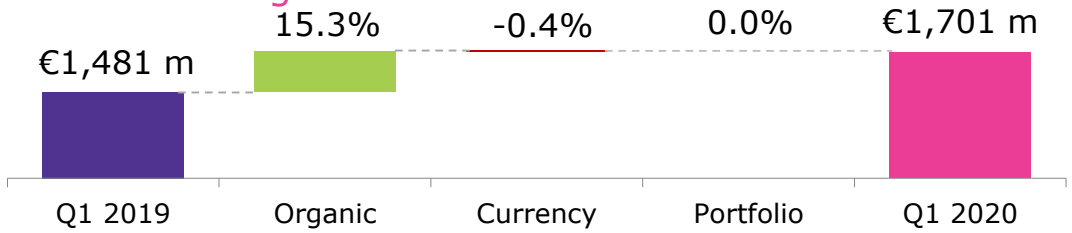
Totals may not add up due to rounding

Healthcare: Strong General Medicine supported by COVID-19 pull-in effect and ongoing Mavenclad® uptake; improved margins from top line leverage

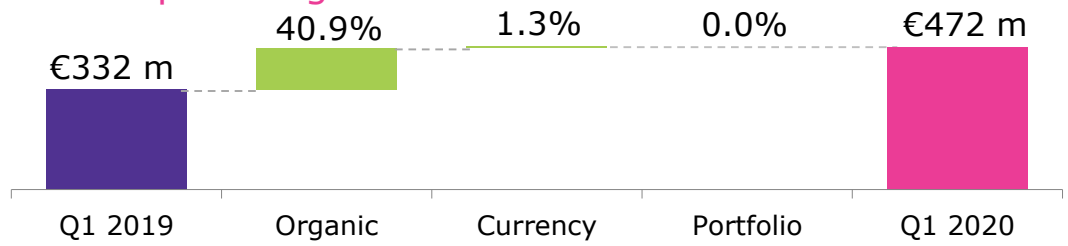
Healthcare P&L

[€m]	Q1 2019	Q1 2020
Net sales	1,481	**1,701**
Marketing and selling	-550	**-423**
Administration	-88	**-79**
Research and development	-380	**-417**
EBIT	128	**422**
EBITDA	329	**501**
EBITDA pre	332	**472**
Margin (in % of net sales)	*22.4%*	***27.8%***

Net sales bridge



EBITDA pre bridge



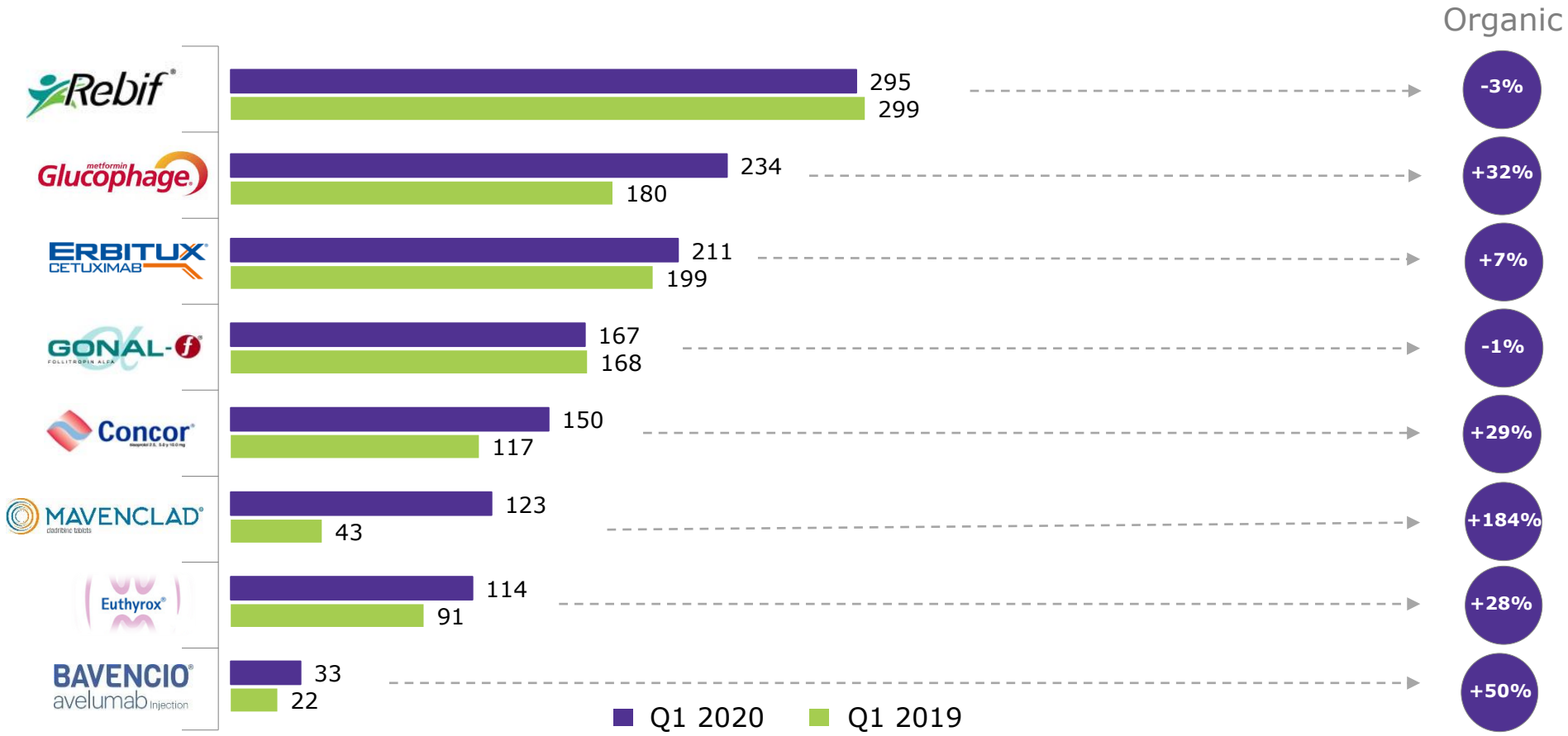
Comments

- Strong demand in General Medicine supported by COVID-19 pull-in and phasing
- Mavenclad® growth vs. Q1 2019, especially in U.S.; however about flat vs. Q4 2019 due to COVID-19, while Rebif® posts less pronounced decline explained by U.S. inventory effects, and Russia tender phasing
- Strong growth of Erbitux® particularly in Europe offsetting weaker China amidst COVID-19; Bavencio® developing as expected
- Moderate Fertility decline from COVID-19 impact most pronounced in China; strong first quarter in U.S.
- M&S decrease due to stringent cost management, resource prioritization across franchises and expired amortization of Rebif®
- R&D cost control offset by Avelumab H&N study termination accrual (-€15 m)
- Higher EBITDA pre driven by strong top-line performance and rigorous cost management

Totals may not add up due to rounding

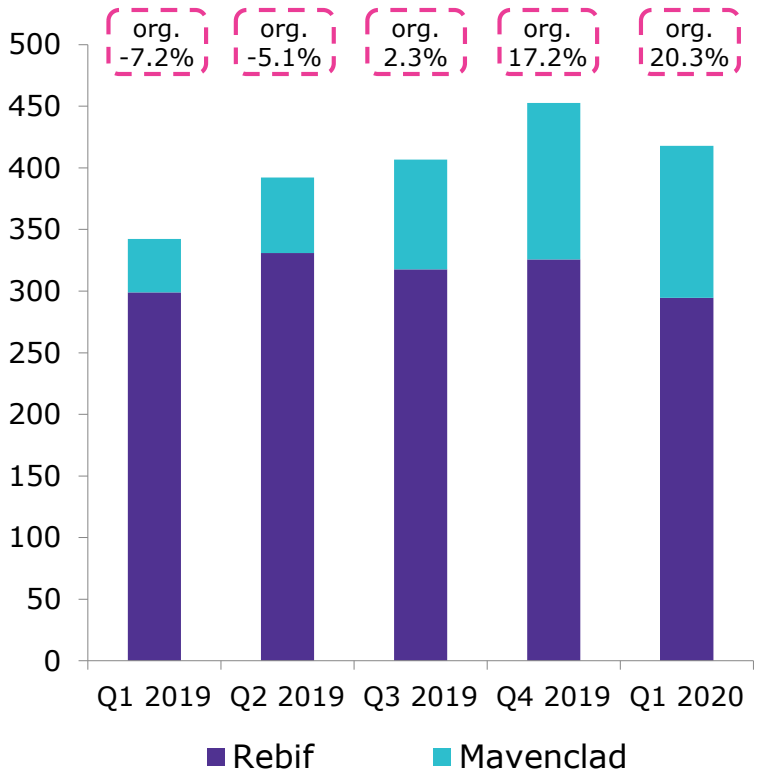
Healthcare organic growth by franchise/product

Q1 2020 organic sales growth [%] by key franchise/products [€m]

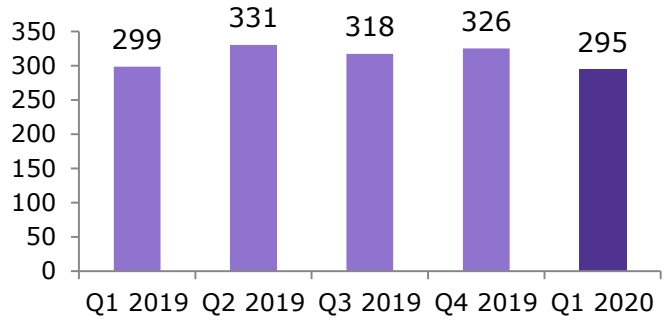


Neurology & Immunology: Paused Mavenclad® ramp up amid Covid-19 uncertainties offset by slower than anticipated organic Rebif® decline

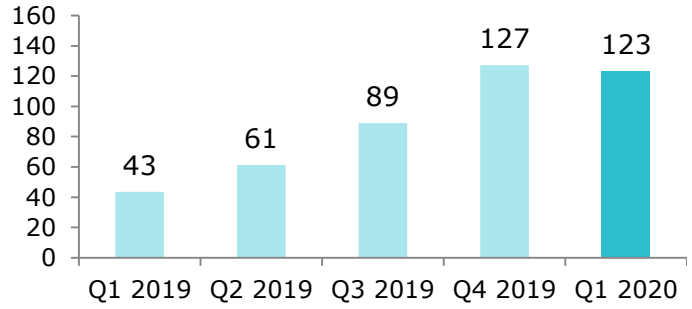
Sales development NDI, [€m]



Rebif® net sales, [€m]



Mavenclad® net sales, [€m]

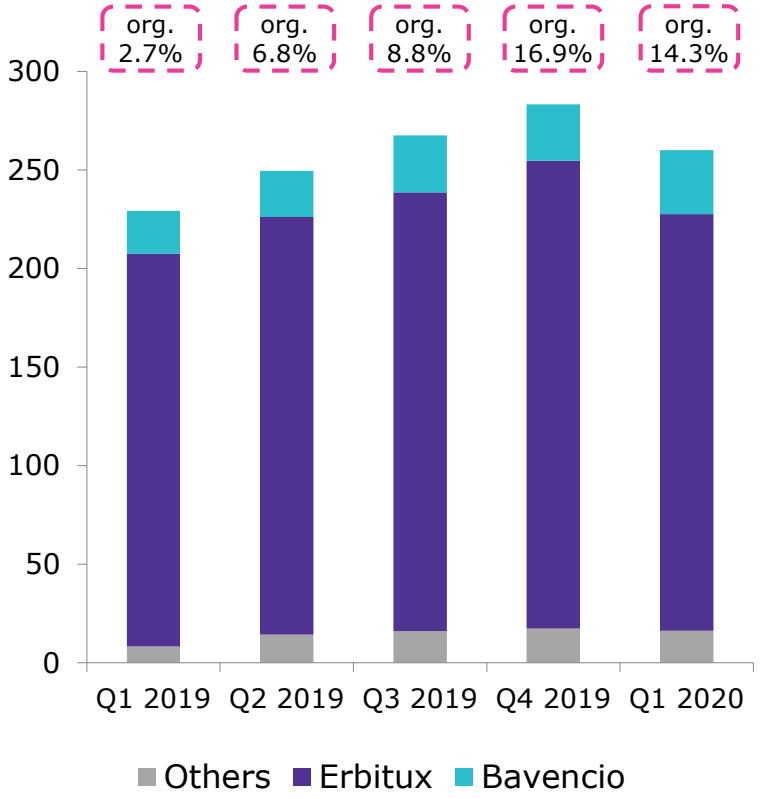


- Rebif® sales of €295 m in Q1 '20 reflect lower organic decline of -3.4%, further mitigated by FX effect of +2%
- Slower than anticipated U.S. decline from inventory effect while ex-U.S. remains stable
- Q-o-Q decline more pronounced against exceptionally strong Q4 '19 from rebate provision releases

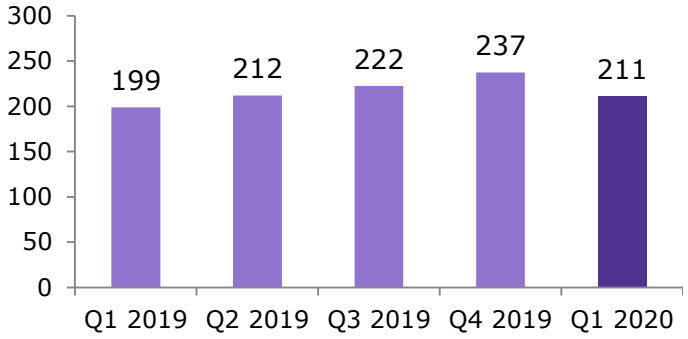
Mavenclad® nearly tripling vs. Q1 '19 but flattish vs. Q4 '19 amid COVID-19 uncertainties in Europe and U.S.

Oncology: High double-digit growth in Bavencio®, while Erbitux® is impacted by interruption of infusion treatment protocols due to COVID-19

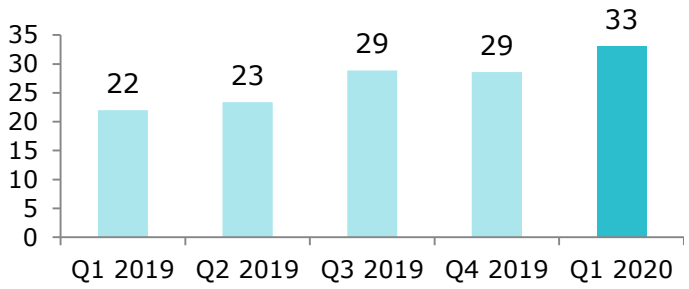
Sales development Oncology, [€m]



Erbitux® net sales, [€m]



Bavencio® net sales, [€m]

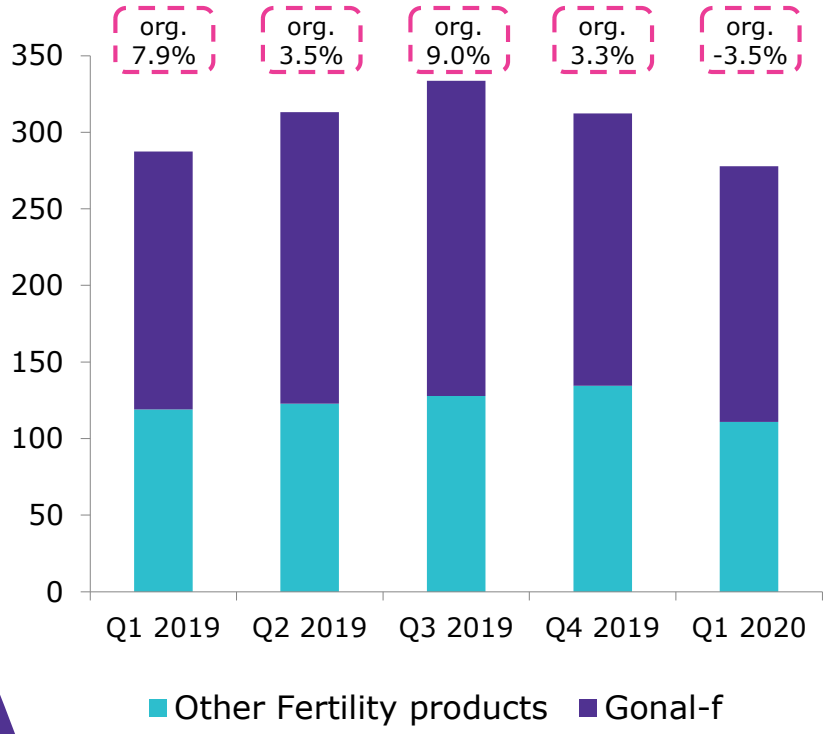


- Absolute sales of €211 m reflect 6.1% growth in Q1 (org. 7.1%; FX -1.0%)
- Erbitux® : COVID-19 related slowdown in APAC (org. +0.6%) offset by double-digit growth in Europe due to tender phasing

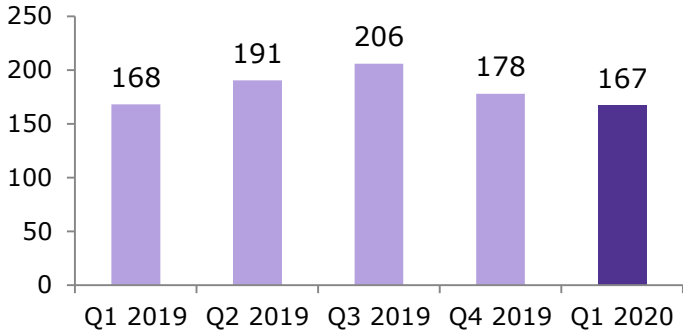
Recent Bavencio® approvals for RCC in U.S., Europe and Japan fuel 50,3% growth in Q1 (org. 49.8%; FX -0.5%)

Fertility: As anticipated, strongest COVID-19 impact among all franchises particularly pronounced in China, Central and Western Europe

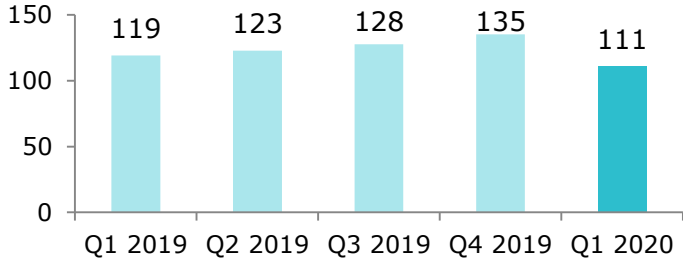
Sales development Fertility, [€m]



Gonal-f® net sales, [€m]



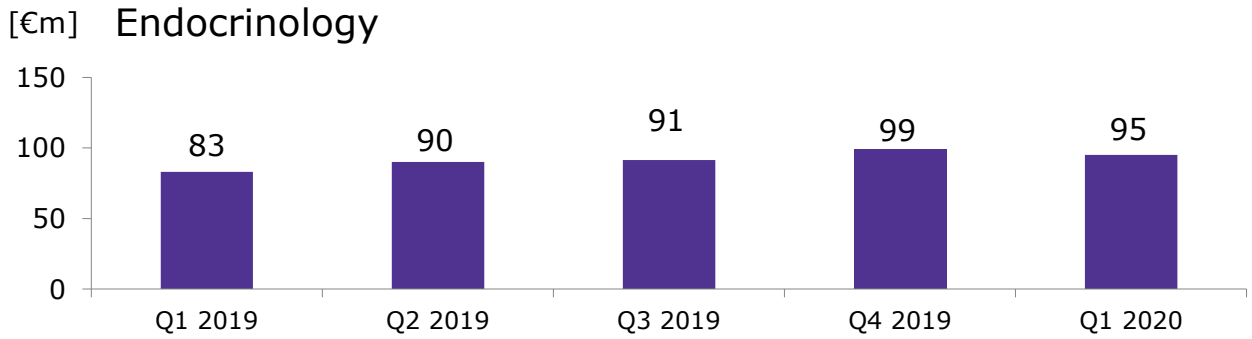
Other Fertility net sales, [€m]



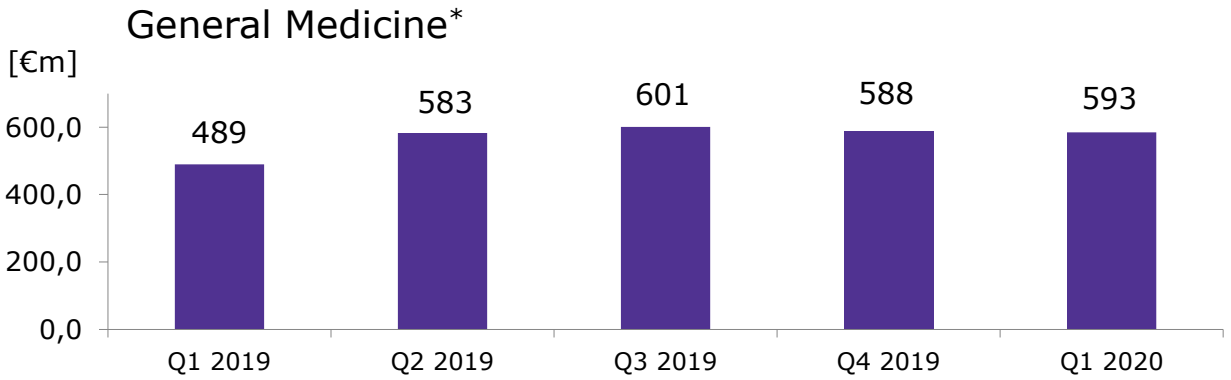
- Entire Fertility portfolio shows a moderate organic decline of -3.5% primarily due to COVID-19
- COVID-19 triggering nearly 50% sales decline in China, offset partially by strong growth in North America
- Milder decline in Gonal-f® (org. -1.2%; FX 0.4%) explained by different quarterly phasing in North America

General Medicine and Endocrinology: Strong growth further accelerated by stocking effects more than offsetting negative COVID-19 impact in China

Sales evolution



Organic
+16.0% org.



Organic
+21.7% org.

Q1 2020 organic drivers

- Endocrinology reflects strong demand for Saizen® particularly in APAC and Latin America partially explained through competitor stockout
- Continuously strong demand for Glucophage® further accelerated in APAC (org. +39%), Latin America (org. +33%), and Europe (org. +18%) due to COVID-19 related trends

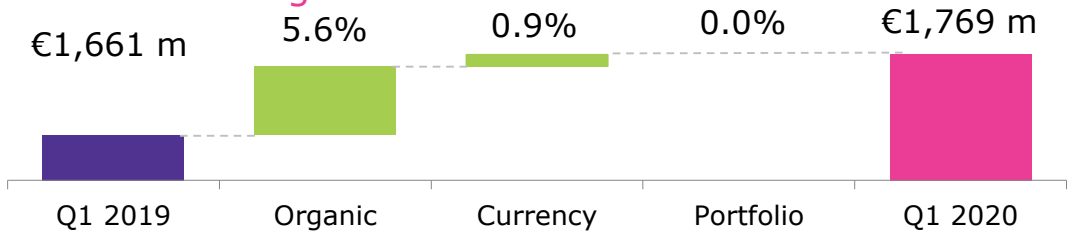
*includes CardioMetabolic Care & General Medicine and Others; ERP = Enterprise resource planning;

Life Science: Showing strong resilience, Process Solutions with double-digit growth, Research and Applied flat

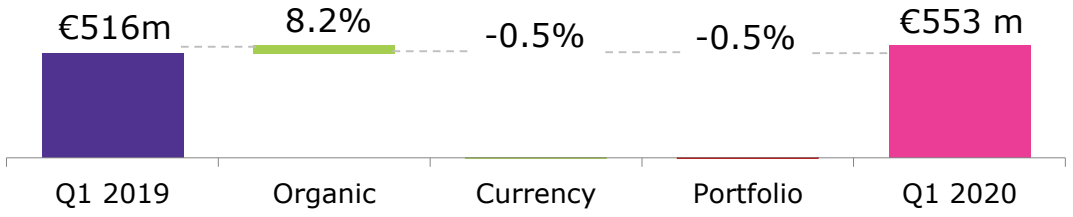
Life Science P&L

[€m]	Q1 2019	**Q1 2020**
Net sales	1,661	**1,769**
Marketing and selling	-470	**-498**
Administration	-88	**-89**
Research and development	-62	**-75**
EBIT	313	**345**
EBITDA	507	**541**
EBITDA pre	516	**553**
Margin (in % of net sales)	*31.0%*	***31.2%***

Net sales bridge



EBITDA pre bridge



Comments

- Double-digit growth of Process Solutions mainly driven by downstream and single use, with COVID-19 demand contributing
- About stable Applied Solutions reflects high comps and decline in lab water due to inaccessibility of labs
- Research Solutions flat: increased demand of bulk chemicals offset by temporary slowdown in academia due to COVID-19
- Higher M&S reflecting increased logistics cost
- Increased R&D driven by investments in strategic projects
- EBITDA pre reflects operational leverage from strong top-line growth

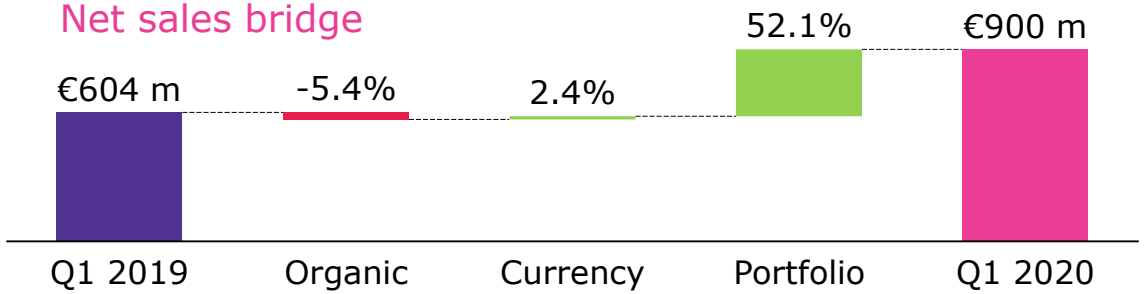
Totals may not add up due to rounding

Performance Materials: Strong Semi more than offset by LC's accelerated underlying negative trajectory and declining Surface amid COVID-19

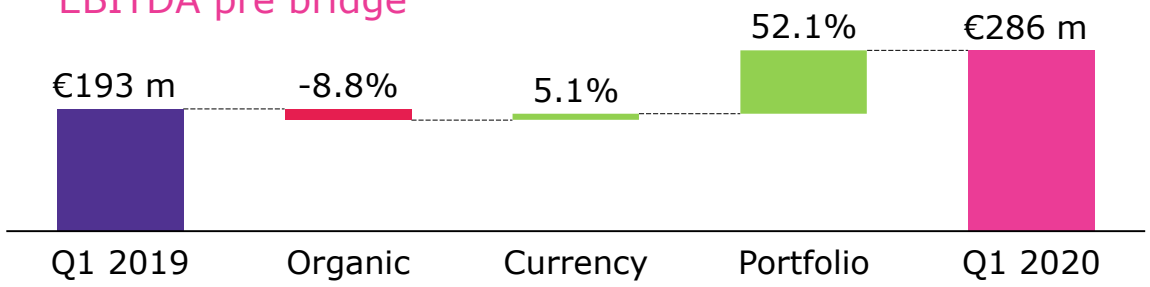
Performance Materials P&L

[€m]	Q1 2019	**Q1 2020**
Net sales	604	**900**
Marketing and selling	-66	**-136**
Administration	-23	**-38**
Research and development	-72	**-71**
EBIT	95	**116**
EBITDA	157	**251**
EBITDA pre	193	**286**
Margin (in % of net sales)	*31.9%*	***31.7%***

Net sales bridge



EBITDA pre bridge

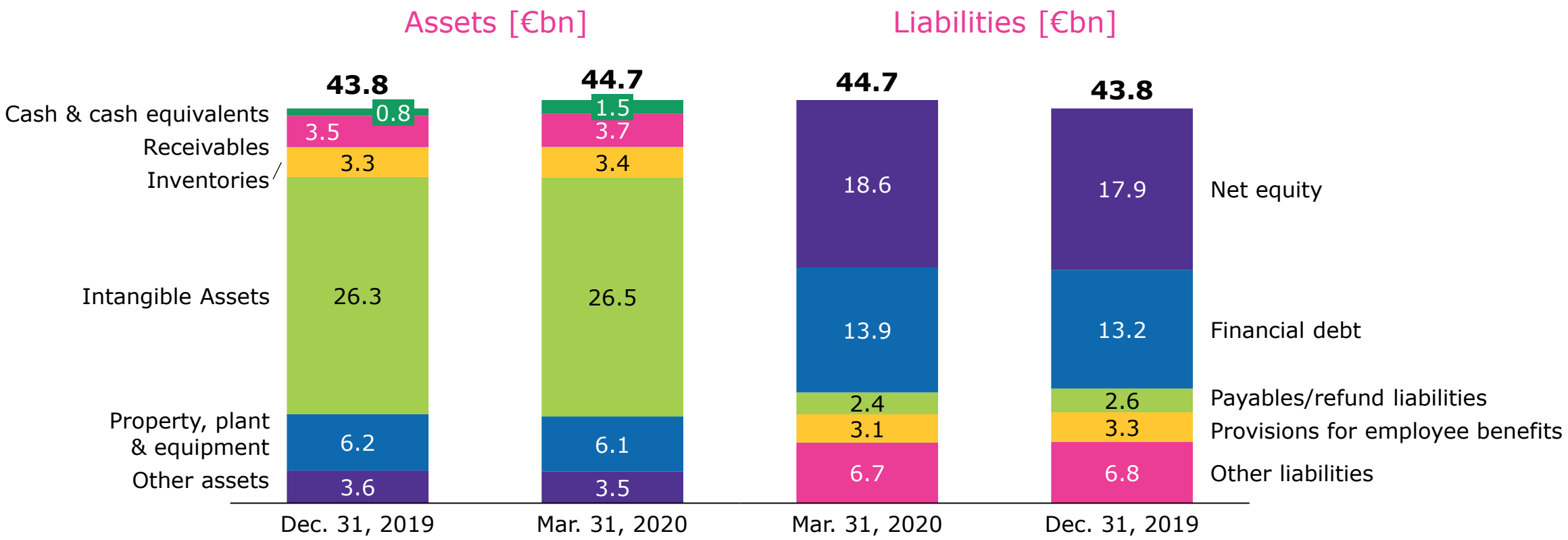


Comments

- Sales growth of nearly 50% reflects portfolio effect from Versum and positive FX, overcompensating organic decline
- Display Solutions: LC's negative underlying trajectory with high comps, not yet significantly impacted by COVID-19; OLED impacted
- Semiconductor Solutions showing strong growth, both organically as well as for Versum portfolio; recovery started already in Q1
- Surface Solutions decline driven by impact of COVID-19 on the Automotive and Cosmetics industries
- M&S reflects consolidation of Versum acquisition and diligent underlying cost management in framework of Bright Future transformation
- R&D staying flat due to Bright Future related provisions in Q1 2019, while Q1 2020 includes Versum consolidation
- Increase in EBITDA pre largely reflects consolidation effect from Versum

Totals may not add up due to rounding

Balance sheet

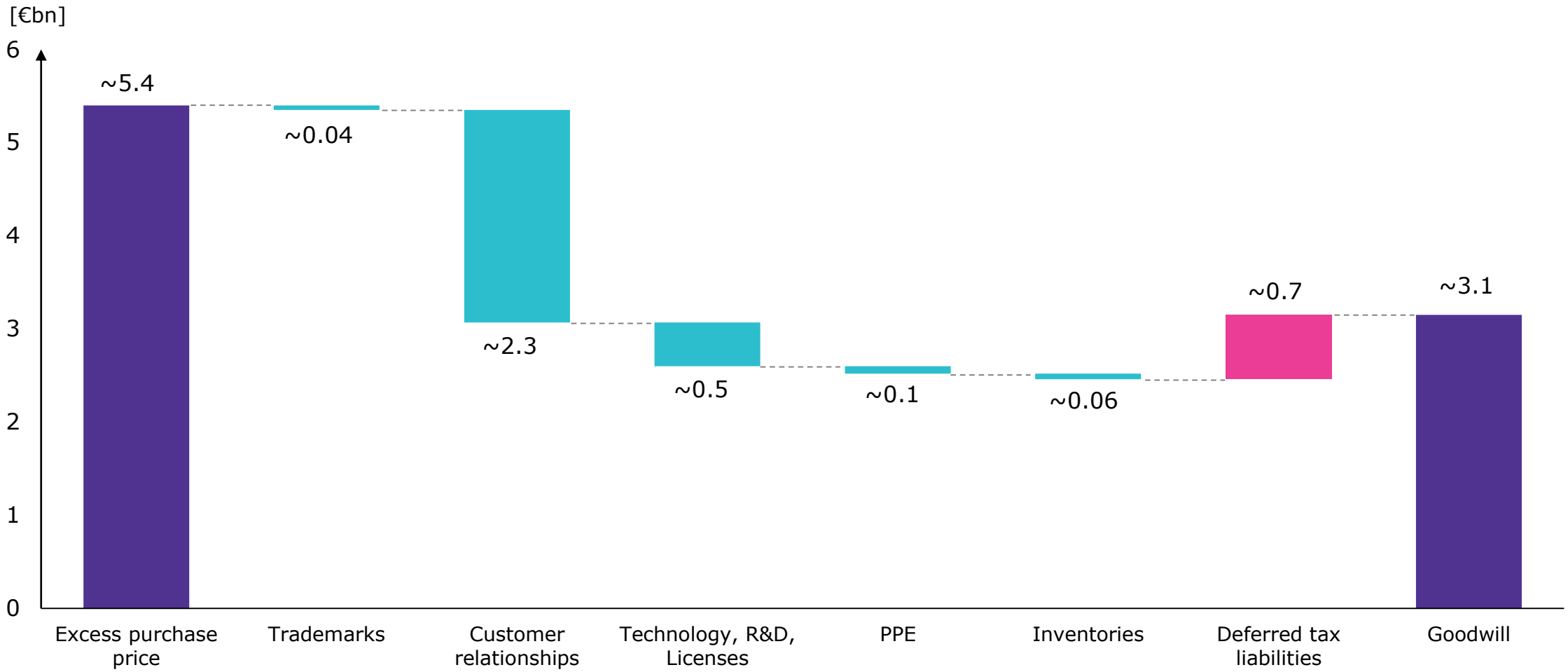


- Balance sheet reflects consolidation of Versum since Dec. 31 2019
- Higher cash (+€750 m) is driven by securing liquidity given the COVID-19 pandemic

- Increase in equity mainly driven by profit after tax and FX translations (equity ratio of 41.6%)
- Financial debt increase reflects new bonds (€1.5 bn) and utilization of available credit lines partially offset by due bonds repayment (€2.0 bn)

Totals may not add up due to rounding

Versum balance sheet effects



Amortization of intangible assets from Versum PPA*: ~€230 – 250 m p.a.

Totals may not add up due to rounding; Preliminary numbers (in line with IFRS3); no major changes expected;
*Purchase price allocation

Reported figures

Reported results

[€m]	Q1 2019	Q1 2020	Δ
EBIT	379	**716**	89.0%
Financial result	-113	**-98**	-12.5%
Profit before tax	266	**617**	131.9%
Income tax	-67	**-159**	137.4%
Effective tax rate (%)	*25.2%*	***25.8%***	
Net income	189	**456**	141.9%
EPS (€)	0.43	**1.05**	144.2%

Comments

- Higher EBIT driven by strong top line growth in Healthcare and Life Science as well as consolidation of Versum and divestment gain from Allergopharma*
- Financial result benefits from comparison with last years' revaluation of F-Star purchase option (-€45 m) partially offset by the current year higher interest expense related to Versum financing
- Effective tax rate within guidance range of ~24-26%
- Higher net income and EPS reflects higher EBIT and better financial result

* closed March 31st ,2020

Totals may not add up due to rounding

Cash flow statement

Q1 2020 – cash flow statement

[€m]	Q1 2019	Q1 2020	Δ
Profit after tax	190	**458**	268
D&A	474	**431**	-42
Changes in provisions	100	**16**	-84
Changes in other assets/liabilities	-89	**-23**	66
Other operating activities	-4	**-10**	-6
Changes in working capital	-178	**-356**	-178
Operating cash flow	493	**516**	24
Investing cash flow	-329	**-288**	41
thereof Capex on PPE	-209	**-341**	-132
Financing cash flow	-3	**542**	545

Cash flow drivers

- Profit after tax driven by higher EBIT and Allergopharma disposal* gain, neutralized in other operating activities
- D&A lower mainly from expired Rebif® amortization, compensated by Versum
- Changes in provisions reflect last year's build up for transformation programs
- Increased working capital driven by trade accounts receivables in Life Science partially impacted by COVID-19
- Higher financing cash flow reflecting new bond issuance (€1.5 bn) and utilization of available credit lines, partially offset by repayment of due bonds (€2.0 bn)

* closed March 31st

Totals may not add up due to rounding

Adjustments in Q1 2020

Adjustments in EBIT

[€m]	Q1 2019		Q1 2020	
	Adjustments	thereof D&A	Adjustments	thereof D&A
Healthcare	3	0	-27	2
Life Science	9	0	11	0
Performance Materials	35	0	35	0
Corporate & Other	28	0	17	0
Total	76	0	36	2

Totals may not add up due to rounding

ESG

We are working on ambitious goals

environment

Climate

We endeavor to reduce direct and indirect emissions to mitigate our impact on the climate.

Waste

We consider it fundamental to both prevent and recycle as much of our waste as possible.

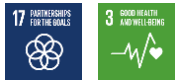
Water

For us, sustainable water management means not negatively impacting the aquatic ecosystems

social

Product safety

Product safety is one of our top priorities: From safe handling of hazardous substances to ensuring patient safety.



Employees

We aim to be an attractive employer, encouraging creativity and development under ideal working conditions.

Access to Medicine

We support a variety of initiatives that improve access to health particularly for people in low- and middle-income countries.

governance

Growth & Profit sharing

Our growth results from innovations and acquisitions strengthening our position in important markets, supported by strong cash-flow, long-term margins of >30% and a conservative but reliable dividend.

Risk management

We are focusing on a diversified business model: Our 3 sectors have pioneering knowledge to develop products to improve life for patients, further the success of our customers and meet global challenges.

Steering

Our core values along with the external regulations lead to business-guiding charters and principles for our responsible governance, documented in our Corporate Responsibility strategy and report.

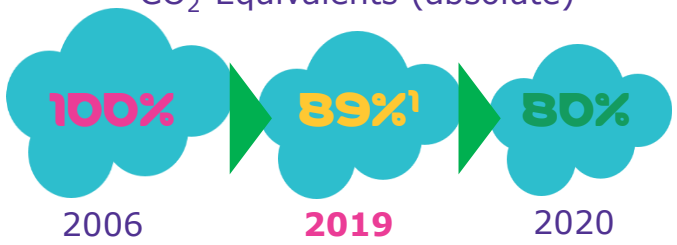
ESG

Emissions, Water, Waste reduced despite growing business

Emission-Target:

- Growth-independent reduction of Group's greenhouse gas emissions of 20% until 2020 vs. 2006
- Despite sales growth of 137% 2006 vs. 2018 we achieved a 11% reduction of CO_2 equiv.
- We still confirm our goal for 2020 expecting positive impact from latest initiatives, e.g. process optimizations and change to renewable energy

CO_2-Equivalents (absolute)

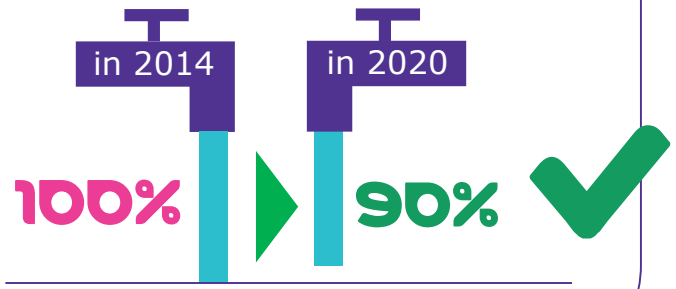


Sales in € bn

Water-Target:

- At 24 sites with relevant water use in areas of high water stress we aim to cut water consumption by 10% until 2020 vs. 2014
- 2018, we lowered our water consumption by 11% resulting from sustainable water management and re-usage
- All pharmaceutical manufacturing facilities have wastewater treatment plants

Water consumption
in water stress areas



2019: -21%

Waste-Target:

- We reduce waste and recycle as much as possible - we aim to reduce the environmental impact of our waste by 5% until 2025 compared to 2016
- The Company Waste Score allows us to compare the amount of waste our sites are producing
- We ensure that raw materials are recycled and that unrecyclable waste is discarded

Group Waste Score

[1]The figures exclude Versum Materials since the integration process is still underway. Based on the figures Versum Materials reported for the previous two years (not calculated in accordance with our metrics), we expect this to add roughly 1.3 million metric tons of CO_2eq per year to our carbon footprint.

ESG
External stakeholders valuate our engagement

In 2019, **Our share was again included in STOXX Global ESG Leaders Index**, a sustainability index that assesses companies based on key environmental, social and governance criteria.

Merck KGaA, Darmstadt, Germany was confirmed as a constituent of the **Ethibel Sustainability Index (ESI) Excellence Europe** in 2020, calculated and managed by Standard & Poor's.

In 2019 we have been constituents of the **Euronext Vigeo Europe 120** and the **Euronext Vigeo Europe 120 index** incl. highest-ranking listed companies in term of their performance in CR.

We received **Platinum status in 2020**, among the **top 1% of companies.**

EcoVadis examines suppliers from 150 countries. The rating focuses is highly valued by customers and suppliers.

Since 2008, Our shares have been included in the **FTSE4Good Index**, measuring the performance of companies demonstrating strong ESG practices

In the **2018 Access to Medicine Index** we maintained **4th place** (9th in 2012, 6th in 2014 and 4th place in 2016).

The ranking appreciates us supporting low and middle income countries.

In 2019, **ISS-Oekom** gave us a "B-" rating which means we have once more achieved **prime status.**

Participation in CDP (formerly Carbon Disclosure Project) since 2008.

CDP Climate: In 2019, we scored "C" (2018: C).

CDP Water: In 2019 we received a "B" (2018: B-).

2018, **Sustainalytics** awarded us 79 out of 100 points, putting us among the **leading pharmaceutical companies:** high marks in CG, community outreach, and environmental performance.

Financial calendar

Date	Event
May 14, 2020	Q1 2020 Earnings release
May 28, 2020	***Virtual*** Annual General Meeting
August 6, 2020	Q2 2020 Earnings release
November 12, 2020	Q3 2020 Earnings release

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