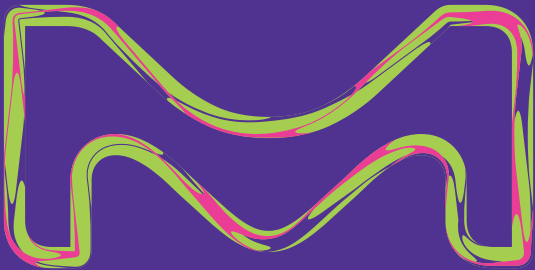




# MERCK KGAA, DARMSTADT, GERMANY— Q3 2017 ROADSHOW

Investor Relations

November 2017





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This quarterly presentation contains certain financial indicators such as EBITDA pre exceptionals, net financial debt and earnings per share pre exceptionals, which are not defined by International Financial Reporting Standards (IFRS). These financial indicators should not be taken into account in order to assess the performance of Merck KGaA, Darmstadt, Germany in isolation or used as an alternative to the financial indicators presented in the consolidated financial statements and determined in accordance with IFRS. The figures presented in this quarterly statement have been rounded. This may lead to individual values not adding up to the totals presented.

# Agenda

- 01 Business overview**
- 02 Transforming the company**
- 03 Healthcare – Funding for success**
- 04 Life Science – Focusing on profitable growth**
- 05 Performance Materials – Maintaining leadership and innovation**
- 06 Executive summary and guidance**



01

## **BUSINESS OVERVIEW**

## Group

# Portfolio of three high-tech businesses



### Leading in specialty pharma markets

- Biologics and small-molecules
- Research focus: Oncology, Immunology & Immuno-Oncology
- Over-the-counter medicine



### Leading life science company

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

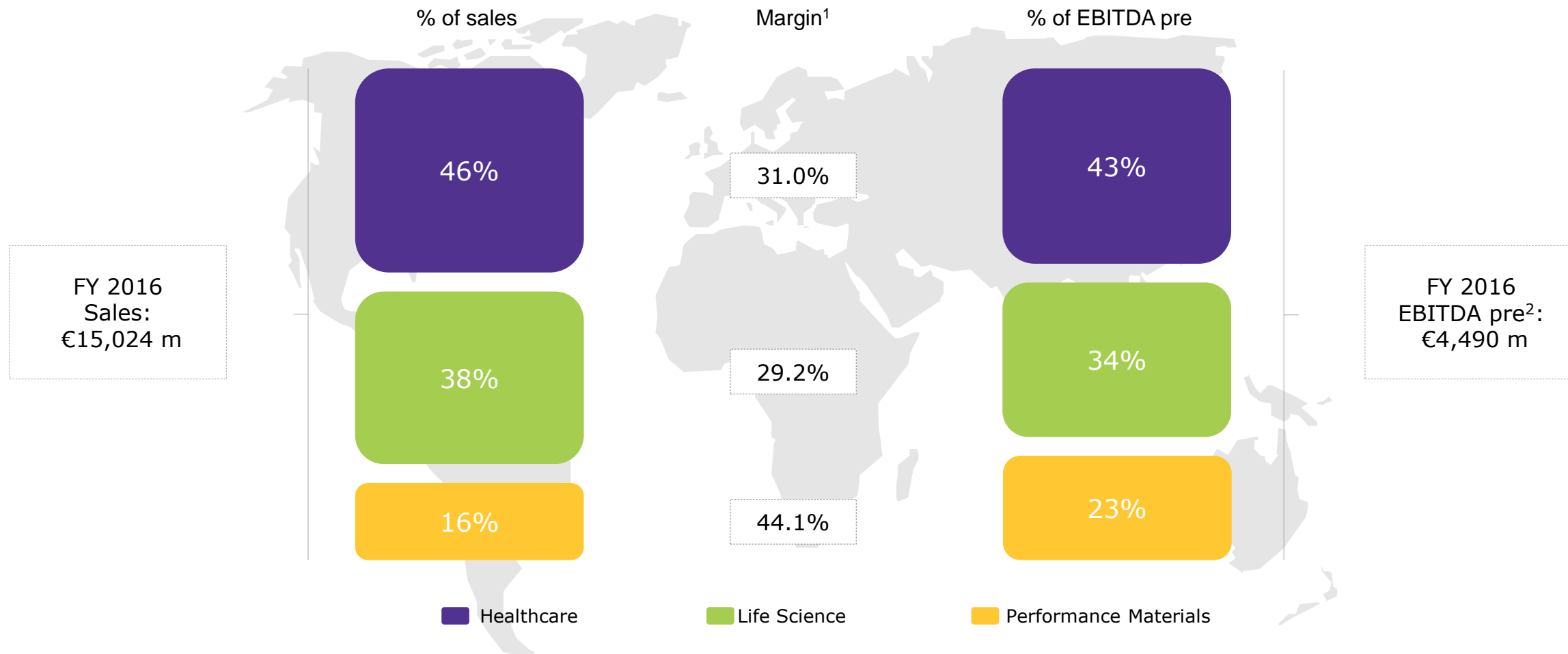


### Market leader in specialty materials

- Innovative display materials
- Effect pigments and functional materials
- High-tech materials for electronics

# Group

## Strong businesses with attractive margins



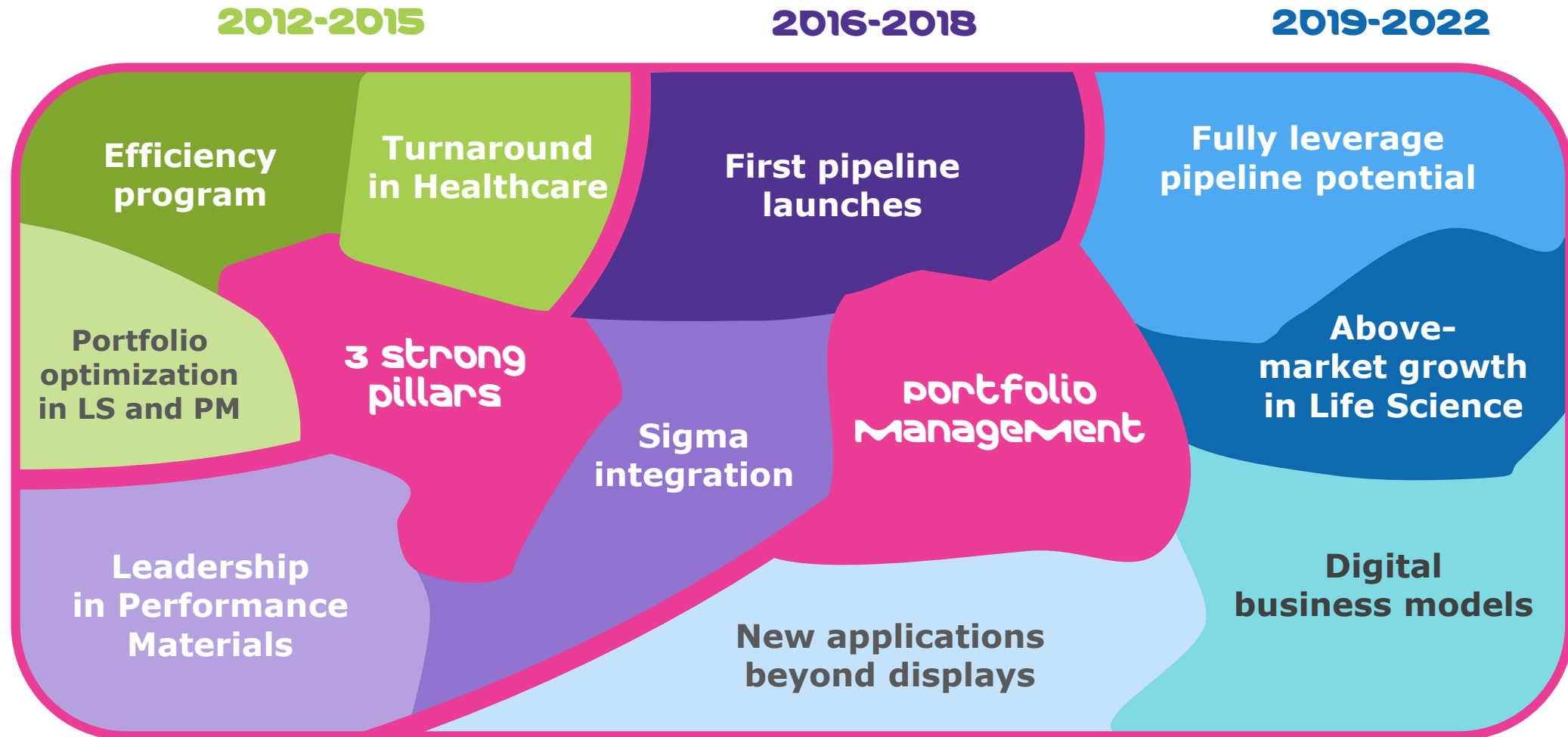
<sup>1</sup>EBITDA pre margin in % of net sales; <sup>2</sup>Including Corporate/Others (-€396 m)



## **02** TRANSFORMING THE COMPANY

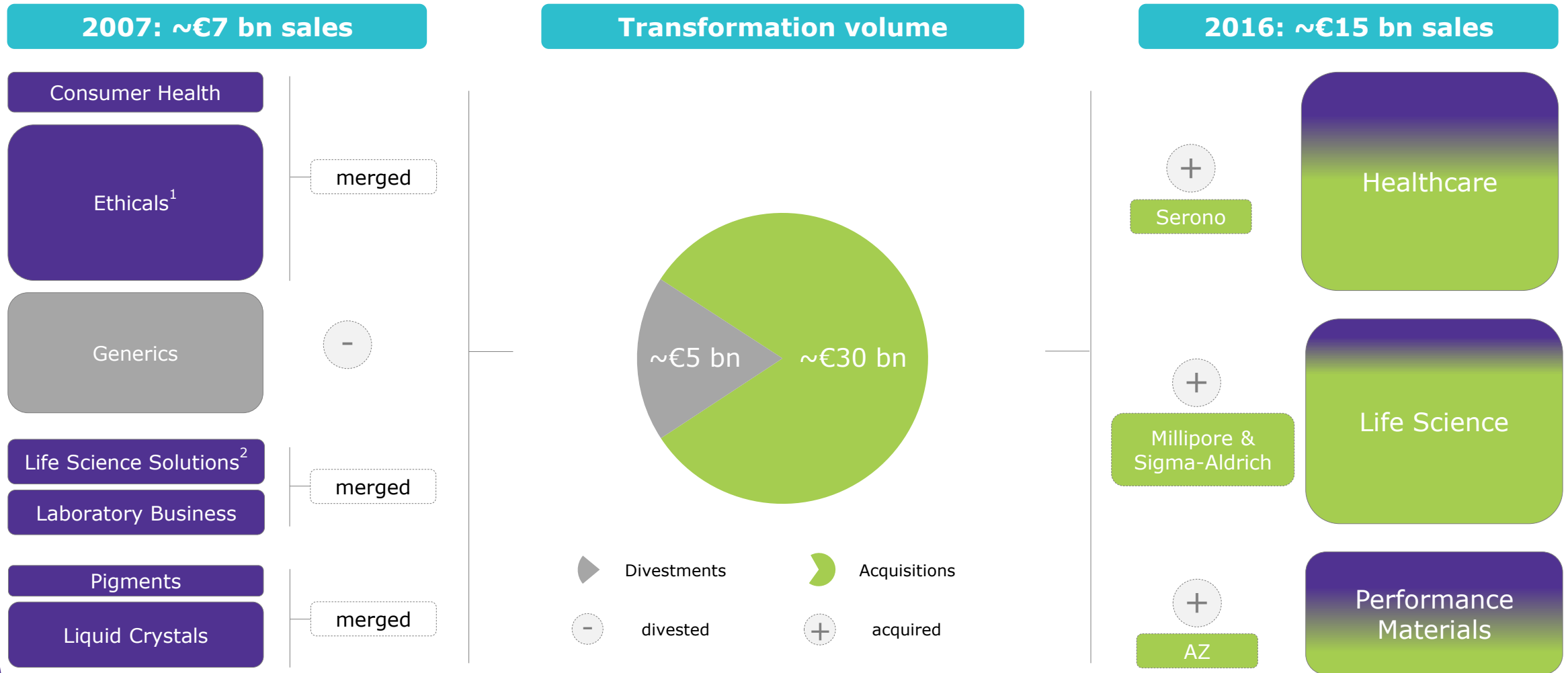


# Group Strategic roadmap 2016-2022



## Group

**We have added scale and strengthened the attractiveness of its portfolio**

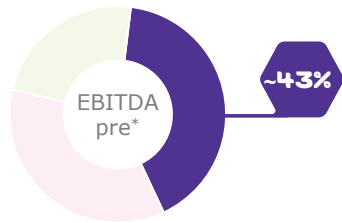


## Group

# Clear set of priority goals to be realized by 2018



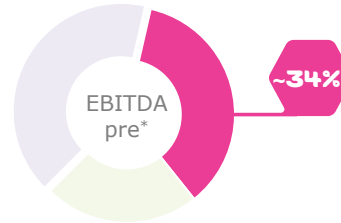
### Healthcare



- Maximize growth of existing franchises
- Deliver pipeline: one product launch or indication p.a. from 2017



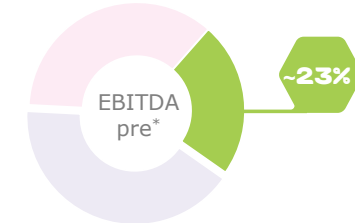
### Life science



- Focus on seamless integration and deliver cost synergies
- Leverage strategic capabilities for value creation



### Performance Materials



- Drive innovation and technology leadership across all businesses
- Innovate in applications also beyond displays

**MERCK KGaA,  
Darmstadt,  
Germany**

- Deleverage to <2x net debt / EBITDA pre in 2018
- No large acquisitions (>€500 m) for the next 2 years (unless financed by divestments)
- Dividend policy reflects sustainable earnings trend

## Regular portfolio review and optimization remains key

- Acquisitions and divestments are part of our history
- Licensing transactions remain on our agenda
- All prior transactions earned their required cost of capital

---

**Regular portfolio review and active capital allocation will continue**

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**DNA and  
track  
record**

**clear  
criteria**

- Supporting mid-term strategy and strengthening core business
- Growing in attractive markets
- Proven track record: strong ability to win
- Compelling financials:
  - $IRR > WACC$
  - EPS pre accretive
  - Maintain investment-grade credit rating

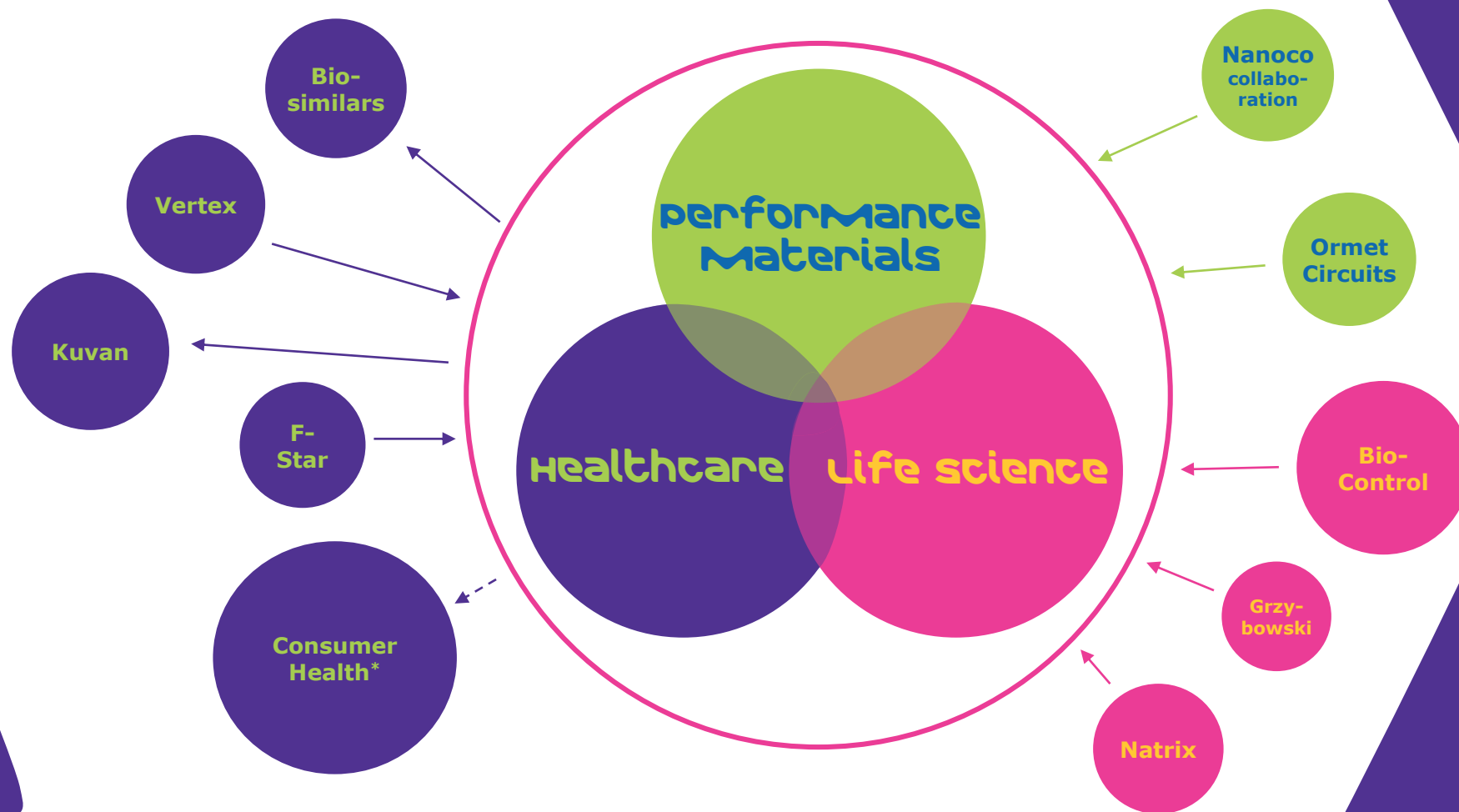
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**Disciplined approach to portfolio management will persist**

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Group

## Stronger portfolio through active management



## profitable growth and value creation

- Well-balanced approach to organic and inorganic growth
- Strengthened all three businesses
- Increased resilience of Group



# 03 **HEALTHCARE**

Funding for success

Healthcare

## Healthcare is set to deliver on promising pipeline candidates

**Deliver**  
on organic growth

**Focus**  
on pipeline



Stable existing business



Solid pipeline of oncology, immuno-oncology and immunology molecules



Transformation of R&D operating model ongoing



Competitive R&D funding in our focus areas



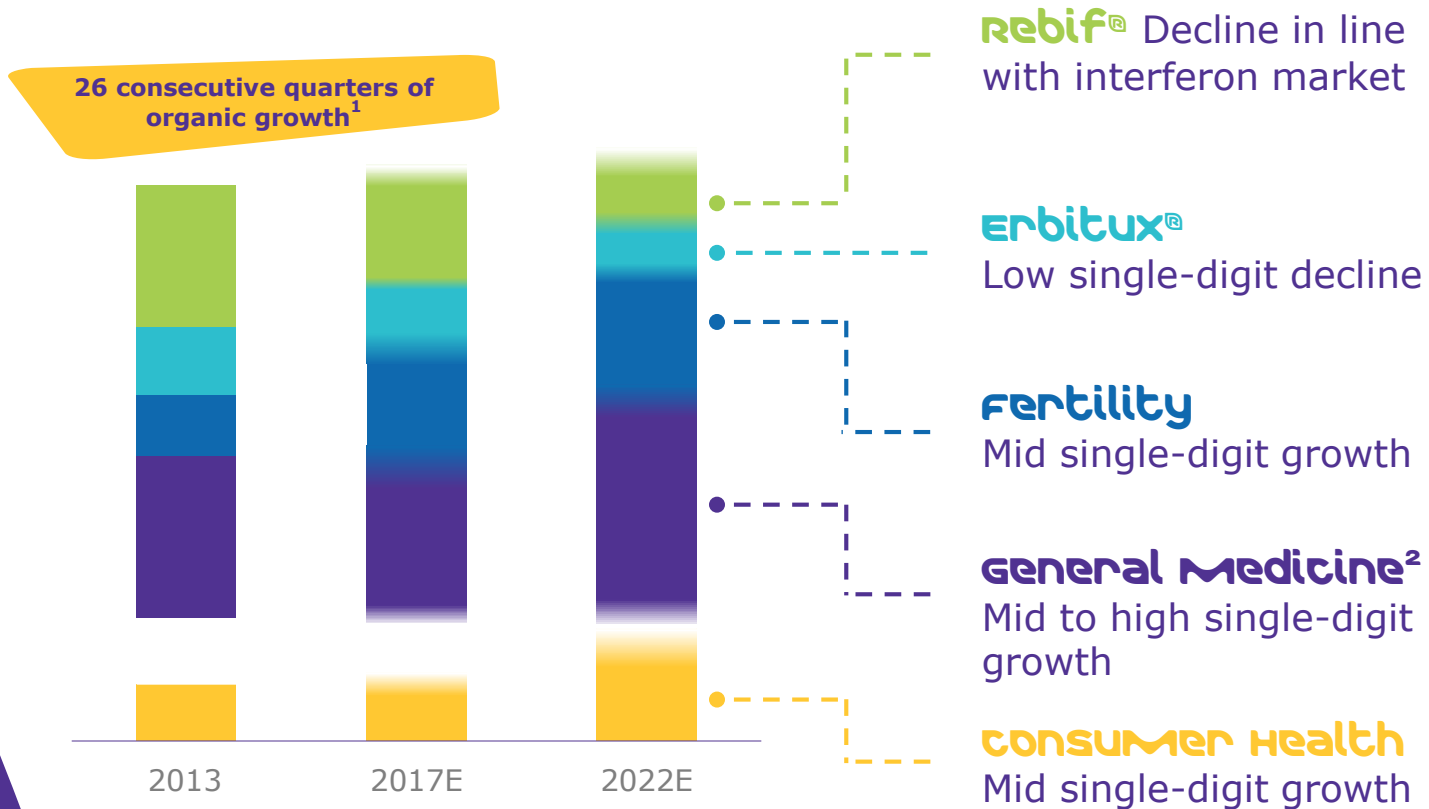
Cost discipline and efficient execution



# Healthcare

## Ambition to keep base business sales organically stable until 2022

### Healthcare base business net sales until 2022



- Maintaining solid track record of patient retention
- Integration into joint franchise strategy with Mavenclad®
- Driving emerging markets growth
- Mitigate price and competitive pressure in EU by clear Erbitux® franchise positioning
- Drug demand driven by emerging markets growth and demographics
- Differentiation versus competition
- Emerging markets demand growth enhanced by new launches, e.g. GlucophageXR® China
- Repatriation measures
- Continuously build emerging markets presence
- Invest in key strategic brands

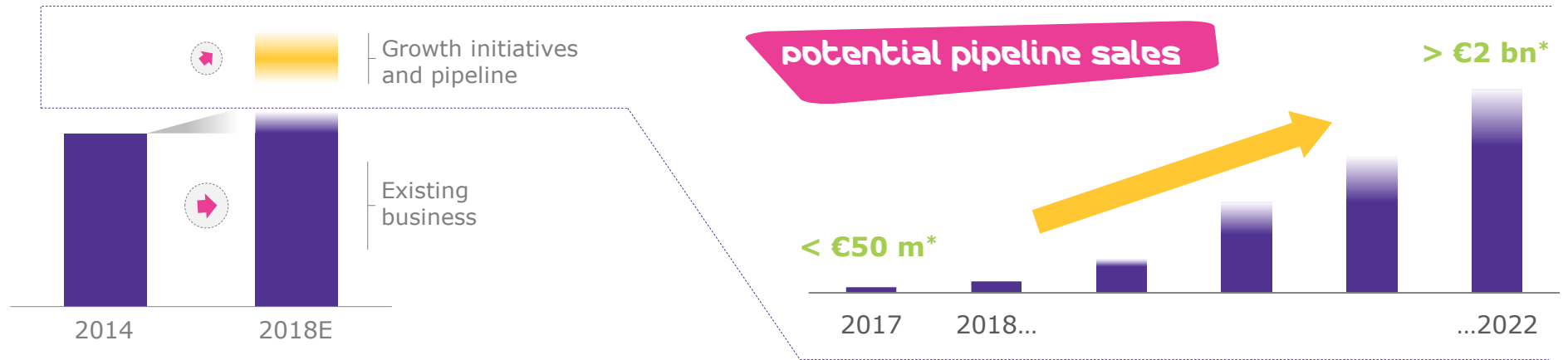


# Healthcare

## Well on track to deliver the pipeline

Deliver the pipeline

Increase R&D spending



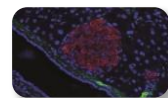
### Key investments



Avelumab



BTK – inhibitor



TGF-beta trap

~€150 – 200 m higher R&D costs in 2017 vs. 2016

Main moving parts:

- Phase III progress of avelumab
- Dynamics of ramp-up for TGF-beta and BTK-i
- Regular prioritization in view of market dynamics

## Healthcare

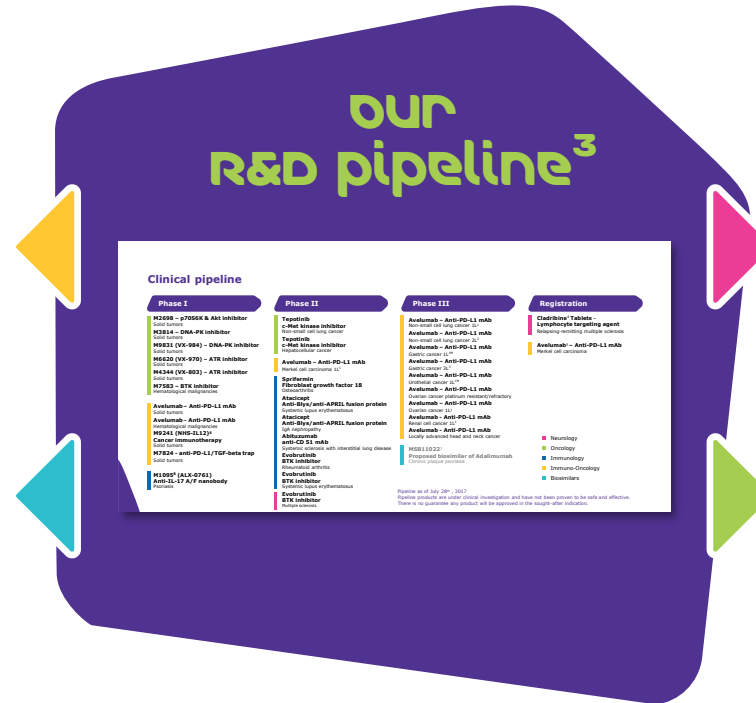
### Pipeline optionality turning into launches

## First approvals and launches

- 4 approvals for Bavencio®:  
U.S. in 2 indications (mMCC, mUC)<sup>1</sup>,  
Europe<sup>2</sup> and Japan in 1 indication  
(mMCC)
- Mavenclad® approval in Europe
- Mavenclad® U.S. filing: Go/no-go  
decision until end of 2017

## Encouraging clinical data

- Evobrutinib RA: clear positive signal in pre-specified patient population in Phase IIa; initiated IIb dose-finding
- Sprifermin: encouraging data; regulatory pathway in discussion



## Upcoming newsflow

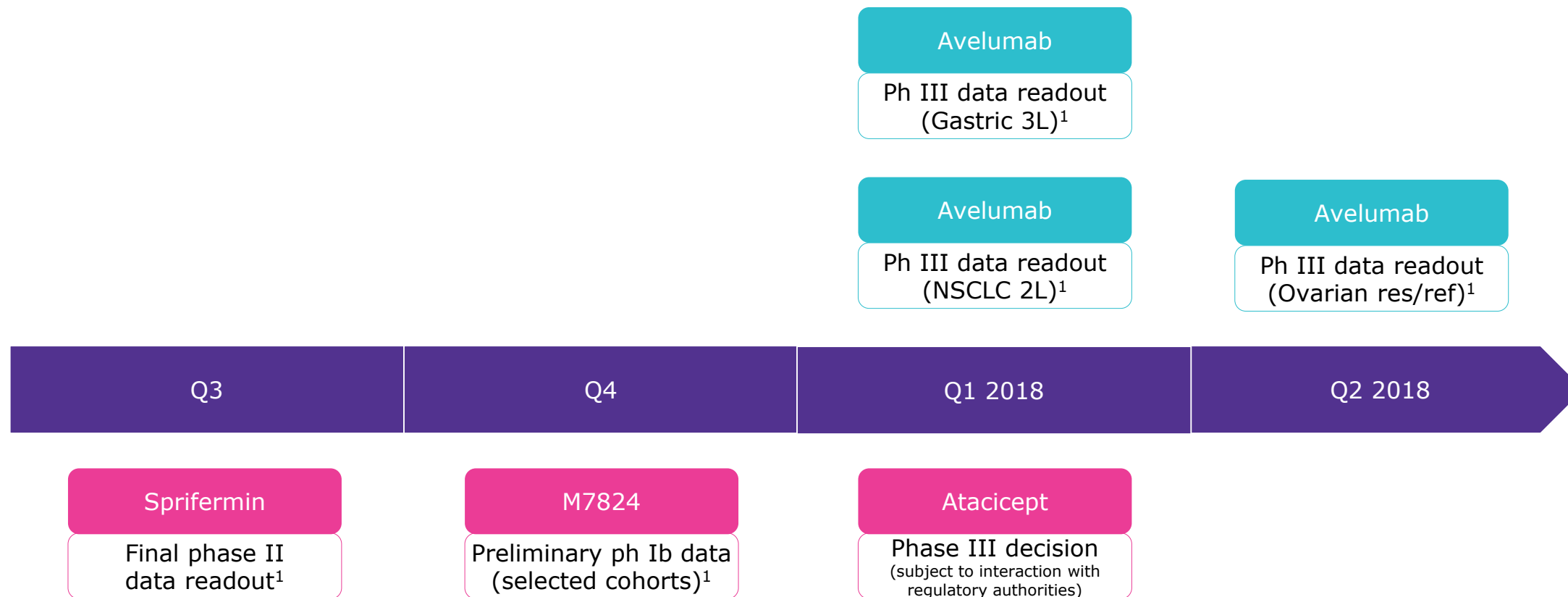
- Avelumab: 3 Phase III readouts in H1 2018
- Atacicept: expected Phase III decision in Q1 2018
- TGF-Beta trap: first preliminary data to be presented in November 2017

## Disciplined funding

- 2017 Healthcare R&D costs to increase by ~€150-200 m YoY
- 2018 R&D cost development will be subject to clinical data, partially offset by biosimilars cost savings
- Ongoing prioritization and potential partnering to maximize asset potential

# Healthcare

## Newsflow timeline



<sup>1</sup> Data-read out is the internal date. Data to be presented at upcoming scientific congress | Acronyms: MCC = Merkel cell carcinoma | RA: Rheumatoid Arthritis | NSCLC: Non small cell lung cancer | RMS = remitting multiple sclerosis | Note: timelines are event-driven and may change



## **LIFE SCIENCE**

Focus on profitable growth

## Serving customers across the life science industry

### RESEARCH



- Academic and government institutions
- Biopharma R&D
- Industry R&D

### PROCESS



- Pharmaceutical companies
- Small biotech
- Contract manufacturing organizations

### APPLIED

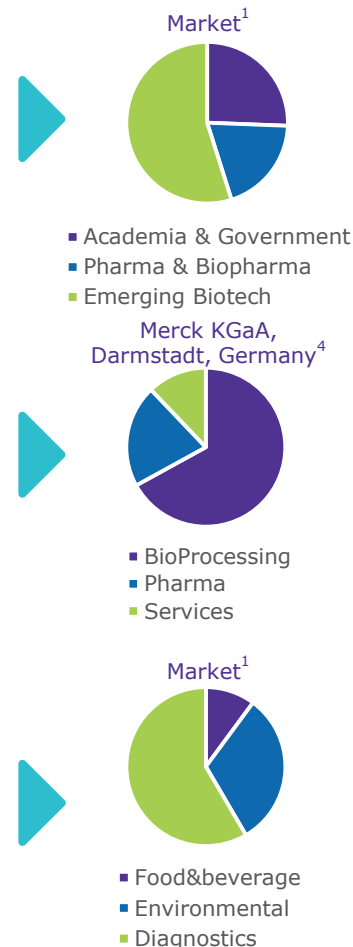
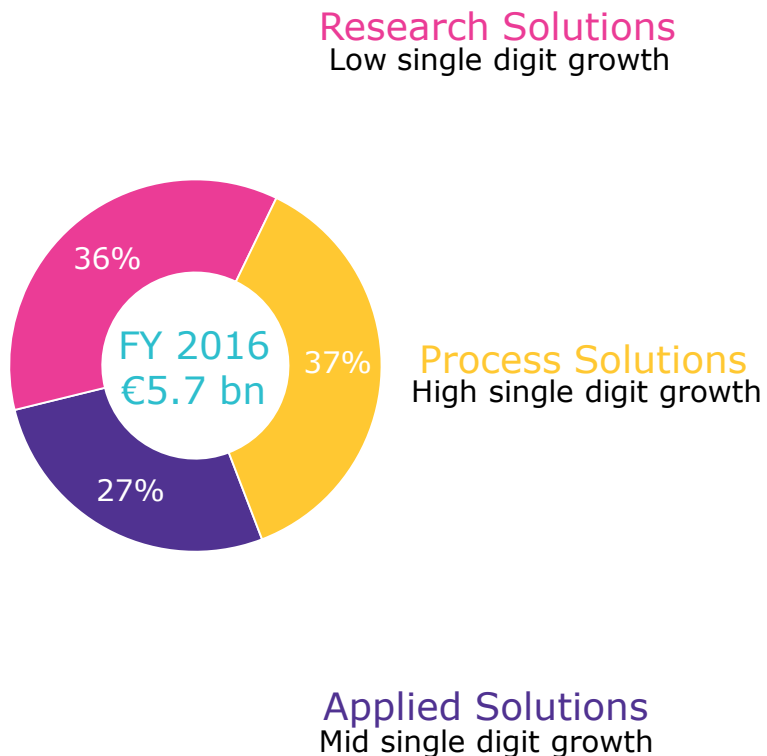


- Diagnostic manufacturers
- Clinical testing labs
- Food & Beverage manufacturers

# Life Science

## Business is on track to deliver above-market organic growth

### Life Science



### Long-term growth drivers

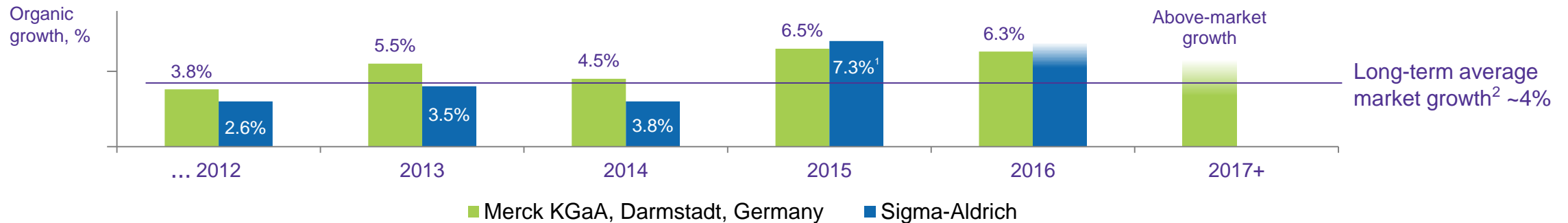
- **Research activity:** >3,000 projects in research pipelines<sup>2</sup>, rising number of experiments and newly emerging therapies/technologies backs healthy growth in biotech and CROs<sup>3</sup>
  - **Public and private funding:** availability, access and predictability drive demand from academia and emerging biotech customers
  - **Regulation:** rising requirements foster long-term customer partnerships
- 
- **Biologics:** mAbs production<sup>5</sup> growing by ~12% p.a. for 2016-2021 driven by new molecules and biosimilars
  - **Diversification:** contribution by top 10 molecules will decline to ~30% until 2021 from 80% today<sup>6</sup>
  - **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
- 
- **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

<sup>1</sup>Source: Merck KGaA, Darmstadt, Germany Factbook; <sup>2</sup>Source: PhRMA; <sup>3</sup>CRO = commercial research organisation; <sup>4</sup>Indicative only; <sup>5</sup>mAbs = monoclonal antibodies; <sup>6</sup>Source: EvaluatePharma April 2017

## Life Science

# Above-market growth to be enhanced by top-line synergies

## Merck KGaA, Darmstadt, Germany and Sigma-Aldrich organic growth rates versus market growth



### Sources of market outperformance

1

#### Portfolio composition

- Exposure to biopharma
- Highest share of consumables
- Broad product offering

2

#### Top-line synergies

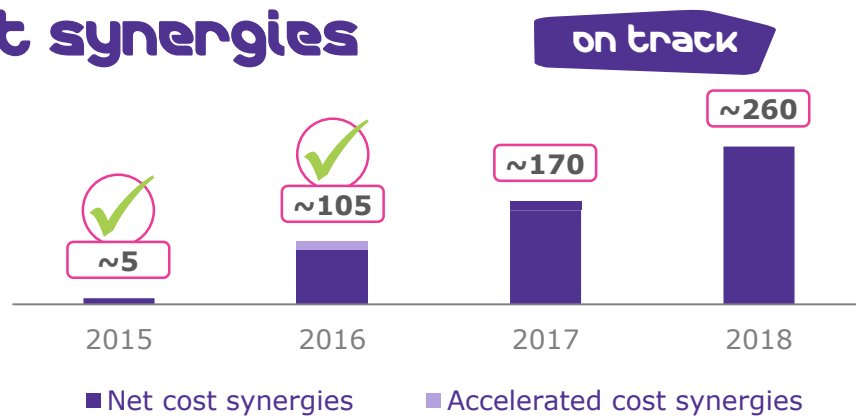
- Best in class eCommerce
- Excellent service capabilities
- Global reach

<sup>1</sup>Growth for 9M 2015 (organic growth of \$152 m on prior 9M 2014 sales of \$2,080 m; <sup>2</sup>Source: Merck KGaA, Darmstadt, Germany market intelligence and broker research

# Integration of Sigma and synergy generation progressing well

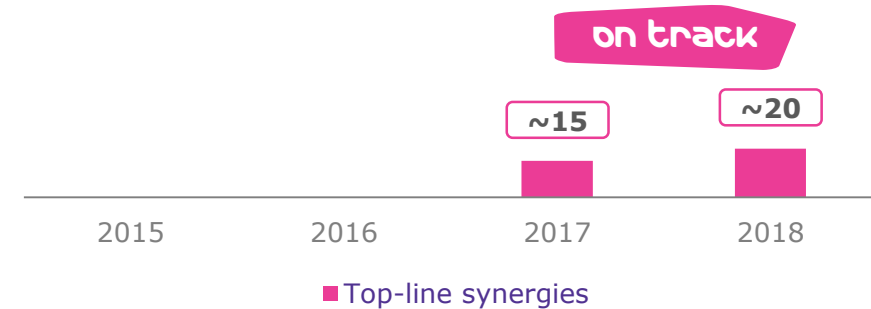
on track to deliver planned synergies of ~ €280 M until 2018

## cost synergies



- **Network consolidation and operational transformation ongoing**
  - Consolidated 10 manufacturing and distribution sites
  - Announced consolidation of 5 further sites
- **Combination of customer service centers and offshoring of transactional tasks**

## topline synergies



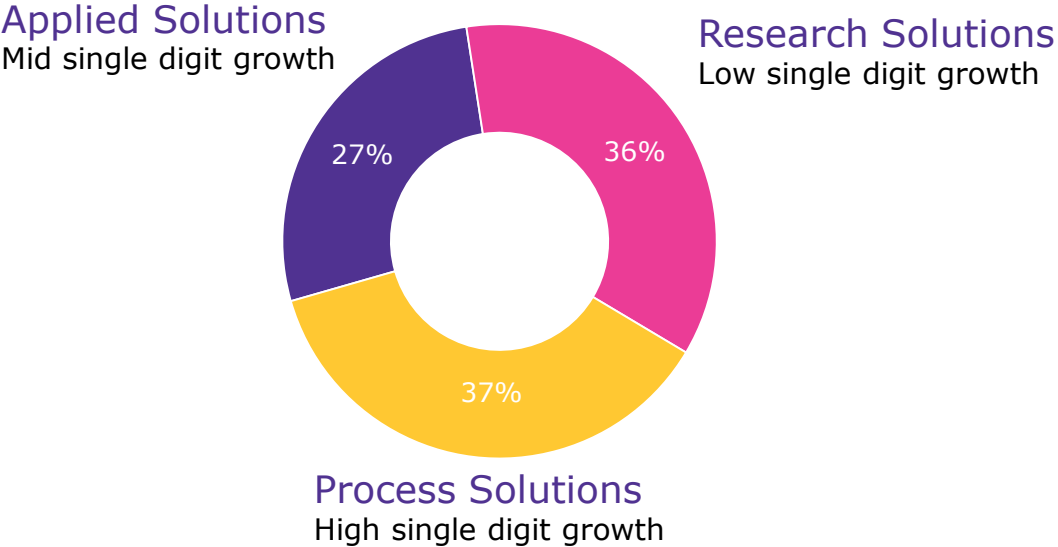
- **Continued integration of sigmaaldrich.com**
  - ~80% of relevant products in U.S. and EU are available online
  - >1/3 of Merck KGaA, Darmstadt, Germany eCommerce orders now contain products from both legacy companies
- **Complete offering in Process Solutions**



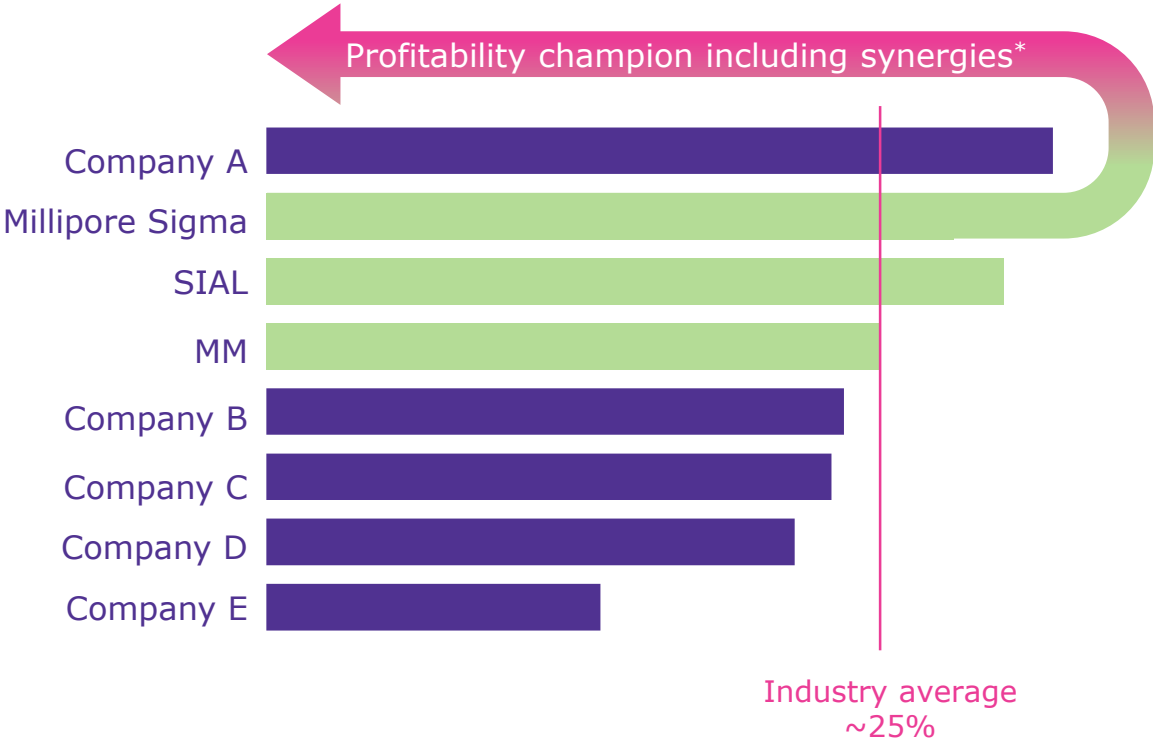
Life Science

**We aim to be the profitability champion of the sector**

Sales breakdown as of FY 2016



Above industry margin levels



**Life Science is well set for sustainable growth and profitability**







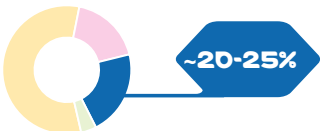







05

## **PERFORMANCE MATERIALS**

Maintaining leadership and innovation

# Performance Materials

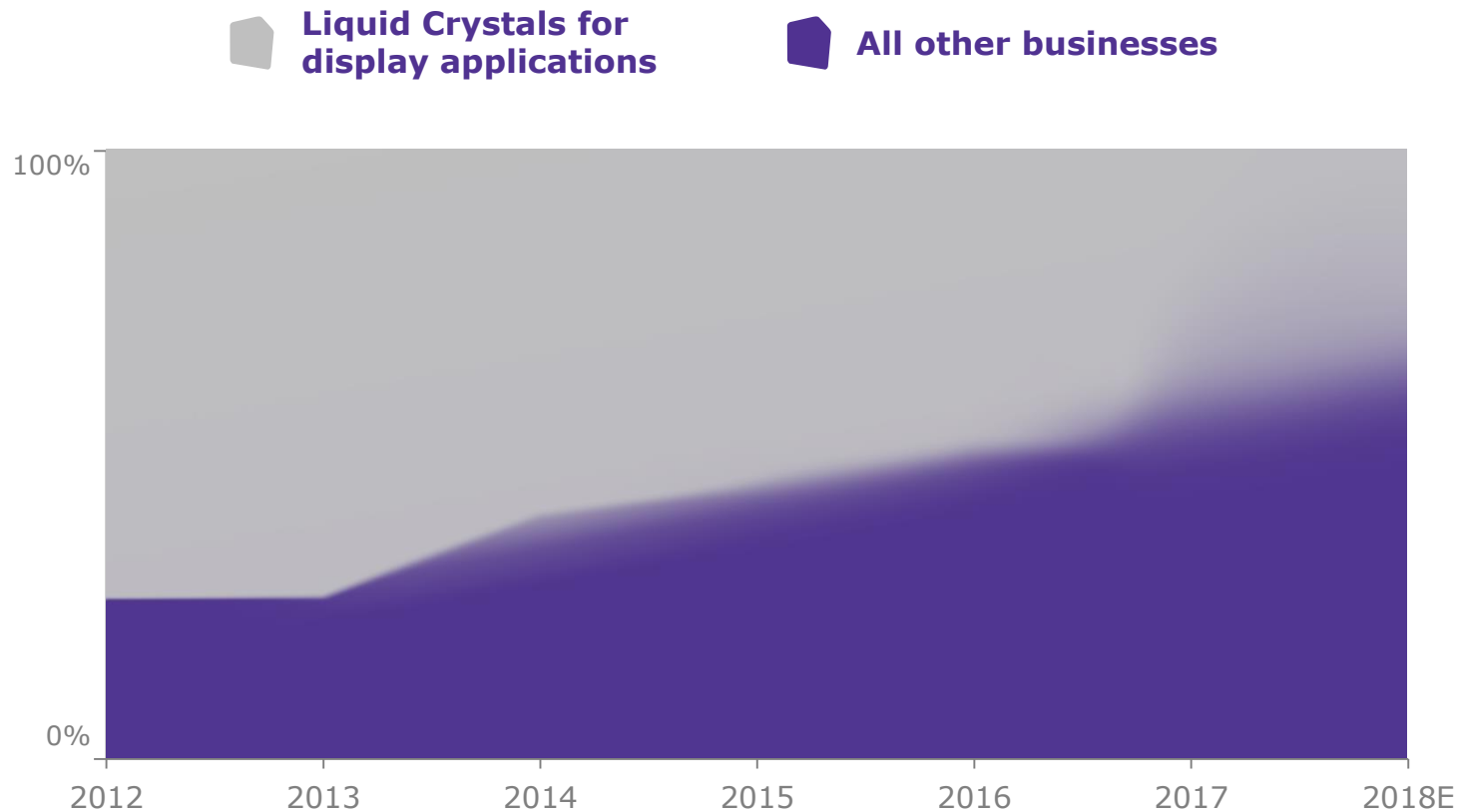
## The four pillars are set for future profitable growth

Business unit	% sales	Products	Mid-term growth trend
 <b>Display Materials</b>		<ul style="list-style-type: none"><li>• Liquid crystals (LC) and photoresists for TVs, smartphones and tablet computers</li><li>• Other display and non-display applications (e.g. LC Windows)</li></ul>	
 <b>Integrated Circuit Materials</b>		<ul style="list-style-type: none"><li>• Dielectrics, colloidal silica, lithography materials, yield enhancers, edge-bead removers</li><li>• Polyimide raw materials and printing materials</li></ul>	
 <b>Pigments and Functional Materials</b>		<ul style="list-style-type: none"><li>• Effect pigments and functional materials for coatings, plastics, printing and cosmetics</li><li>• Functional materials for cosmetics &amp; special applications</li></ul>	
 <b>Advanced Technologies</b>		<ul style="list-style-type: none"><li>• Organic and inorganic light emitting diodes</li><li>• Functional materials for electronics and energy solutions</li></ul>	

**Well-founded medium-term low single-digit growth profile**

# Four-pillar-strategy drives Performance Materials to a higher level of diversification

Sales share of Liquid Crystals for displays versus all other businesses

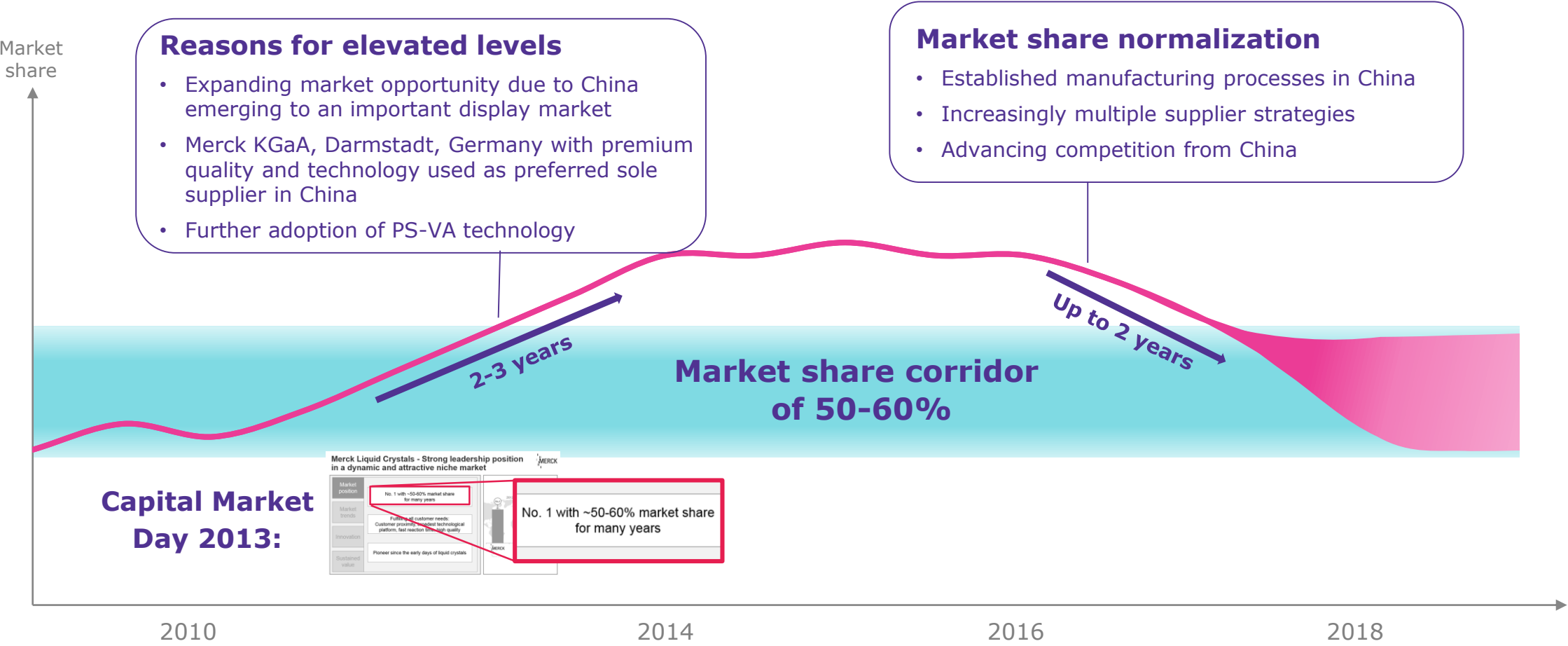


## Diversification of Performance Materials increased due to

- AZ acquisition in 2014
- LC market shares returning to more normal levels
- Higher growth of non-LC businesses

# Market shares are returning to normal levels

Merck KGaA, Darmstadt, Germany global liquid crystal market share development



# Market share normalization will have financial implications

## sales:

- ~ €200 – 300 m Liquid Crystals sales decline, depending on market share assumptions
- Started end of 2016; expected to last up to end of 2018

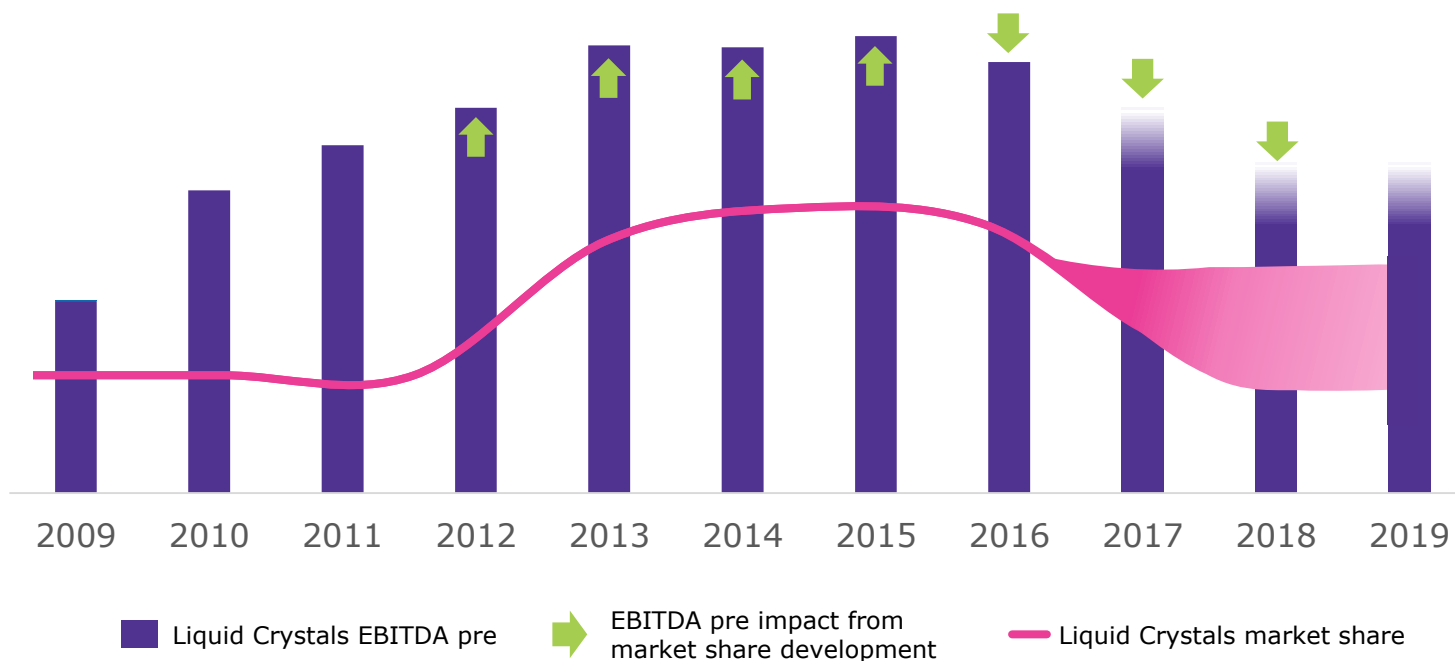
## profitability :

- Volume growth temporarily below typical price decline
- Lower volume growth limits operational efficiencies
- Lower share of business with highest profitability causes negative mix

## Earnings:

- Significant EBITDA pre impact

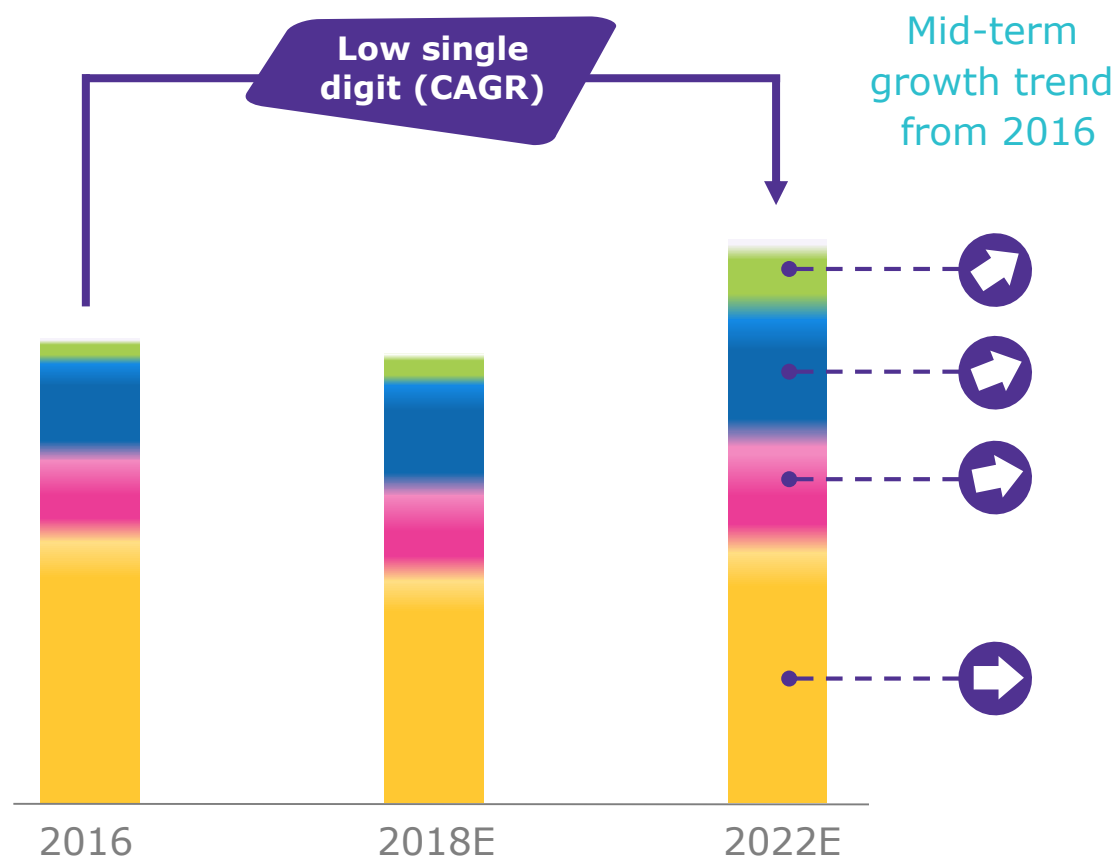
Liquid Crystals: Organic EBITDA pre and market share illustration



**Strong sales and EBITDA pre contribution from 2012-2015 to reverse from 2017 onwards**

# Performance Materials on track to achieve solid growth path

## Performance Materials mid-term sales development and drivers



### Advanced Technologies

Enhance and exploit leading position in OLED

### Integrated Circuit Materials

Outpace market growth with specialty materials assisting miniaturization

### Pigments & Functional Materials

Expansion into larger functional material markets

### Display Materials

- Assumed market share stabilization after 2018
- Area demand and capacity growth of ~4%
- New modes mitigating price declines (SA-VA, UB-Plus,...)
- Liquid Crystals initiatives beyond displays to contribute from 2018 onwards (windows, antennas, light guiding)



## 06 EXECUTIVE SUMMARY AND GUIDANCE



Group

## We are well on track to deliver on our promises



### Group

Net debt reduced by >€2 bn<sup>1</sup>  
Strict financial discipline supports rating



### Healthcare

Base business growing  
2 Bavencio indications & Mavenclad launched



### Life Science

Sigma-Aldrich synergies raised and well on track  
Organic growth above market



### Performance Materials

Market challenges well managed  
New technologies in test phase

**Important  
Milestones  
reached  
to deliver  
on our  
promises**

**CMD<sup>2</sup>  
December  
2015**

**Q3 2017  
Results**

**2018**

Group

## We have clear financial priorities for the next two years



Focus on **cash flow**  
and **deleveraging**

- **Strong cash flow** will be used to drive down gearing to <2x net debt / EBITDA pre in 2018
- **Larger acquisitions (>€500 m) ruled out** for the next two years (or financed by divestments)
- **Dividend policy** reflects sustainable earnings trend



**Ongoing cost discipline**

- **Synergy generation** is utmost priority
- **Cost discipline** continues in all business sectors
- **Further efficiency gains** from ongoing improvement and harmonization of processes and systems



**Efficient capital  
allocation**

- **All our businesses** have growth potential
- **Decisions on growth investments** are based on sound business cases and robust clinical data

**Near-term financial priorities will secure ours profitable growth path**

## Full-year 2017 guidance

▶ Net sales: ~ €15.3 – 15.7 bn ◀

▶ EBITDA pre: ~ €4,400 – 4,600 m ◀

▶ EPS pre: ~ €6.15 – 6.50 ◀





# Appendix

**01** Guidance details

**02** Healthcare

**03** Life Science

**04** Performance Materials

**05** Financial details



01

## **GUIDANCE DETAILS**

## 2017 business sector guidance



### Net sales

- Slight organic growth
- Ongoing organic Rebif decline
- Other franchises growing; repatriation of Glucophage/China supportive

### EBITDA pre

~ €1,900 – 2,000 m



### Net sales

- Organic growth slightly above market, driven by Process Solutions
- First minor contribution of top-line synergies

### EBITDA pre

~ €1,780 – 1,850 m



### Net sales

- Slight to moderate organic decline
- Volume increases in all businesses
- Continuation of Liquid Crystal market share normalization in China

### EBITDA pre

~ €950 – 1,050 m

# Additional financial guidance 2017

## Further financial details

Corporate & Other EBITDA pre	~ -€300– -350 m
Interest result	~ -€250 – -260 m
Effective tax rate	~ 23% to 25%
Capex on PPE	~ €850 – 900 m
Hedging/USD assumption	<b>Q4 2017 - 2018 hedge ratio ~ 60% at EUR/USD ~ 1.17 to 1.19</b>
2017 Ø EUR/USD assumption	~ 1.12 – 1.14



# Group

## Main earnings drivers in 2018



### EBITDA\*-supporting factors

- Organic net sales growth by Healthcare and Life Science
- Sigma-Aldrich incremental cost and revenue synergies ~+€95 m YoY
- Biosimilars divestment frees up R&D budget (2017: mid to high double-digit R&D costs)
- First full-year sales contribution from newly launched pipeline products Mavenclad® and Bavencio®
- Potential further milestone payments for Avelumab



### EBITDA\*-reducing factors

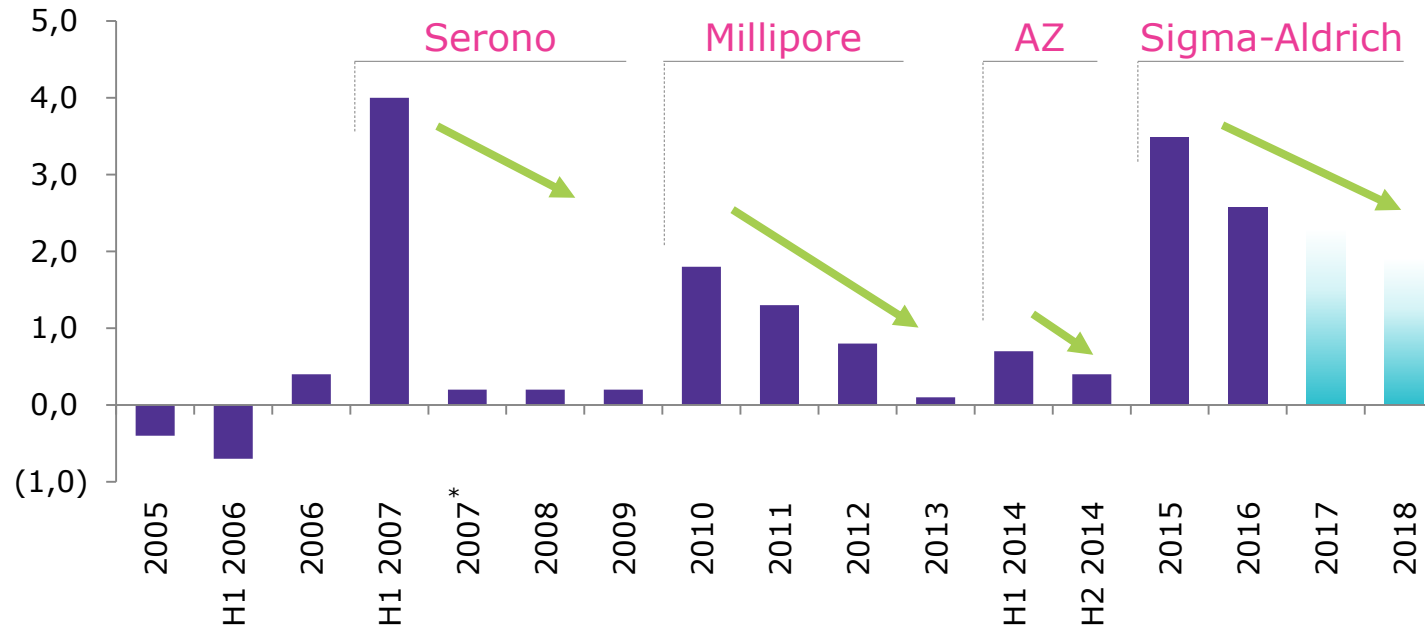
- Underlying R&D costs in Healthcare above 2017, subject to clinical data outcome of priority projects
- Healthcare margins negatively impacted by product mix
- 2017 special gains of ~€200 m (swap of royalty & license income stream, 4 Bavencio® milestone payments)
- Performance Materials sales and earnings continuously affected by adjustment processes in Liquid Crystals
- Potential launch preparations for Mavenclad® U.S., subject to go/no-go decision on filing
- FX if rates remain at current levels

**Discipline and prioritization will be key ingredients to deliver**

# Group

## We remain focused on deleveraging

### Net debt excl. pensions / EBITDA pre



- We have a strong track record of disciplined deleveraging after large acquisitions
- We stay focused on deleveraging to gain financial flexibility

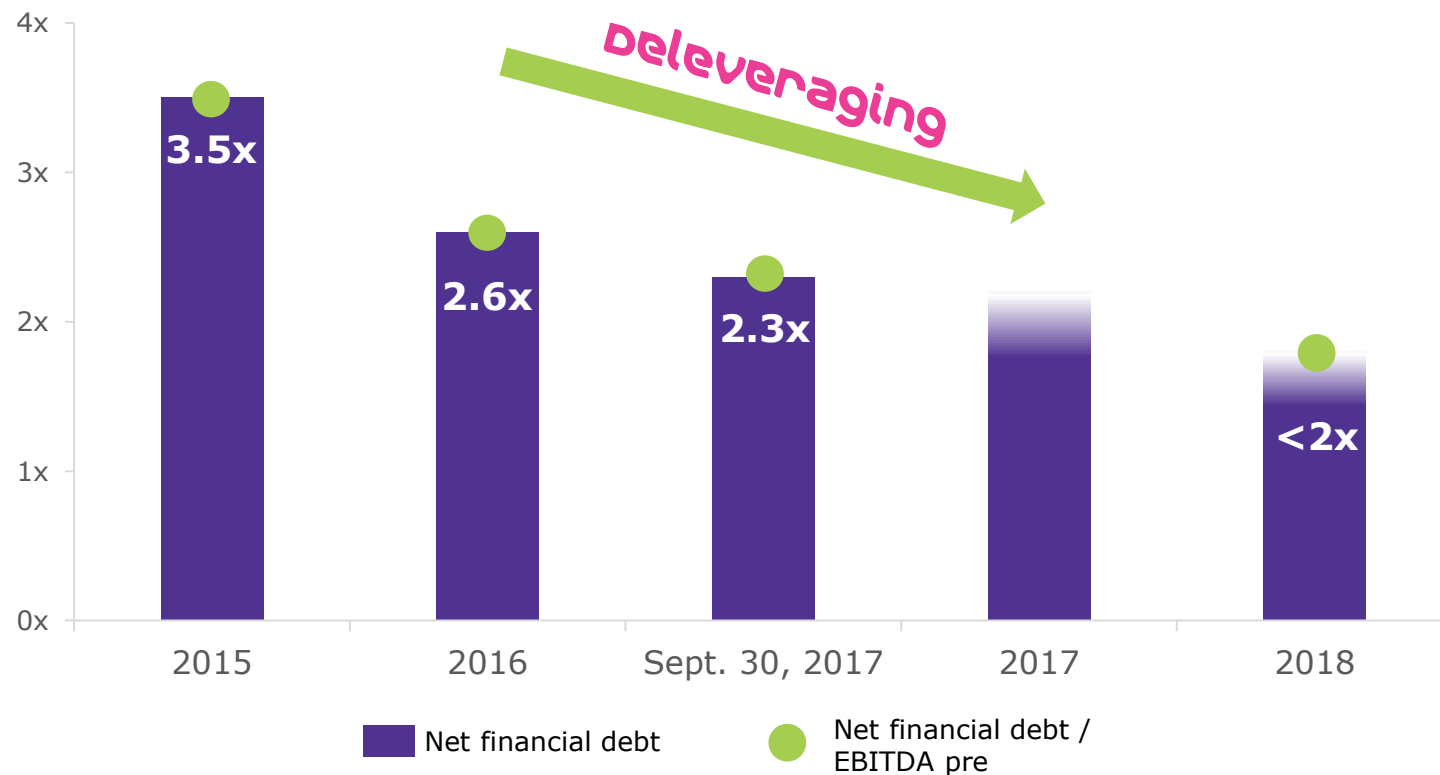
**MERCK KGaA,  
Darmstadt,  
Germany**

- **Deleverage to <2x net debt / EBITDA pre in 2018**
- **No large acquisitions (>€500 m) until end of 2018 (unless financed by divestments)**
- **Dividend policy reflects sustainable earnings trend**

# Strong focus on cash generation to ensure swift deleveraging

## Net financial debt\* and leverage development

[Net financial debt/  
EBITDA pre]



## Focus on deleveraging

- Commitment to swift deleveraging to ensure a strong investment grade credit rating and financial flexibility
- Strong cash flow will be used to drive down leverage to expected <2x net debt/EBITDA pre in 2018
- Larger acquisitions (>€500 m) ruled out for the next two years (or financed by divestments)

# FX sensitivity varies across our businesses



## Sales

- Global presence
- ~40% of sales in Europe

## Costs

- High Swiss franc cost base due to manufacturing sites
- R&D hub and notable sales force in U.S.

## FX impact on EBITDA pre



## Sales

- Balanced regional sales split between EU, NA and RoW

## Costs

- Extensive manufacturing and research footprint in the U.S.
- Global customer proximity requires broad-based sales force

## FX impact on EBITDA pre



## Sales

- ~80% of sales in Asia-Pacific
- Industry is USD-driven

## Costs

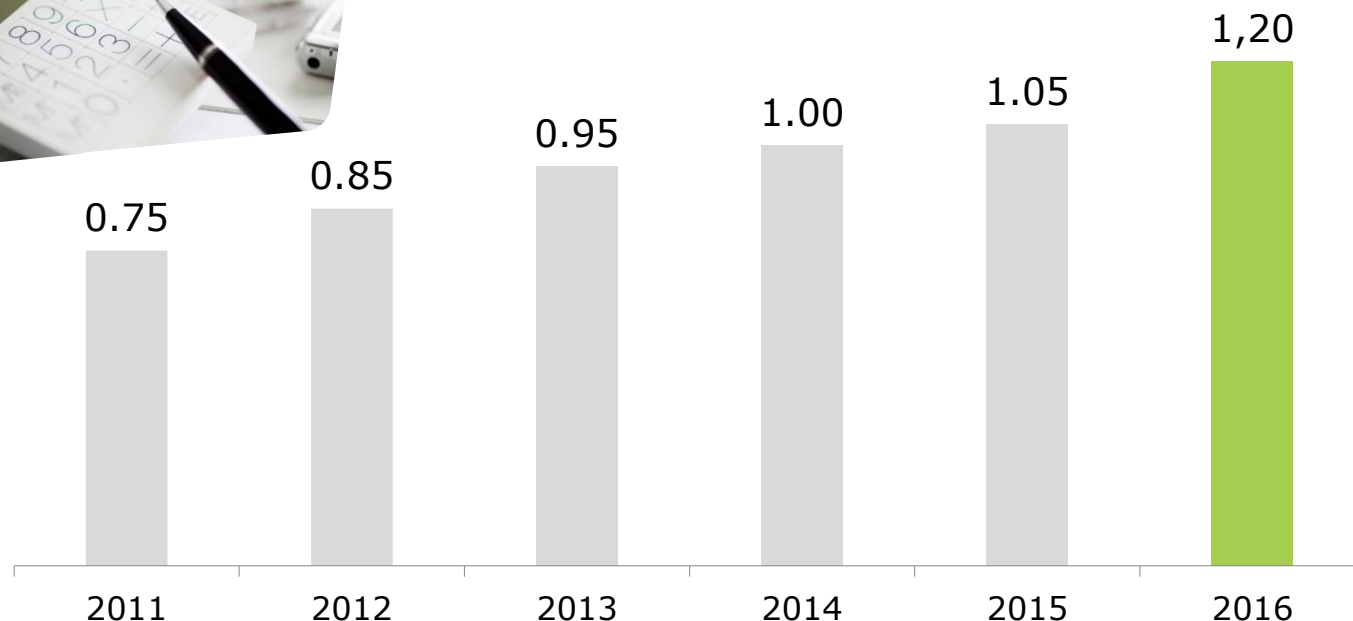
- Main production sites in Germany
- Several R&D and mixing facilities in Asia

## FX impact on EBITDA pre



# Sustainable dividend development

## Dividend<sup>1</sup> development 2011-2016



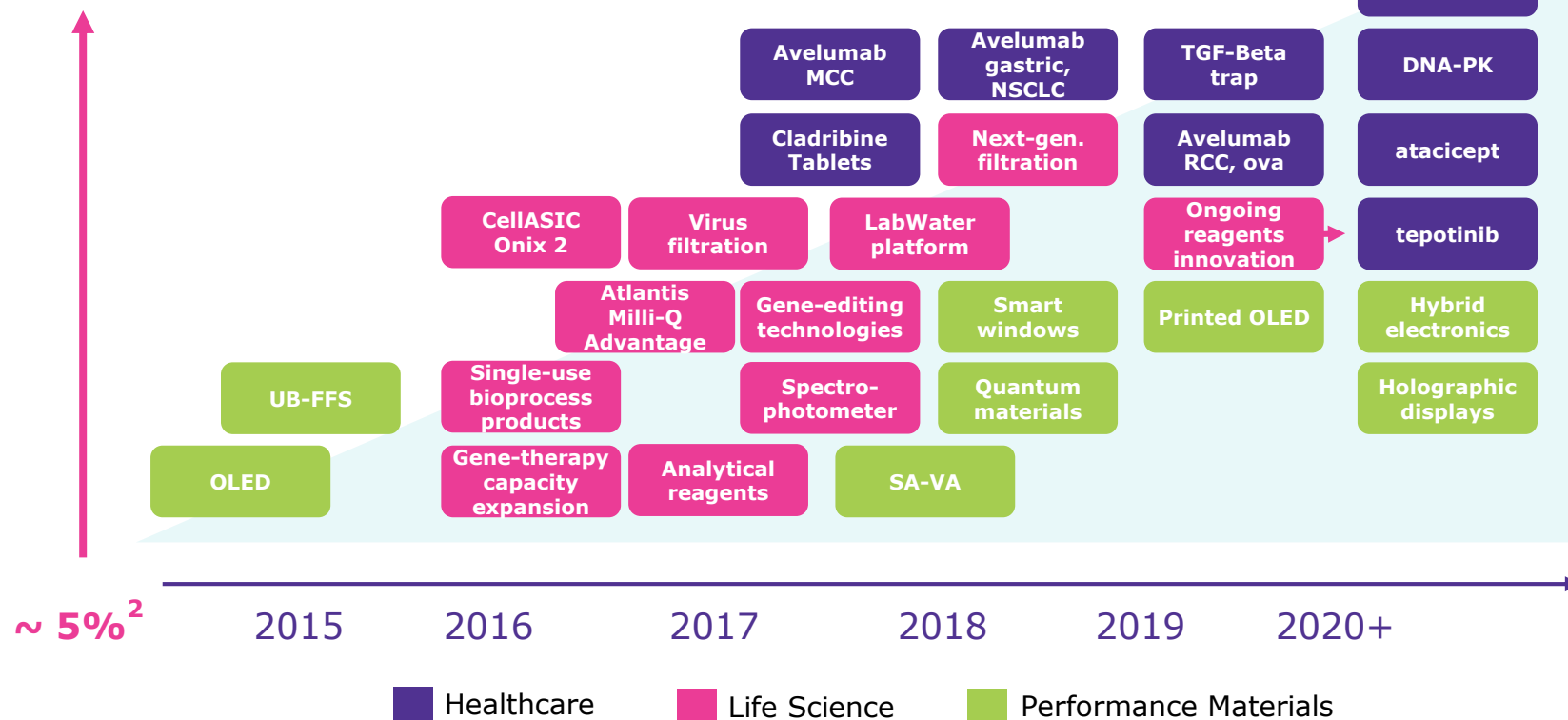
## 2016 dividend

- Dividend of €1.20 per share for 2016, reflecting 19.3% of EPS pre
- Dividend development in line with business performance and earnings progression
- Dividend yield<sup>2</sup> of 1.21%

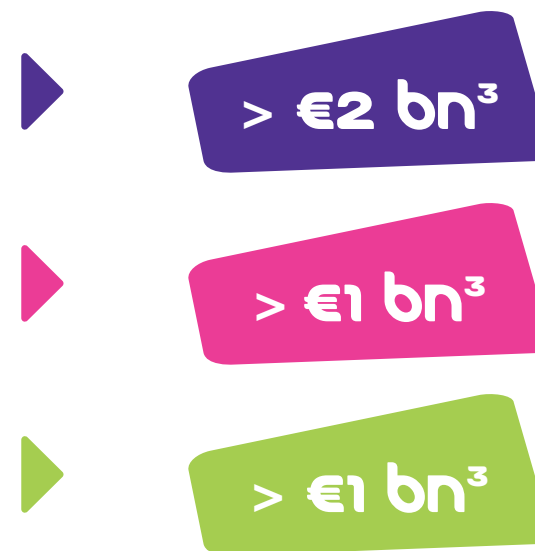
# Our strong innovation capabilities will drive growth

## New product launch cadence<sup>1</sup> by business sector

~ 20%<sup>2</sup>



## New product sales<sup>3</sup> potential 2022



**Our rich pipeline will strongly drive sales**

<sup>1</sup>Illustration: timelines may change as product introductions are subject to customer adoption and implementation; pharma pipeline products are under clinical investigation and there is no guarantee any product will be approved in the sought-after indication; <sup>2</sup>Share of total Group net sales from new products launched over the past 5 years, risk-adjusted; <sup>3</sup>risk-adjusted



## 02 HEALTHCARE

# Portfolio management: Differentiating across diverse business models

## General Medicine portfolio



- Limited risk with high cash generation
- Sustainable steady growth fueled by Emerging Markets



## Biologicals portfolio



- Moderate risk and reward profile
- Economies of scale due to state-of-the-art production capabilities
- Emerging Markets gain importance



## Oncology & Immunology innovation portfolio



- High reward at high risk
- Innovation key success factor – high R&D spend
- Promising pipeline projects



Mid-term, all parts of the portfolio need to earn their cost of capital



# The road to maximizing Healthcare's existing franchises is clear

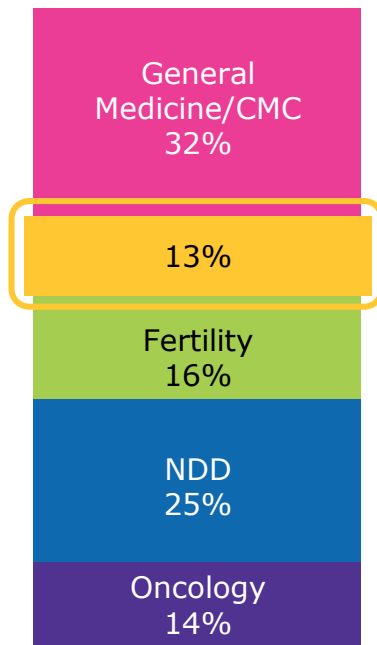
	Continue to drive mCRC* share by increasing patient testing and expanding head and neck coverage
	Ongoing 3x3 growth strategy implementation to strengthen sales and marketing activities delivering above-market organic sales growth
	Capitalize on strong efficacy and new smart devices to maximize differentiation and defend franchise
	Build on No.1 position and ART* channel access with embryo diagnostics and other innovative technologies
	Harness strengths of existing business and build a new focus area driven by innovative devices and services for patients
	Build on existing track record in emerging markets, drive brand and lifecycle management and expand business including asset repatriation



# Healthcare

## Preparing strategic options for Consumer Health

### Healthcare - Net sales 2016



CH

- ▶ Consumer Health entering next phase
- ▶ Accelerating successful future development
- ▶ Strategic options include potential full or partial sale or strategic partnerships

#### high-quality brands

- Well-recognized consumer brands in attractive categories
- Differentiated and compelling consumer brand positioning

#### diversified presence

- Well-balanced presence in >40 markets
- Strong footprint in emerging markets: >50% of sales from growth markets

#### high-growth Markets

- Global €100 bn OTC\* market seen growing ~5% until 2025
- Strong demand drivers: demographics, emerging markets, self-care demand

#### attractive financials

- Sales ~€860 m in 2016: organic CAGR 2013-2016 ~6%
- ~3,800 employees globally

**Accelerating strategy; fully capturing market opportunities; strong business with leading brands in attractive OTC categories**

# Clinical pipeline

## Phase I

**M2698**  
**p70S6K & Akt inhibitor**  
Solid tumors

**M3814**  
**DNA-PK inhibitor**  
Solid tumors

**M9831 (VX-984)**  
**DNA-PK inhibitor**  
Solid tumors

**M6620 (VX-970)**  
**ATR inhibitor**  
Solid tumors

**M4344 (VX-803)**  
**ATR inhibitor**  
Solid tumors

**M3541**  
**ATM inhibitor**  
Solid tumors

**M8891**  
**MetAP2 inhibitor**  
Solid tumors

**M7583**  
**BTK inhibitor**  
Hematological malignancies

**avelumab**  
**anti-PD-L1 mAb**  
Solid tumors

**avelumab**  
**anti-PD-L1 mAb**  
Hematological malignancies

**M9241 (NHS-IL12)<sup>4</sup>**  
**Cancer immunotherapy**  
Solid tumors

**M7824**  
**anti-PD-L1/TGFbeta trap**  
Solid tumors

**M4112**  
**Cancer immunotherapy**  
Solid tumors

**M1095 (ALX-0761)<sup>5</sup>**  
**anti-IL-17 A/F nanobody**  
Psoriasis

**M6495**  
**anti-ADAMTS-5 nanobody**  
Osteoarthritis

**M5717**  
**PeEF2 inhibitor**  
Malaria

## Phase II

**tepotinib**  
**c-Met kinase inhibitor**  
Non-small cell lung cancer

**tepotinib**  
**c-Met kinase inhibitor**  
Hepatocellular cancer

**avelumab - anti-PD-L1 mAb**  
Merkel cell cancer 1L<sup>1</sup>

**sprifermin**  
**fibroblast growth factor 18**  
Osteoarthritis

**atacept**  
**anti-Blys/anti-APRIL fusion protein**  
Systemic lupus erythematosus

**atacept**  
**anti-Blys/anti-APRIL fusion protein**  
IgA nephropathy

**abrituzumab – anti-CD51 mAb**  
Systemic sclerosis with interstitial lung disease

**evobrutinib**  
**BTK inhibitor**  
Rheumatoid arthritis

**evobrutinib**  
**BTK inhibitor**  
Systemic lupus erythematosus

**evobrutinib**  
**BTK inhibitor**  
Multiple sclerosis

## Phase III

**avelumab - anti-PD-L1 mAb**  
Non-small cell lung cancer 1L<sup>1</sup>

**avelumab - anti-PD-L1 mAb**  
Non-small cell lung cancer 2L<sup>2</sup>

**avelumab - anti-PD-L1 mAb**  
Gastric cancer 1L-M<sup>1M</sup>

**avelumab - anti-PD-L1 mAb**  
Gastric cancer 3L<sup>3</sup>

**avelumab - anti-PD-L1 mAb**  
Ovarian cancer platinum resistant/refractory

**avelumab - anti-PD-L1 mAb**  
Ovarian cancer 1L<sup>1</sup>

**avelumab - anti-PD-L1 mAb**  
Urothelial cancer 1L-M<sup>1M</sup>

**avelumab - anti-PD-L1 mAb**  
Renal cell cancer 1L<sup>1</sup>

**avelumab - anti-PD-L1 mAb**  
Locally advanced head and neck cancer

Pipeline as of November 1<sup>st</sup>, 2017

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.

## Registration

**cladribine tablets**  
**lymphocyte targeting agent**  
Relapsing multiple sclerosis<sup>6</sup>

- Oncology
- Immuno-Oncology
- Immunology
- Neurology
- General Medicine

<sup>1</sup> First Line treatment; <sup>1M</sup> First Line maintenance treatment; <sup>2</sup> Second Line treatment; <sup>3</sup> Third Line treatment; <sup>4</sup> Sponsored by the National Cancer Institute (USA);

<sup>5</sup> 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;

<sup>6</sup> As announced on August 25 2017, the European Commission has granted marketing authorization for cladribine tablets for the treatment of highly active relapsing multiple sclerosis in the 28 countries of the European Union in addition to Norway, Liechtenstein and Iceland.

## Strategy anchored on four foundational pillars

1	<b>Avelumab</b>	<ol style="list-style-type: none"><li>1. Monotherapy as a basis for combinations</li><li>2. Establish immunogenic priming in combination or sequence with CT/RT<sup>1</sup></li><li>3. Proprietary novel combinations</li><li>4. Establish value of unique molecular characteristics (ADCC)</li></ol>	<ol style="list-style-type: none"><li>1. MCC, UC 2L, Gastric 3L, NSCLC 1L/2L,</li><li>2. Maintenance in UC 1L, gastric 1L, ovarian 1L</li><li>3. Avelumab + Inlyta (RCC 1L), plus 5 phase 1 combinations</li><li>4. DLBCL, NSCLC 1L (high intensity), unique combinations leveraging ADCC</li></ol>
2	<b>IO bi-functionals</b>	Engineer or access platforms where biology is best addressed by a bi-functional approach	<ul style="list-style-type: none"><li>• anti-PD-L1/TGF-beta trap</li><li>• anti-PD-L1/anti-LAG-3</li><li>• NHS-IL 12</li></ul>
3	<b>DNA Damage Response (DDR)</b>	Establish leadership in DDR and leverage synergies across portfolio (immuno-oncology plus emerging platforms)	<ul style="list-style-type: none"><li>• DNA-PK-i</li><li>• ATR-i</li><li>• ATM-i</li></ul>
4	<b>Emerging Platforms</b>	Invest in complementary discovery areas	<ul style="list-style-type: none"><li>• Antibody-Drug-Conjugates (ADC, e.g. partnership with Mersana/Sutro)</li><li>• Oncogenic signaling</li><li>• Bi-functional fusion proteins</li><li>• Bi-specific antibodies</li></ul>

# External Innovation

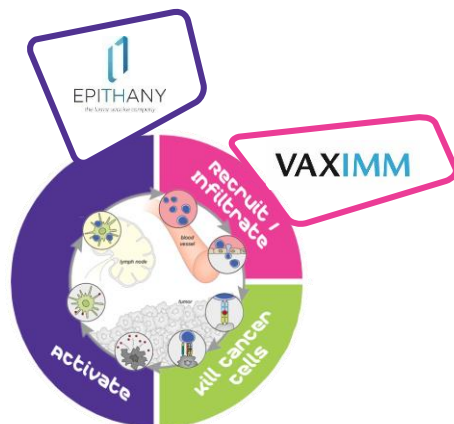
## 2017 deal activity aligned with strategic pillars

1

### Clinical collaborations for avelumab combinations

#### expand across the immunity cycle

- **EpiThany:** EP-101 STEMVAC vaccine (breast cancer)
- **Vaximm:** Oral T-cell immunotherapy (glioblastoma, colorectal cancer)

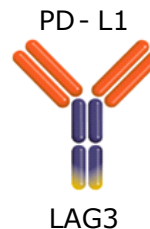


2



#### Leading bi-specific platform

- **Option deal**
- **Bi-specific antibodies** (promising lead asset **Anti-LAG3/ PD-L1**)
- FS118 shows superior activity pre-clinically (**expected in clinic 2018**)
- Potential in PDx-refractory setting
- Four additional mAb2 programs



3



#### strengthen DDR platform

- **Acquisition (license) deal**
- **Leadership** in DDR-i
- Combination of Vertex' Oncology and Merck KGaA, Darmstadt, Germany's DNA-PK inhibitor programs

#### Vertex

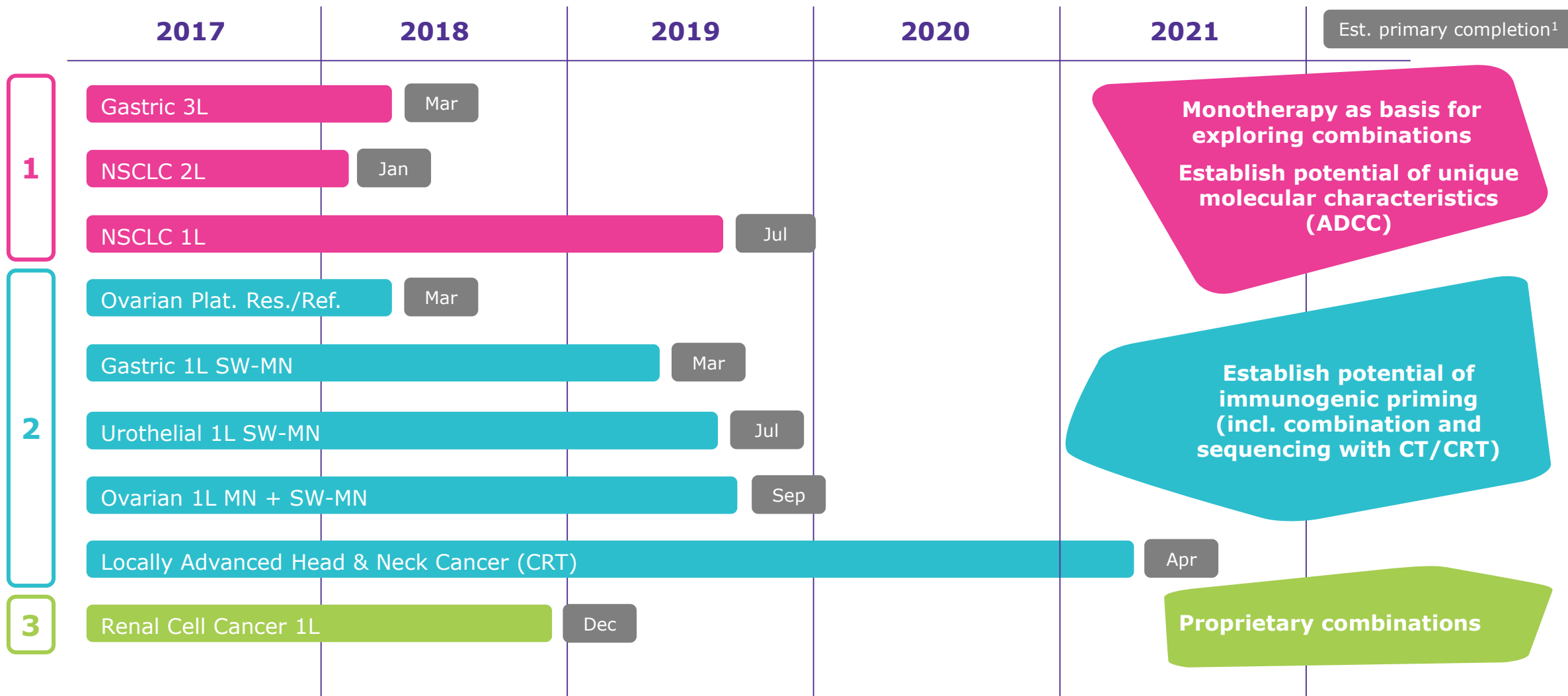
- Two **ATR-inhibitors**
- One **DNA-PK inhibitors**
- Two pre-clinical programs

#### MERCK KGaA, Darmstadt, Germany

- DNA-PK inhibitor
- **ATM-inhibitor** (preclinical)

# 1 Avelumab

## Nine ongoing pivotal studies with differentiation potential



<sup>1</sup> Estimated primary completion date according to Clinicaltrials.gov as of November 08, 2017

Acronyms: CT: Chemotherapy | CRT: Chemoradiotherapy | Plat. Res./Ref.: Platinum Resistant/Refractory | MN: Maintenance | SW: Switch





# Avelumab

## Clinical results support avelumab as therapeutic option for metastatic Merkel cell carcinoma

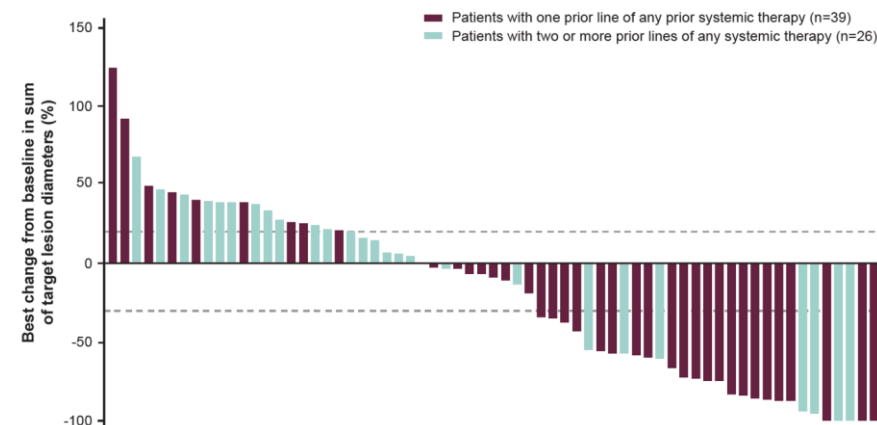
### Encouraging response rates<sup>1</sup>

- ORR: 31.8%
  - 9.1% complete response
  - 22.7% partial response
  - Rapid (78.6% responding within 7 weeks of treatment)
  - Durable (82.1% still responding at time of analysis)
- 6-mo OS: 69% (median OS: 11.3 months)
- 6-mo PFS rate: 40%
- Manageable safety profile; no unexpected safety signals



### Potential for differentiation

- Largest international multicenter, open-label study of anti-PD-L1/PD-1 reported in this patient population (88 patients) – Responses observed in large number of patients
- Improved response rates observed when used earlier, i.e. fewer lines of prior chemotherapy appeared to be associated with better response to avelumab in MCC 2L and beyond
  - ORR of 40.4% for patients with one prior systematic treatment
  - ORR of 19.4% for patients with two and more prior treatments



Note: timelines are event-driven and may change

<sup>1</sup>Avelumab (MSB0010718C; anti-PD-L1) in patients with metastatic Merkel cell carcinoma previously treated with chemotherapy: results of the phase 2 JAVELIN Merkel 200 trial / Oral Presentation at the 52nd ASCO Annual Meeting, June 3-7, 2016; Chicago, Illinois. Abstract No. 9508; Howard Kaufman et al.

## Key ASCO abstracts at a glance (two oral presentations)

### MCC (1L)

- Initial results from a cohort of chemotherapy-naïve pts with mMCC (ongoing study)
- Manageable safety profile, consistent with findings for 2L+ cohort
- **Unconfirmed ORR: 64.0%** (≥6 weeks follow-up) / **Confirmed ORR: 56.3%** (≥3 months follow-up)
- Avelumab is associated with early responses; preliminary results suggest that responses mature to become durable

### NSCLC

- Exposure-response and PD-L1 expression analysis of NSCLC 2L (Phase I cohort)
- Patients in upper half of increased exposure ( $C_{troughfirst}$ -dose quartiles Q3-Q4) showed increasing ORR (by higher PD-L1-staining level); **ORR: 25% (≥1%); 26% (≥5%); 33% (≥50%); 43% (≥80%)\***
- Analysis provides rationale for the modification of the NSCLC 1L Phase III trial

### Urothelial

- Updated efficacy and safety data of avelumab in metastatic urothelial carcinoma 2L (pooled Phase Ib)
- Durable responses in heavily pretreated patients, irrespective of tumor PD-L1 expression status
- **Confirmed ORR: 17.4%; 6.2% CR** (≥6m follow-up)

### RCC (oral presentation)

- First line avelumab + Inlyta therapy in patients with advanced renal cell carcinoma 1L (Phase Ib)
- Preliminary findings confirm manageable safety profile and consistent with agents administered as monotherapy
- **Confirmed ORR: 58.2%**, based on 3 CR and 32 PR (follow-up ongoing)

### Anti PD-L1/ TGF-beta trap (oral presentation)

- Preliminary results from Phase I dose-escalation study (bifunctional fusion protein targeting PD-L1 and TGF-β)
- Manageable safety profile in patients with heavily pre-treated advanced solid tumors
- Early signs of clinical efficacy: **1 ongoing confirmed CR** (cervical), **1 durable PR** (pancreatic), **1 unconfirmed PR** (anal)
- A 25% reduction in the sum of diameters of target lesions after 2 doses of M7824 (cervical), and 2 cases of prolonged stable disease (pancreatic; carcinoid).

Note: timelines are event-driven and may change

\*Avelumab (MSB0010718C; anti-PD-L1) in patients with metastatic Merkel cell carcinoma previously treated with chemotherapy: results of the phase 2 JAVELIN Merkel 200 trial / Oral Presentation at the 52nd ASCO Annual Meeting, June 3-7, 2016; Chicago, Illinois. Abstract No. 9508; Howard Kaufman et al.

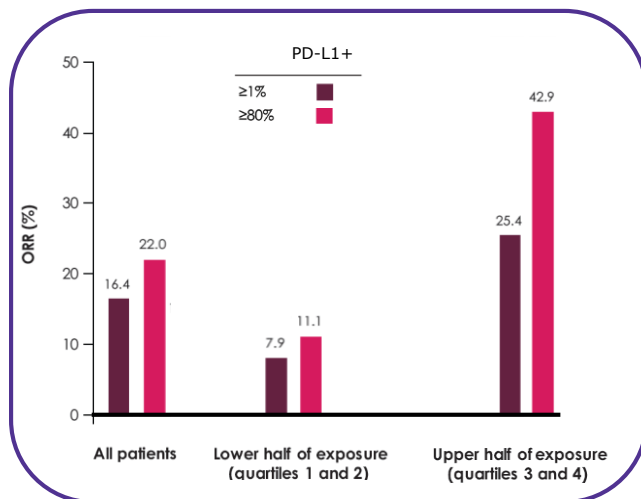
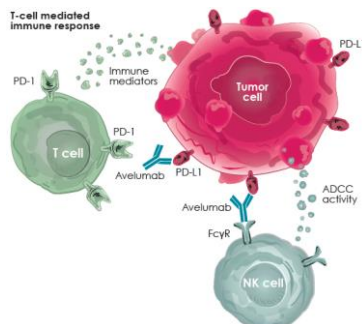


1

# Avelumab

## NSCLC 1L: Assessing potential efficacy upside in mono-therapy<sup>1</sup>

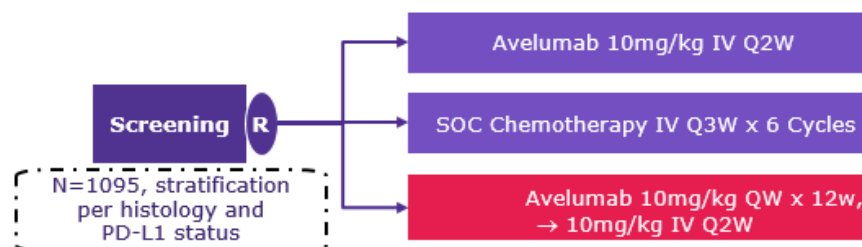
NSCLC 2L+: exposure response



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 Apr 2019)

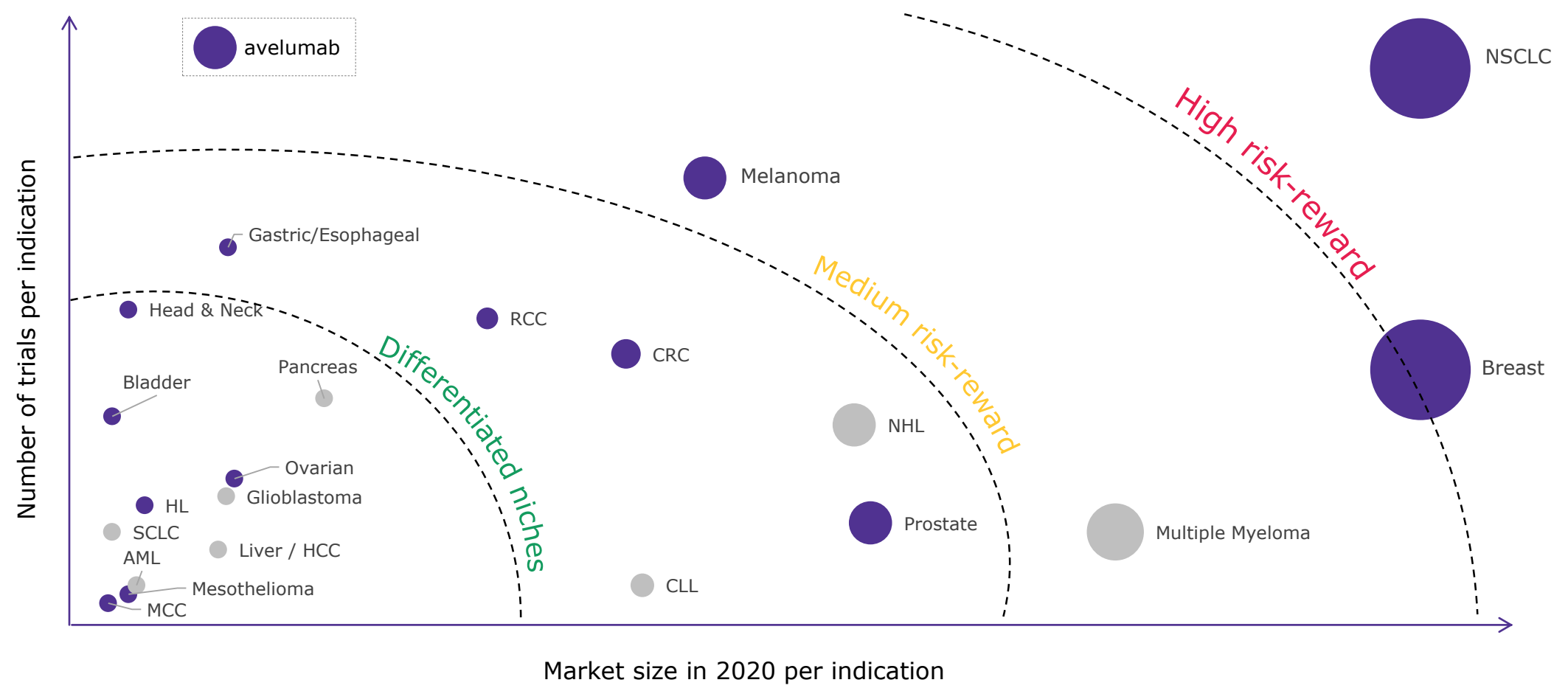


- **Primary endpoints:** PFS & OS @ high PD-L1-expression
- **Secondary endpoints:** PFS & OS @ moderate and low PD-L1-expression (BOR, DOR, Safety, QoL)
- **Hierarchical ordered hypothesis**

1

# Avelumab

## Avelumab plays predominantly in attractive and differentiated niches





# Avelumab

## Differentiation strategy varies according to chosen target indication and market

1

**Unsaturated  
and / or niche  
indications**

- Ambition to lead in niche indications (e.g. Merkel cell) or markets (e.g. Asia for gastric)
- Quick to market strategy (e.g. BTB designation for MCC)
- Small, but less crowded markets and sales potential with notable impact for us
- Strategic strength of Healthcare in niche markets

2

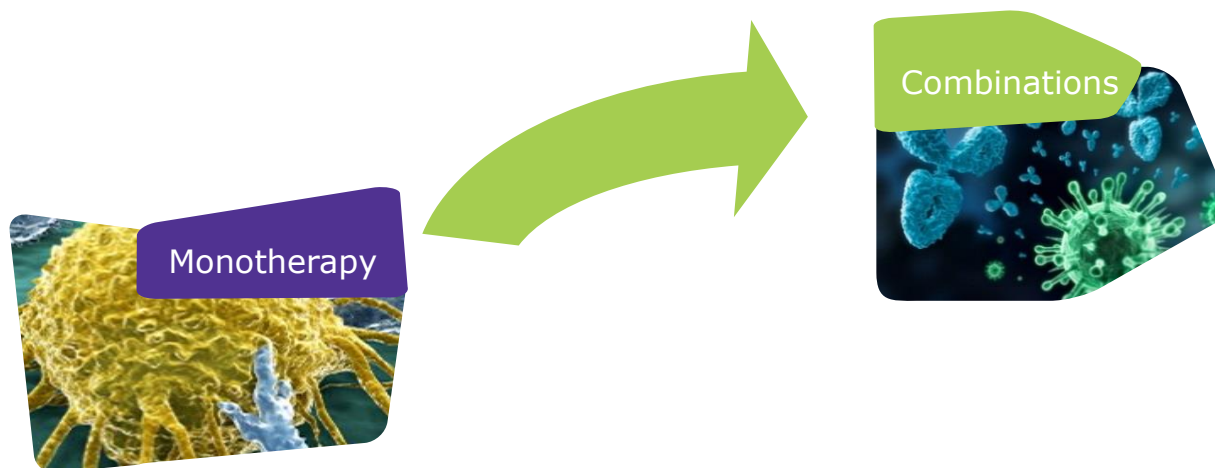
**Saturated  
and / or major  
indications**

- Learn from experience of incumbents/early movers in major indications (e.g. NSCLC, Bladder)
- Potential for combinations given breadth of combined development pipelines
- Differentiate in trial design and explore application of further biomarkers



# 1 Avelumab

## Combinations will drive differentiation strategy



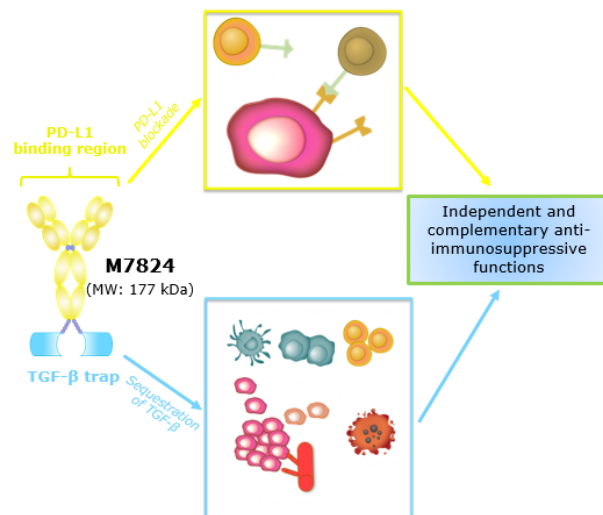
- **In registration: metastatic Merkel Cell (EU)**
- Phase III: Ovarian (1L & Plat. Res. Ref.)<sup>1</sup>
- Phase III: Gastric (1L MN & 3L)
- Phase III: NSCLC (1L & 2L)
- Phase III: Urothelial (1L MN)
- Phase III: SCCHN (Locally advanced, Front line)
- Phase II: Merkel Cell (1L)
- Multiple other tumor types

- **Phase III: Ovarian 1L & Plat. Res. Ref.**<sup>1</sup>  
(Avelumab + Chemotherapy)
- **Phase III: Renal 1L**  
(Avelumab + Inlyta)
- **Phase III: L/A Head and Neck**  
(Avelumab + Chemoradiation)
- **Phase I: DLBCL**<sup>2</sup>  
(Avelumab + various agents)
- **Phase I/II: Advanced malignancies**  
(Avelumab + 4-1BB / + OX40)
- **Phase Ib/II: Ovarian**  
(Avelumab + Entinostat; Syndax)
- **Phase I/Ib: Ovarian**  
(Avelumab + VS-6063; Verastem)
- **Phase I/II: SCCHN**  
(Avelumab + TG4001; Transgene)
- **Phase Ib/II: NSCLC**  
(Avelumab + VX15/2503; Vaccinex)
- **Phase I/Ib: NSCLC**  
(Avelumab + Debio1143; Debiopharm)
- **Phase I/Ib: Glioblastoma and Colorectal**  
(Avelumab + VXM01; VAXIMM)

2

## Anti-PD-L1/TGF- $\beta$ trap

### Dose escalation completed, showing first signs of clinical activity<sup>1</sup>



- **Innovative first-in-class bifunctional fusion protein** designed to simultaneously target two immune suppressive pathways (blocking PD-L1 and reducing TGF- $\beta$  signaling)
- **Manageable safety profile** (patients with heavily pretreated advanced solid tumors)
- **Saturated peripheral PD-L1 and sequestered all released plasma TGF- $\beta$ 1, - $\beta$ 2, and - $\beta$ 3<sup>1</sup>**

Patients with metastatic or locally advanced solid tumors for which no standard effective therapy exists or standard therapy has failed (N = 19)

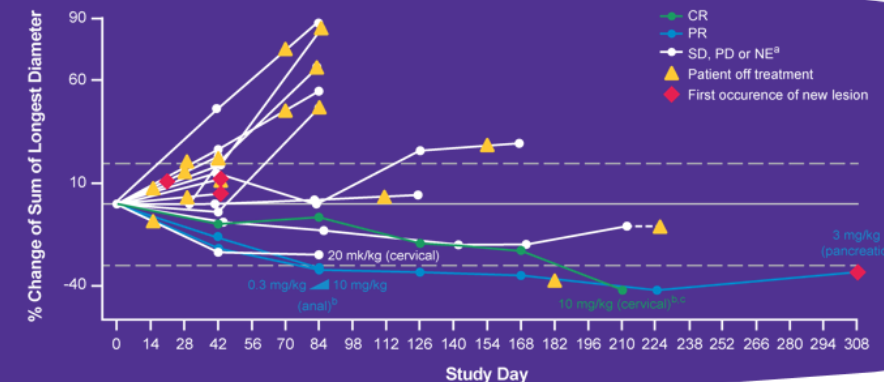
Dose Q2W, mg/kg	n
0.3 $\nabla$ 10	3
1	3
3	3
10	3
20	7

**Primary endpoints**

- TEAEs
- DLTs
- Treatment-related AEs

**Secondary endpoints**

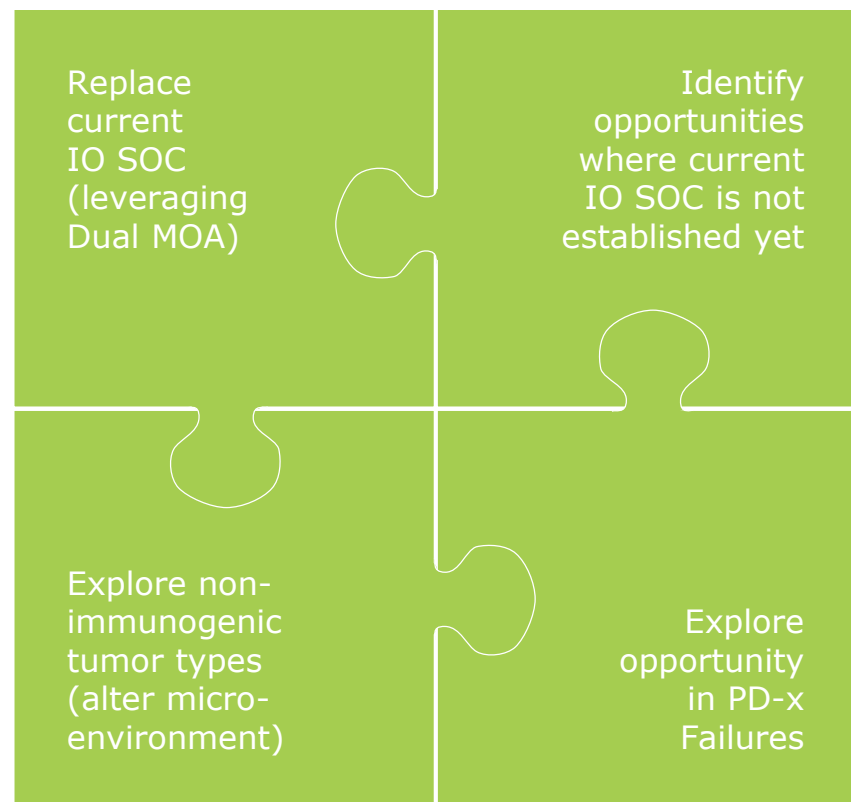
- PK
- M7824 immunogenicity
- BOR



## Anti-PD-L1/TGF- $\beta$ trap

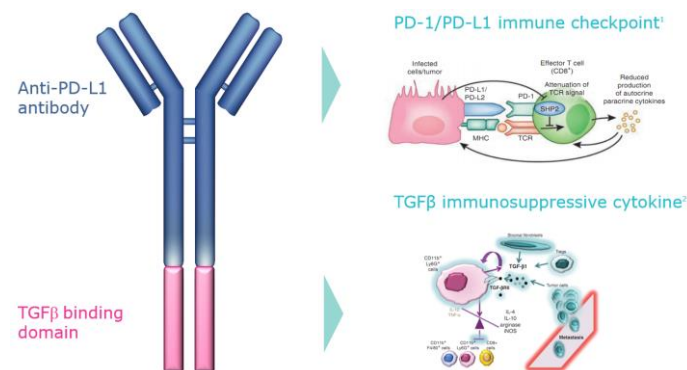
# PD-L1–TGF-beta indicates potential to move beyond checkpoint inhibitors

### Four focus areas for exploration



### Status and next steps

- Novel, first-in-class bifunctional immunotherapy
- Bifunctional mode should result in broader application vs. respective mono-functional agents
- Great potential when combined with Standard of Care, immunotherapy and internal pipeline drug candidates
- Dose level finding of Phase I completed
- Recruiting into Ib expansion cohorts started in Q3 2016



## 2 Anti-PD-L1/TGF-β trap Cohort data will enable decision per indication/category

Dose escalation completed<sup>1</sup>

14 cohorts in recruitment

Defined criteria allow timely decision

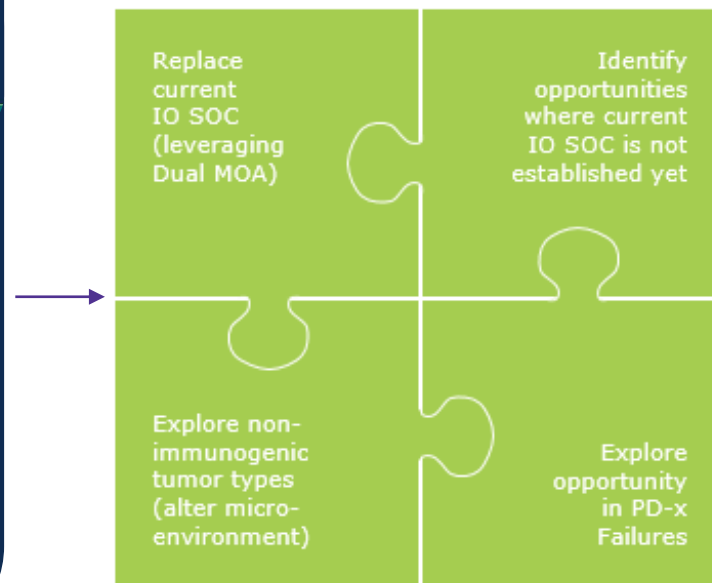
**Preliminary results from a phase 1 trial of M7824 (MSB0011359C), a bifunctional fusion protein targeting PD-L1 and TGF-β, in advanced solid tumors**

J. L. Gulley<sup>1</sup>, C. R. Heery<sup>2</sup>, J. Schlom<sup>3</sup>, R. A. Madan<sup>4</sup>, L. Cao<sup>1</sup>, E. Lamping<sup>4</sup>, J. L. Marte<sup>1</sup>, L. M. Cordes<sup>5</sup>, O. Christensen<sup>6</sup>, C. Helwig<sup>7</sup>, J. Strauss<sup>1</sup>

<sup>1</sup>National Cancer Institute at the National Institutes of Health, Bethesda, MD; <sup>2</sup>Laboratory of Tumor Immunology and Biology, National Cancer Institute at the National Institutes of Health, Bethesda, MD; <sup>3</sup>National Cancer Institute, Bethesda, MD; <sup>4</sup>Gastrointestinal Malignancies Branch, National Cancer Institute, NIH, Bethesda, MD; <sup>5</sup>National Institutes of Health, Bethesda, MD; <sup>6</sup>EMD Serono, Billerica, MA; <sup>7</sup>Merck KGaA, Darmstadt, Germany

ASCO ANNUAL MEETING '17 #ASCO17

- **Ongoing confirmed CR** (cervical, 10 mg/kg)
- **Durable confirmed PR** (pancreatic, 3 mg/kg)
- **Unconfirmed PR** (anal, 0.3 mg/kg 10 mg/kg)
- **Near-PR** (cervical, 20 mg/kg)
- **Prolonged SD** (pancreatic, 3 mg/kg)
- **Prolonged SD** (carcinoid, 1 mg/kg)



Expand cohort and/or explore single-arm path-to-registration

Expand cohorts to confirm signal and/or follow with randomized comparative trial

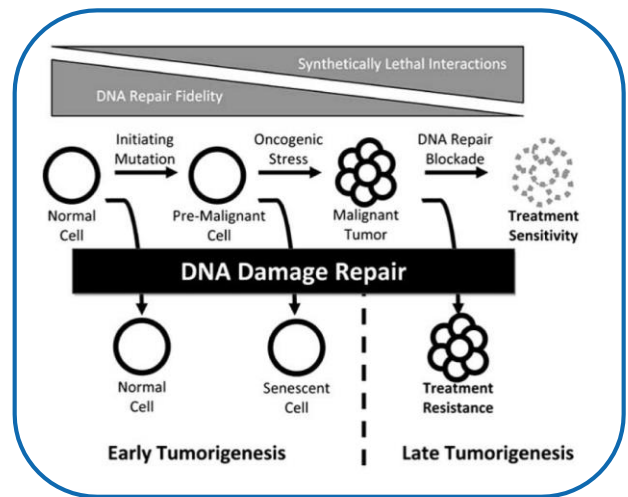
Explore biomarker driven pan-tumor opportunities

De-prioritize cohort

<sup>1</sup> As presented by J. L. Gulley at ASCO Annual Meeting 2017, June 5, 2017.  
Acronyms: CR: complete response | PR: partial response

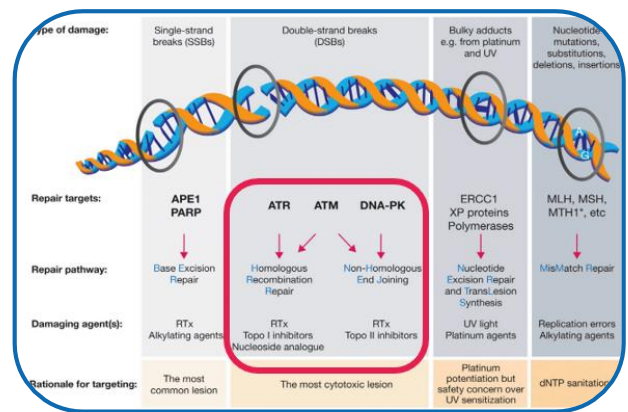


# 3 DNA damage response (DDR) Complete portfolio supporting leadership in a potentially disruptive class



Genomic instability: a hallmark of late stage cancers<sup>1</sup>

- DNA damage response (DDR) keeps genetic information intact
- In many cancers DDR pathways are defected, leading to greater dependency on remaining functional DDR pathways
- Preferentially inhibiting remaining DDR pathways can result in cancer cell death (“synthetic lethality”)



Amplifying cytotoxic effects of conventional and novel cancer treatments potentially bears combination potential

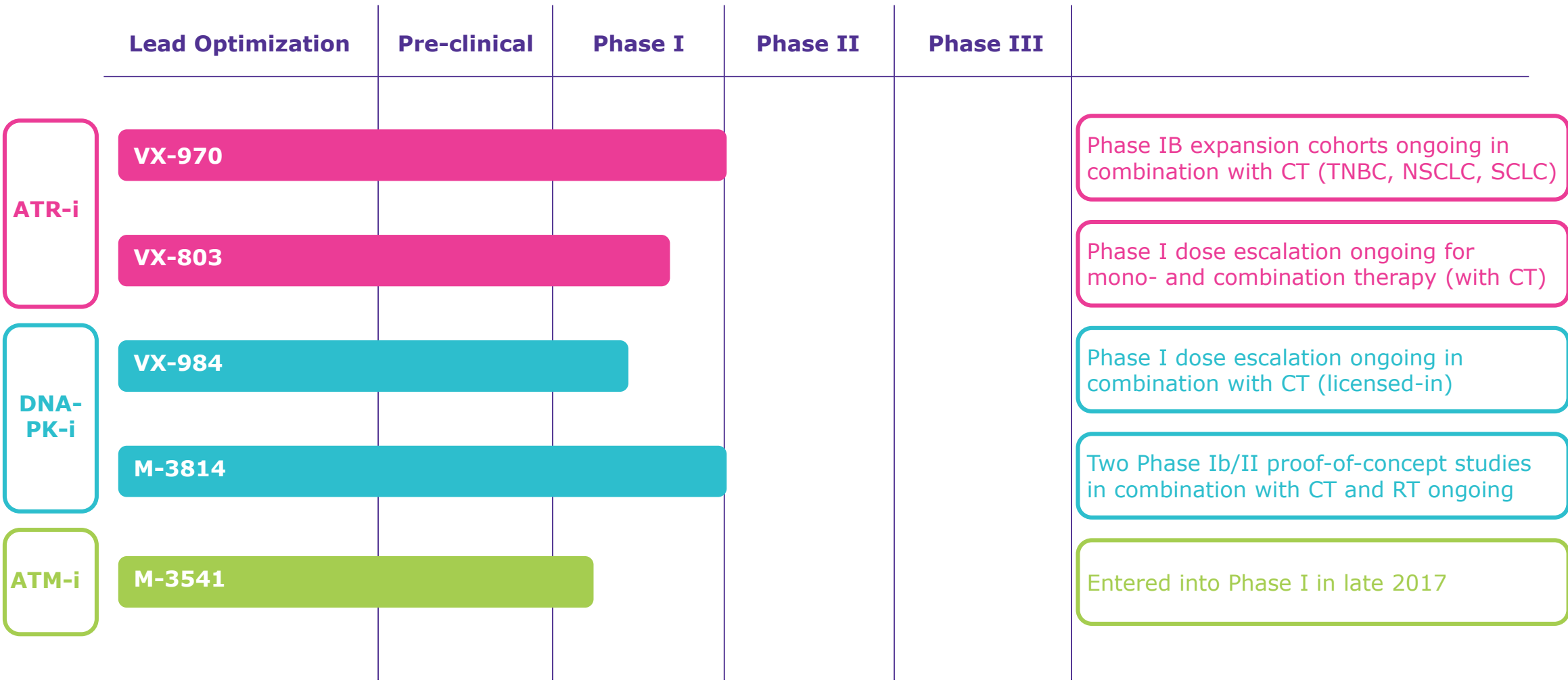
1. Inhibitor portfolio targets all three leading pathways of double stranded breaks – enabling unique synergies
2. ASCO 2017: leading DNA-PK-I (M3814) found safe and tolerable in a phase I study, with limited single-agent activity (20% of patients with stable disease for at least 18 weeks)<sup>2</sup>

<sup>1</sup> Sources: O'Connor, Molecular Cell, 2015 | Benjamin et al., Current Drug Targets, 2010, 11, 1336-1340

<sup>2</sup> “A multicenter phase I trial of the DNA-dependent protein kinase (DNA-PK) inhibitor M3814 in patients with solid tumors”, Mark van Bussel, ASCO 2017  
 Acronyms: ATM: ataxia-telangiectasia mutated | ATR: ataxia telangiectasia and Rad3 | DNA-PK: DNA-dependent protein kinase |



# 3 DNA damage response (DDR) Clinical program targets all three DDR pathways, in mono- and combination



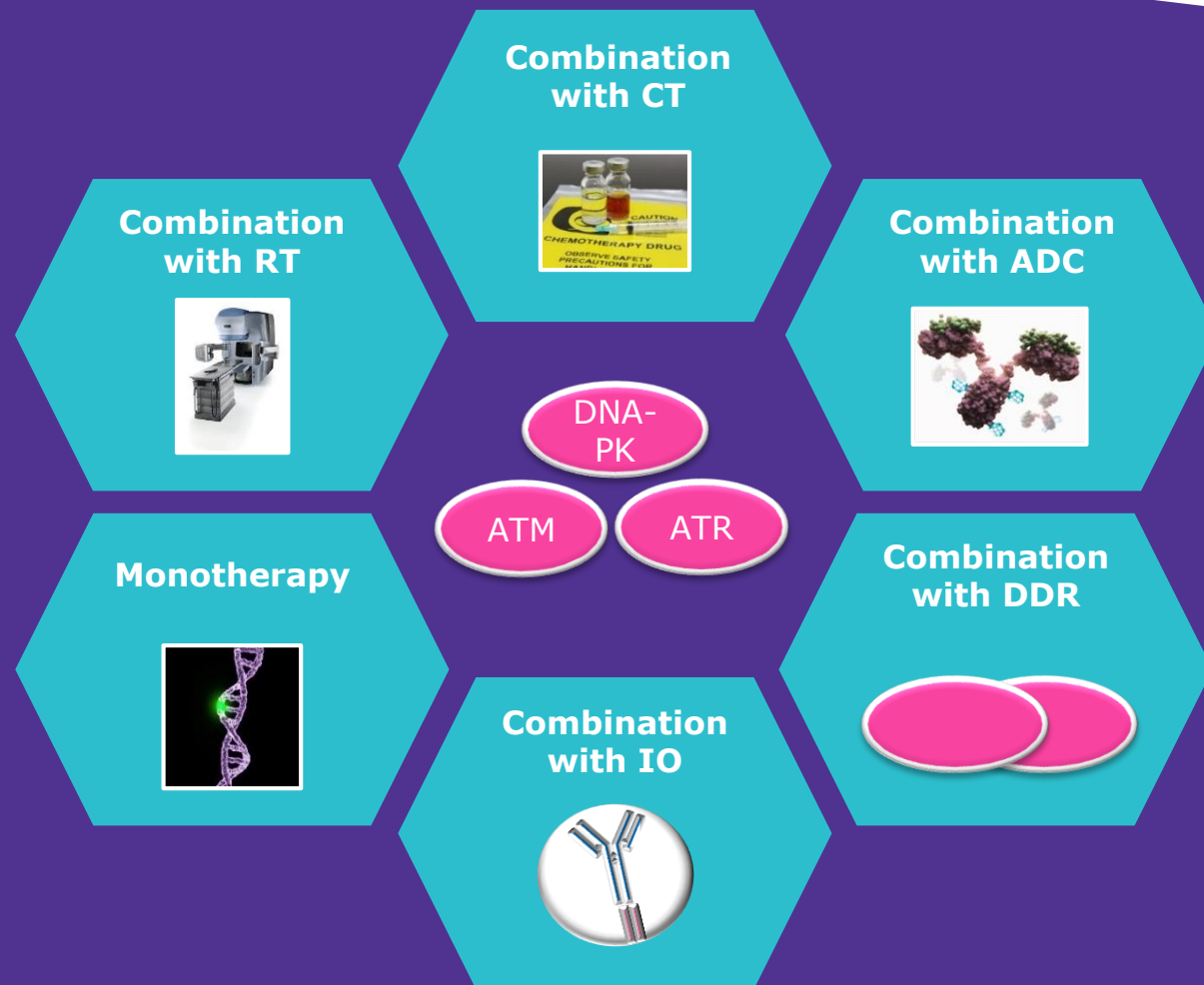
Acronyms: ATM: ataxia-telangiectasia mutated | ATR: ataxia telangiectasia and Rad3 | DNA-PK: DNA-dependent protein kinase | CT: Chemotherapy | RT: Radiotherapy | NSCLC: non-small cell lung cancer | SCLC: small cell lung cancer | TNBC: triple negative breast cancer | Note: timelines are event-driven and may change

### 3 DNA damage response (DDR) Broad combination potential across multiple mechanisms

At least **50%** of all cancer patients receive some type of **RADIATION** therapy (NCI 2016)

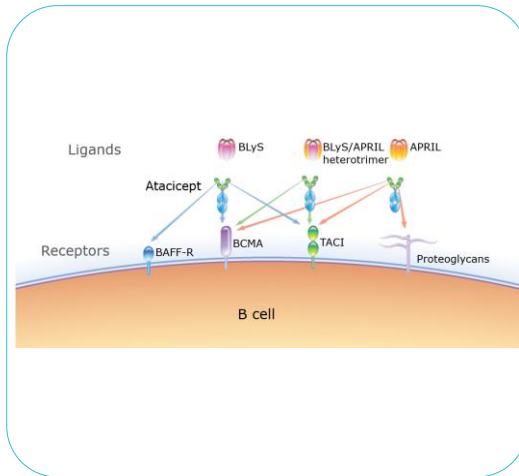
At least **70%** of all cancer patients receive some type of **CHEMOTHERAPY** (NCI 2016)

Significant share of patients to be treated with **CHECKPOINT INHIBITORS**



# Update on selected assets

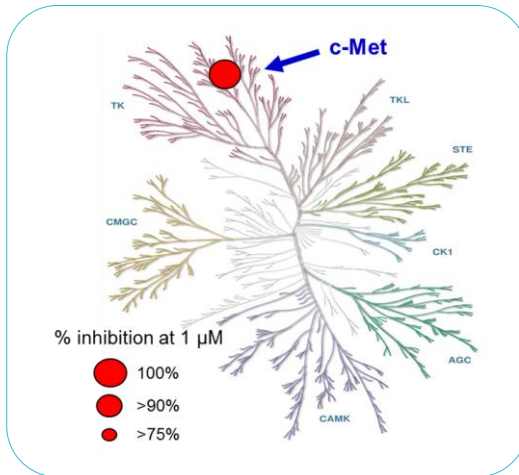
## Atacicept



- Binds to receptors of two cytokines regulating maturation, function, and survival of B cells (B-lymphocyte stimulator (BLyS) & a proliferation-inducing ligand (APRIL))
- ADDRESS II (Phase IIb) in SLE patients (n=306):
- Primary endpoint not met, but analyses of predefined subpopulation with high disease activity (HDA; n=158) demonstrated statistically significant treatment effects (e.g. SRI-6 response at week 24 significantly greater with atacicept 150 mg vs. placebo); both doses led to significant reductions in BILAG A and SFI flares

Phase III decision subject to interactions with authorities

## Tepotinib

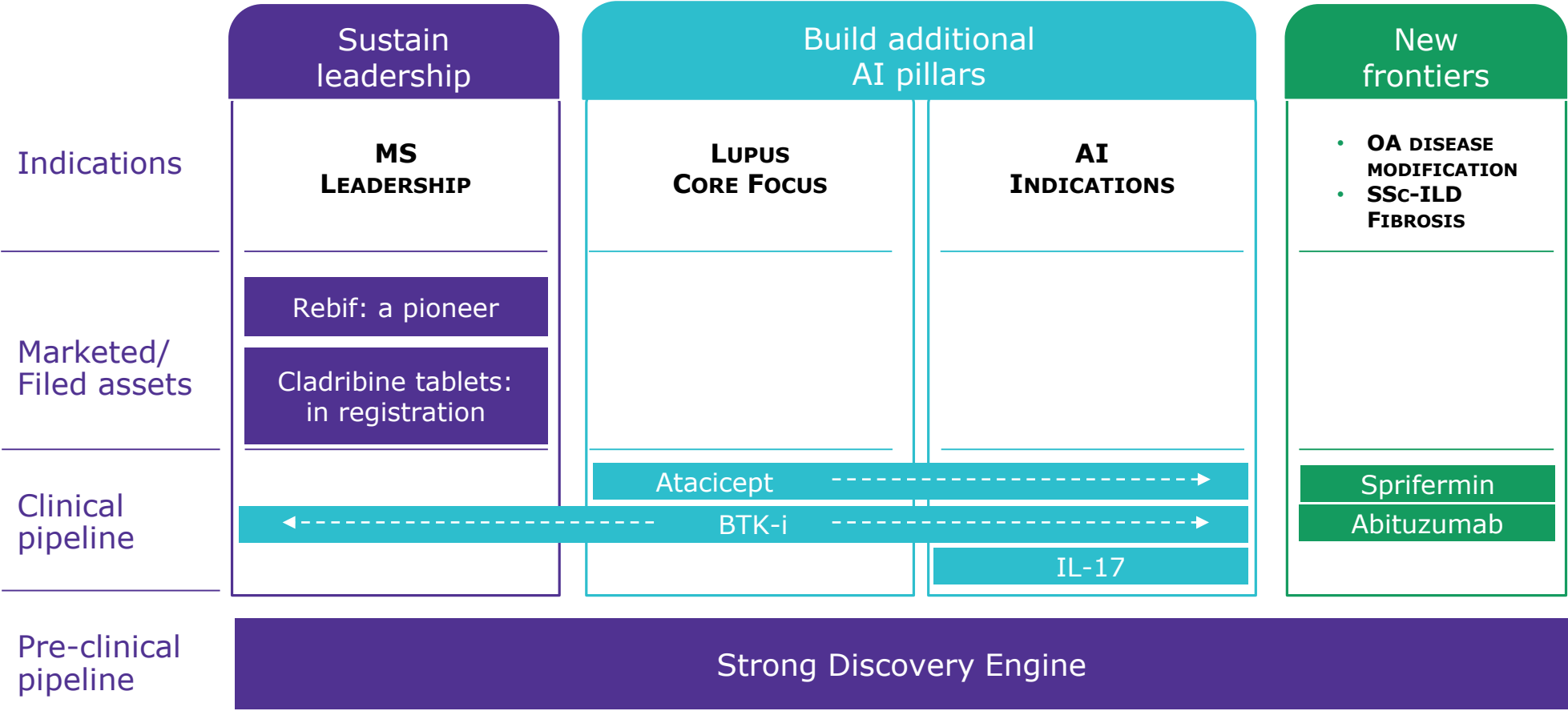


- Highly selective small molecule c-Met inhibitor
- Active in ligand-dependent and ligand-independent tumor models
- Biomarker-driven approach for patient selection
- Preliminary data show encouraging signs of anti-tumor activity in c-Met positive patients in NSCLC and HCC
- Phase II trials in progress in NSCLC and HCC

Analysis of Phase II data for HCC and NSCLC expected in H1 2018

# Immunology

## Strategy anchored on leadership in selected disease areas



# Healthcare

## Mavenclad® launch well prepared and successfully executed in first days

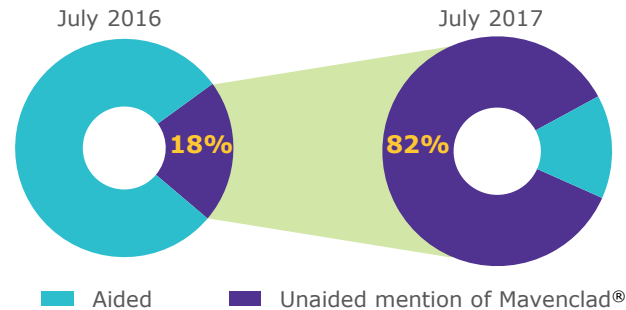
**1** Interest by scientific community increased 9x within only 1 year

No. of reactive MSL<sup>1</sup> interactions



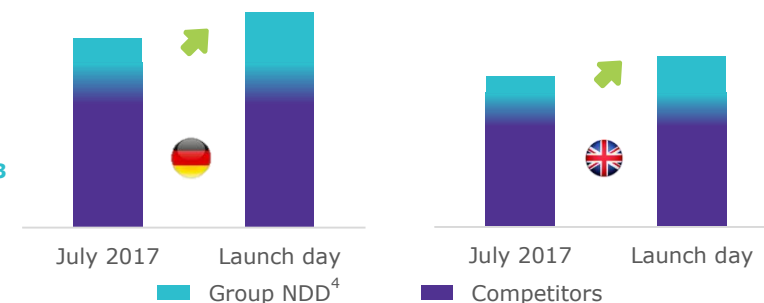
**2** Awareness improved substantially within key German neurologists<sup>2</sup>

Unaided awareness survey



**3** Share of voice lifted through swift build-up of sales force and utilization of existing Rebif® infrastructure

No. of sales people<sup>3</sup>



**on track to reach high single digit € M sales in 2017**

- Germany: first patients already started treatment
- UK: In discussions with healthcare authorities to secure immediate access and funding for patients
- Lowest-cost high-efficacy agent in multiple sclerosis
- U.S.: consultations with the FDA initiated; Go/no-go decision until end of 2017
- Further submissions initiated or in planning (e.g. CH, AUS, Israel)

**Expected peak sales ~€500 – 700 M in EU**

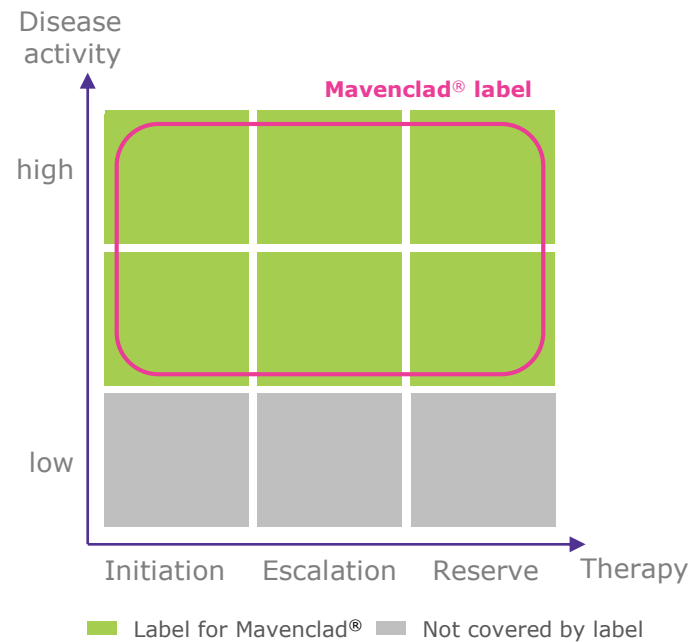
<sup>1</sup>MSL = medical scientific liaison (team); <sup>2</sup>Awareness Tracking MS, Produkt + Markt; <sup>3</sup>Source: Merck KGaA, Darmstadt, Germany analysis; <sup>4</sup>NDD = neurodegenerative diseases

## Healthcare

# Mavenclad's attractive label<sup>1</sup> supports integrated franchise strategy

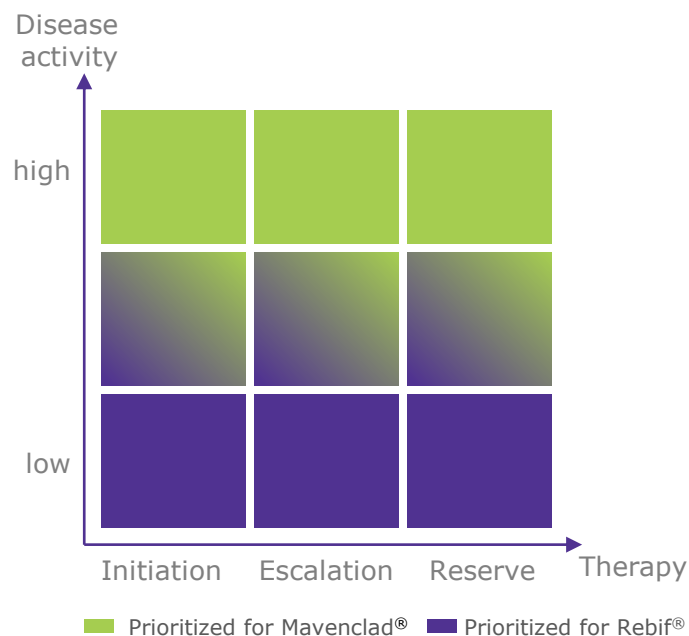
**Mavenclad® label covers 60-70% of patients with RRMS<sup>2</sup> within the MS<sup>1</sup> patient population**

MS patient population<sup>3</sup>



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

RRMS patients, EU-5<sup>4</sup>



## Integrated Franchise strategy

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

<sup>1</sup>Mavenclad® label covers: RRMS+rSPMS+rPPMS; <sup>2</sup>Abbreviations: RRMS relapsing-remitting multiple sclerosis, MS = multiple sclerosis, rSPMS = relapsing secondary progressive MS, rPPMS = relapsing primary progressive multiple sclerosis; <sup>3</sup>Source: Merck KGaA, Darmstadt, Germany; <sup>4</sup>Source: Merck KGaA, Darmstadt, Germany, Ipsos

# Cladribine tablets – Decision by EC expected in Q3 2017

## Background

- Targets lymphocytes (both B and T cells), integral to MS pathogenesis
- Two Phase III and one Phase IIIb extension studies conducted in RRMS and early MS<sup>1,2,3</sup>; Phase II study in patients failing IFN beta therapy<sup>5</sup>
- Substantial new efficacy & safety characterization including data from long-term follow up (>10,000 patient-years)
- Most recent analyses provide relevant information on benefit/risk profile of cladribine tablets in RRMS:
  - ARR reduction (58%)
  - Risk of disability progression (33% reduction)
  - Relative reduction in mean number of lesion (86% reduction in T1 gadolinium-enhanced lesions)
  - 47% of patients experience NEDA over 2 years<sup>4</sup>

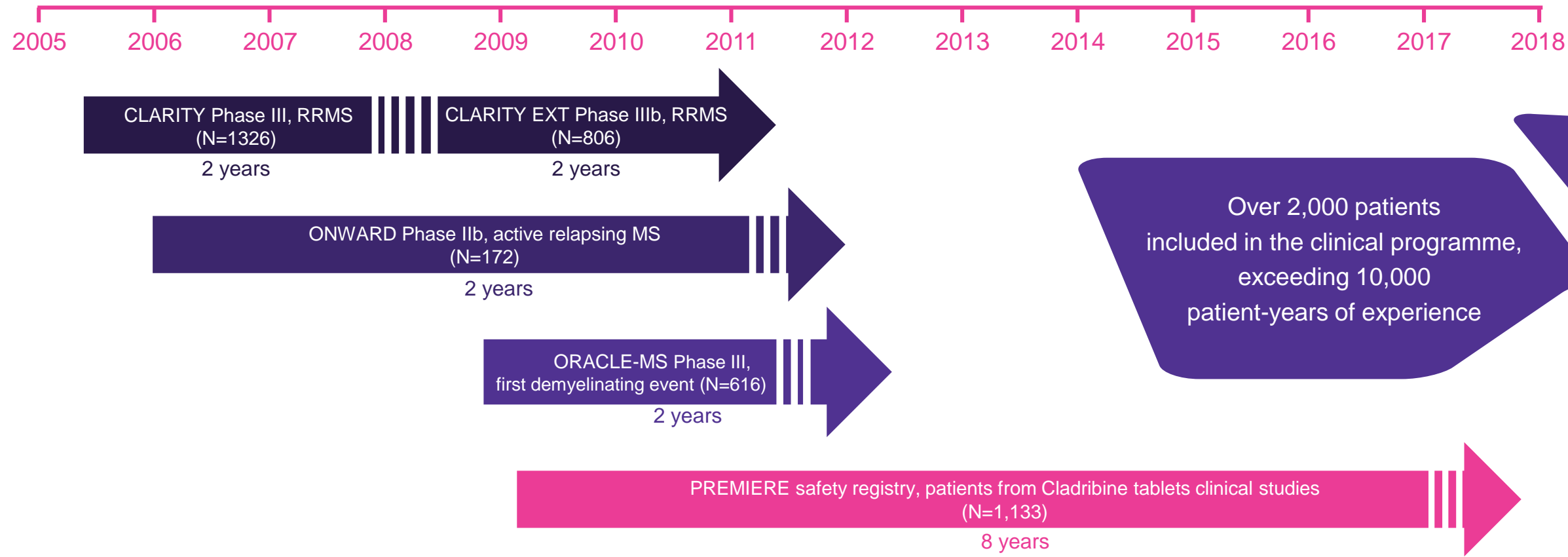
## Potential for differentiation

- Merck KGaA, Darmstadt, Germany aims to address significant unmet needs for agents delivering high efficacy with favorable safety profile in a convenient dosing regimen
- Administered orally (tablet formulation)
- Extremely short treatment courses (8–10 days per year) leading to long-term efficacy<sup>1</sup>

Note: timelines are event-driven and may change

EC = European Commission; ARR = Annualized Relapse Rate; MAA = Marketing Authorization Application; MS = multiple sclerosis; NEDA = no evidence of disease activity; RRMS = relapsing-remitting multiple sclerosis. <sup>1</sup> Giovannoni G et al. New Engl J Med 2010;362:416–26; <sup>2</sup> Giovannoni G et al. 65th annual meeting of the American Academy of Neurology 2013. P07.119. <sup>3</sup> Leist TP et al. Lancet Neurol 2014;13:257–67. <sup>4</sup> Giovannoni G et al. Lancet Neurol. 2011;10:329–37. <sup>5</sup> Montalban X et al. 65th annual meeting of the American Academy of Neurology 2013. P07.099.

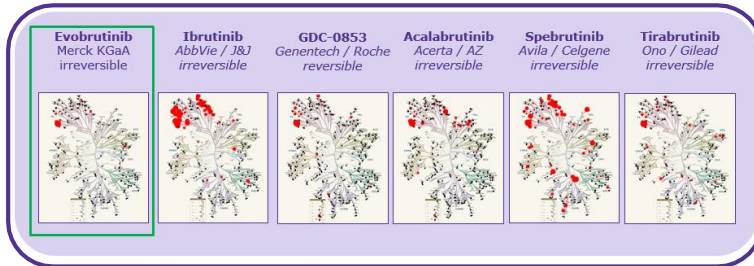
# Cladribine tablets supported by 10,000 patient years of experience collected over 13 years including an 8 year safety registry





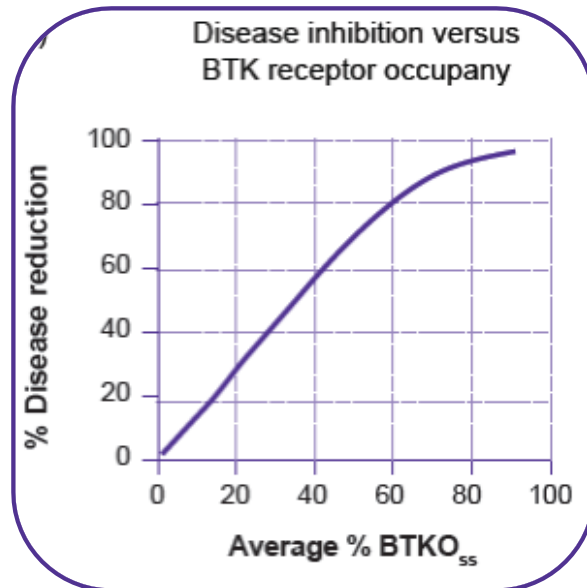
# Evobrutinib

## Highly selective BTK-i to be explored as chronic therapy



### Safety: promising kinase selectivity minimizing off-target effects<sup>1</sup>

- Greater selectivity vs. in-class competitors in kinase screen (>270 kinases)
- Besides BTK, two more kinases inhibited (vs. 25 off-target kinases by others)
- Kinase selectivity may result in lower AE rate vs. existing treatments

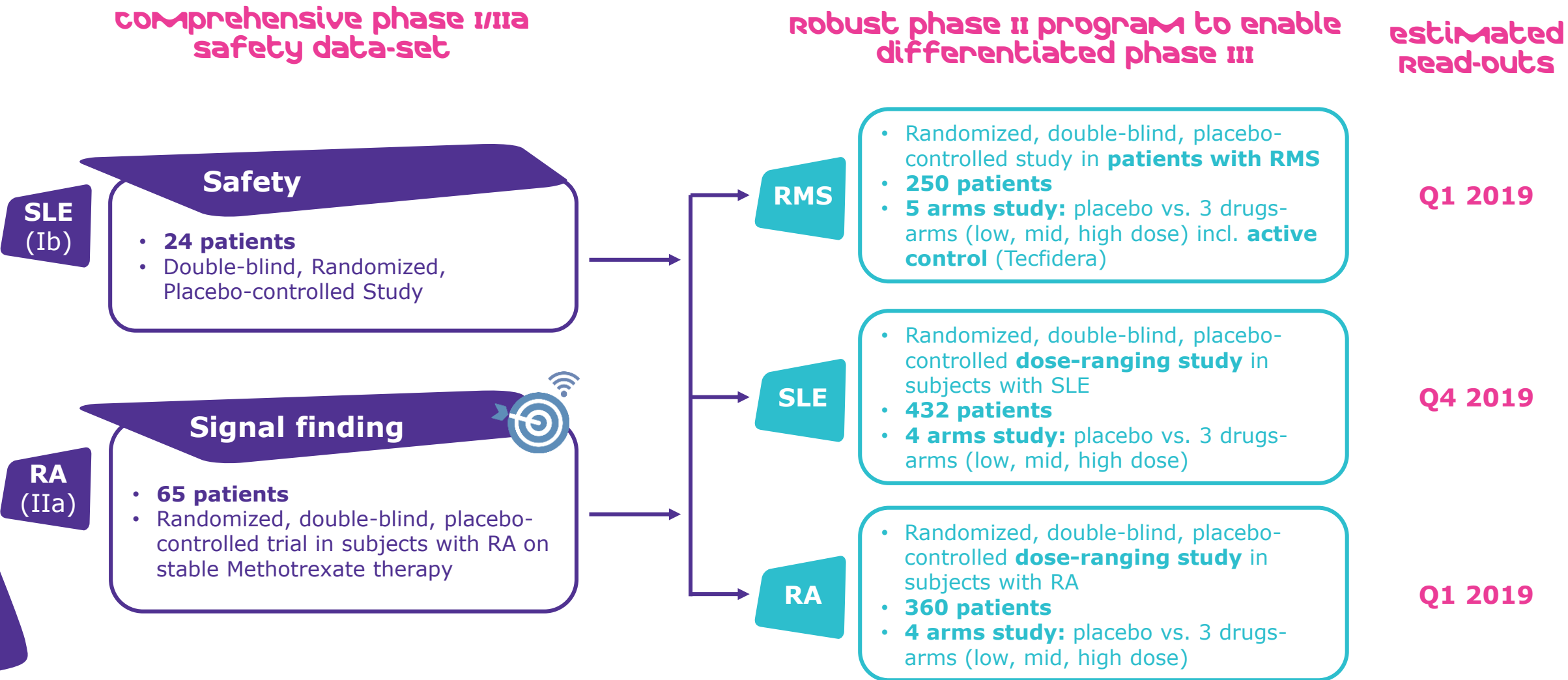


### Efficacy: oral, highly efficacious in pre-clinical models<sup>1</sup>

- Evobrutinib (irreversible antagonist) inhibiting signal transduction until protein is naturally degraded (no B-cell depletion)
- Occupancy/efficacy correlation: average BTK occupancy of >80% correlated with near complete inhibition of disease activity<sup>1</sup>
- Clinical benefit of addressing B cell biology demonstrated by anti-CD20 targeting agents
- Insights from phase IIa trial (RA) leveraged in broad clinical development program (three phase IIb trials ongoing in MS, SLE, and RA)

# Evobrutinib

## Comprehensive development plan across immune-mediated diseases



## Outlook

### Healthcare is well set for future growth

Stable existing  
business



Base business delivering solidly with stable outlook

R&D pipeline  
optionality



High quality assets across all three areas continuously complemented with short- and longer term optionalities

Innovative  
partnerships



Joint investments and innovative deals models to maximize potential of assets and maintain focus

Disciplined  
execution



Systematic pipeline review and timely decision making ensure efficient resource and budget allocation

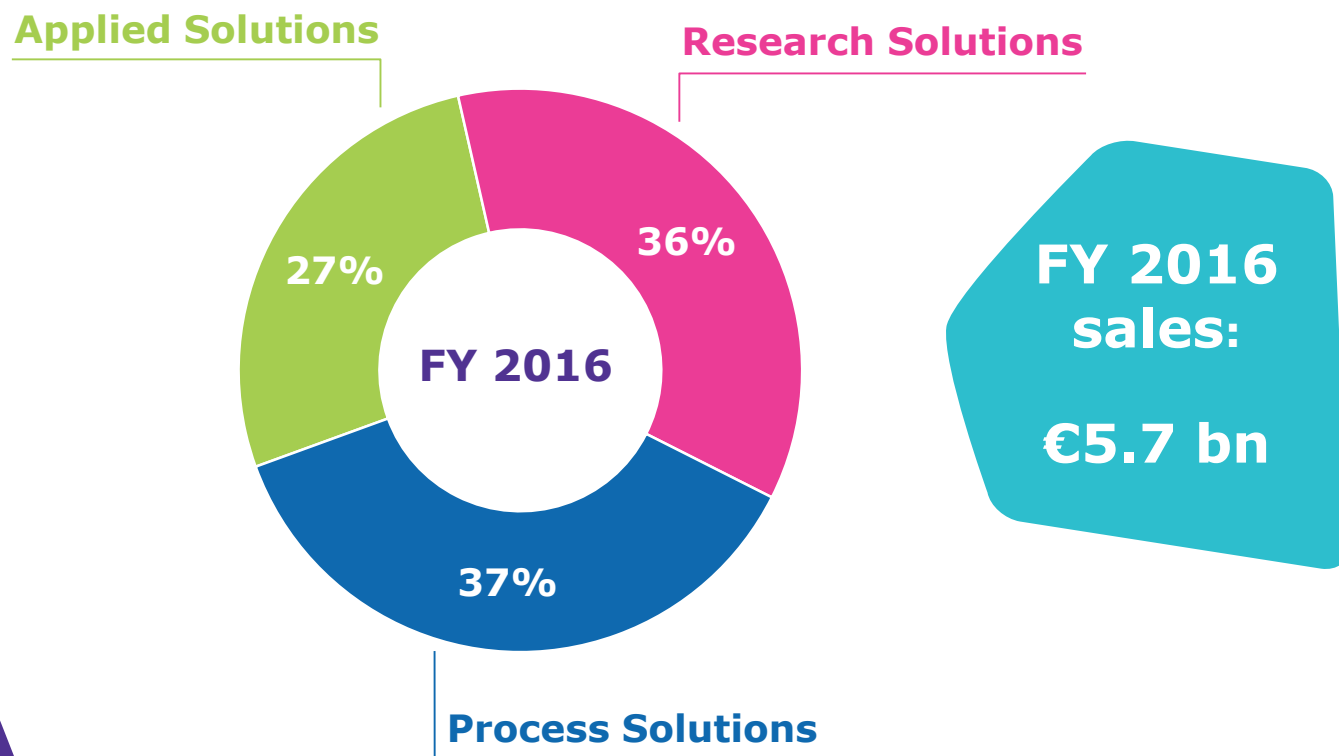




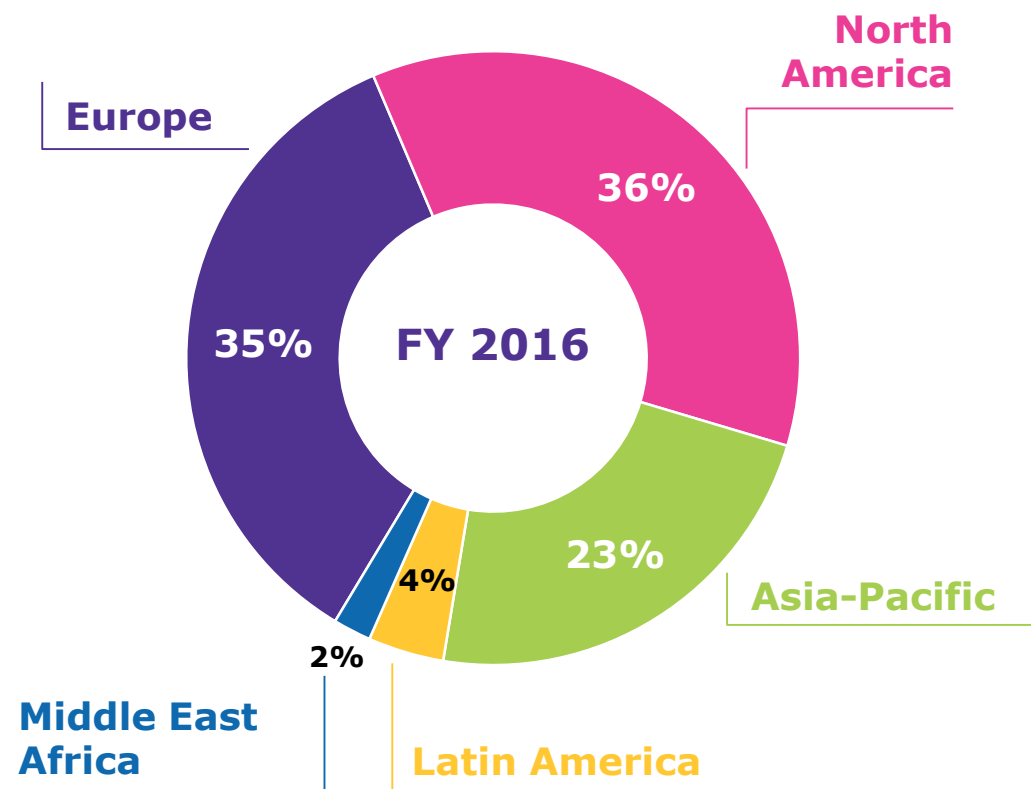
# 03 LIFE SCIENCE

# A balanced portfolio and geographic presence

## Sales by business unit



## Sales by region



# Life Science is an attractive market

## RESEARCH

~€42 bn

Low single digit



- Growth in volume of experiments
- Mild growth in academic funding
- Investment in industry R&D

## PROCESS

~€38 bn

High single digit



- Drug volume growth
  - from biologics
  - from emerging modalities
- Continued shift to single-use

## APPLIED

~€45 bn

Mid single digit



- Volume growth from
  - Population growth
  - Increased testing needs

# Success driven by portfolio breadth and differentiation, a customer-centric approach and world-class capabilities

## RESEARCH



Broad, relevant and innovative portfolio

Simple customer interface

Ability to manage complexity across organization (e.g., reliability of supply)

## PROCESS



Developed market:  
Deep expertise in each unit operation

Emerging market:  
Broad portfolio

Demonstrated quality & regulatory leadership

## APPLIED



Customized workflows for specific applications

Ability to manage complexity across organization (e.g., reliability of supply)

Demonstrated quality & regulatory leadership



# Process Solutions

## Our end-to-end portfolio for manufacturing mAbs



### MAKE

Produce antibodies



### PURIFY

Remove cell debris, virus, etc.



### FORMULATE

Final drug product



EX-CELL®  
Advanced™  
CHO Fed-batch  
Medium  
**Cell culture media  
to enhance cell  
growth**



2000L CellReady  
bioreactor  
**Tank for  
cultivating cells**



Clarisolve®  
clarification  
filters  
**Removing cell  
debris**



FlexReady®  
chromatography  
**Purifying mAbs**



Viresolve® Pro  
solution  
**Removing viruses  
from protein  
solutions**



Pellicon®  
cassette filters  
**Washing and  
removing cells,  
lipids, particles**



Opticap® capsules  
**Sterile filtration**

Provantage®

BioReliance®

EMPROVE®

cGMP SOLUTIONS & SERVICES



# #1 website in research life science industry

Industry leading e-commerce platform and supply chain capability



SEARCH



Hundreds of thousands of products at your fingertips



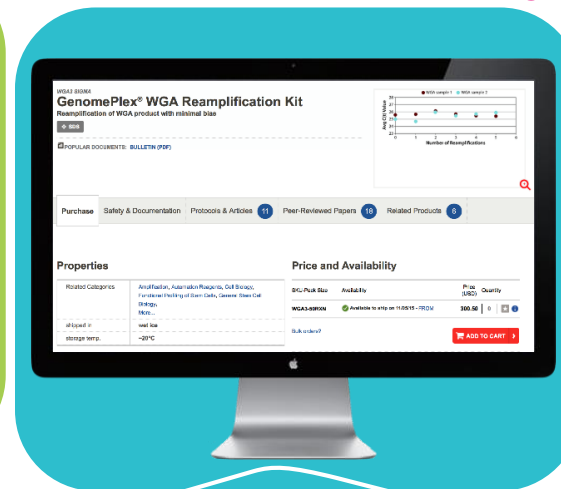
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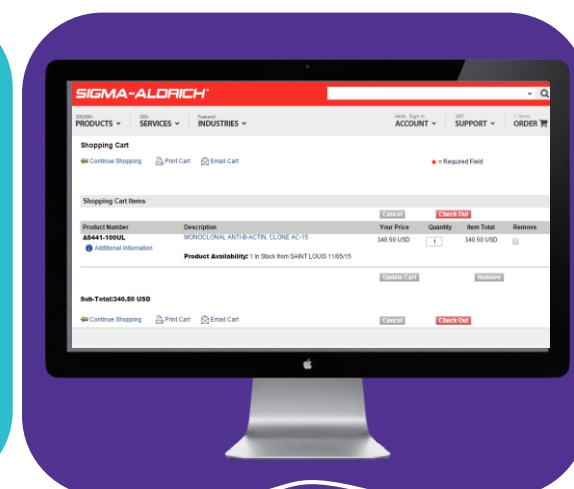
Online leader in scientific content: articles, protocols and peer reviewed papers



ORDER



Real-time pricing and availability



Convenient and simple customer interface: no more than 2 clicks from shopping cart

# Focus on strategic growth initiatives will secure long-term growth

## Strategic initiative



END TO END



SINGLE-USE



GENE EDITING &  
CELL THERAPY

## Ambition

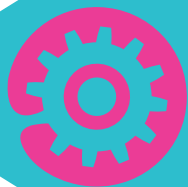
Offer **process development** services with our complete bioprocessing portfolio especially to small biotechs

Establish leadership in the fast-growing **single-use** bioprocessing segment through standardization and capacity expansion

Develop tools for **gene editing** and manufacturing services for **cell therapy**

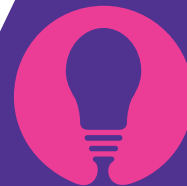
Strategic initiatives are key contributors to €1 bn new product sales ambition in 2022

# Life Science's growth initiatives consist of two types of innovation activities



## Evolutionary

Developing offerings to further existing platforms



## Breakthrough

Developing new platforms and product categories

### End to end (E2E)

- 15 new projects won to date
- New E2E labs opened in China and North America
- Increasing capacity at various sites, e.g. Martillac

### Single use

- Launch of Mobius Select to allow modular customizable assembly
- Capacity expansion in Danvers and Asia

### Connected Lab

- Connectivity: Internet of Things toolbox developed
- Electronic Lab Notebook platform in beta testing at several customers
- Launching LabWater offering

### Next gen processing

- 7 programs in place to address continuous processing in mAb production
- Developing solutions to overcoming drug bioavailability challenges

### Gene editing & novel modalities

- CRISPR/Cas9 tools launched with IP filing
- Build-up of commercial viral vector production in Carlsbad

- **Growth initiatives support Life Science's long-term growth ambition**
- **Portfolio is well set up; bolt-ons and partnerships will remain important**

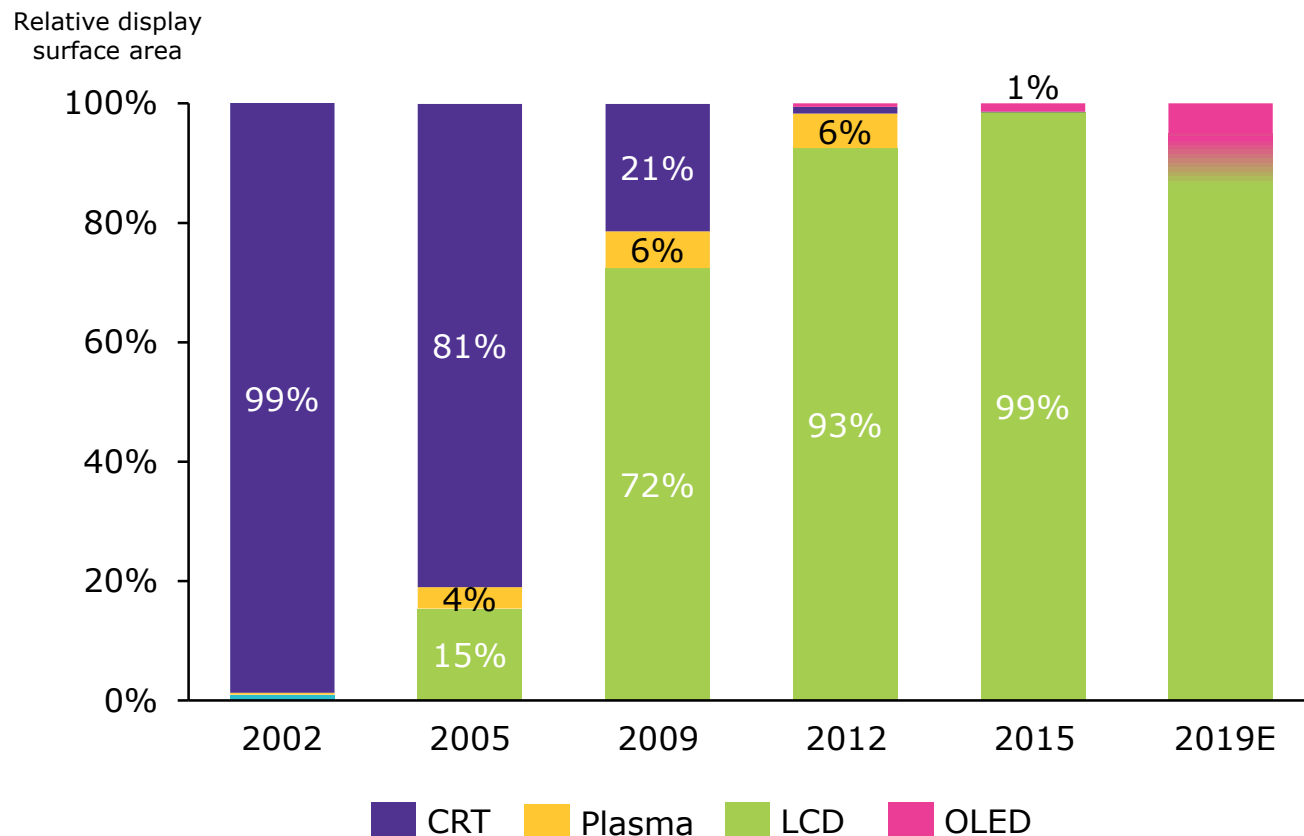


04

## PERFORMANCE MATERIALS

# Liquid crystals are clearly the dominant display technology

## Market share by display technology



### Rationale for LCD leadership

#### For consumers:

- Price
- Thinner frames
- Higher resolution in all sizes
- Proven track record of extreme reliability

#### For manufacturers:

- Price and scalability
- Production costs and capacities

**LCD progress creates higher technological and commercial entry barriers**

**OLED share will increase in mobile applications**

# Our leading OLED business is well set to exploit display market opportunities

## Market position

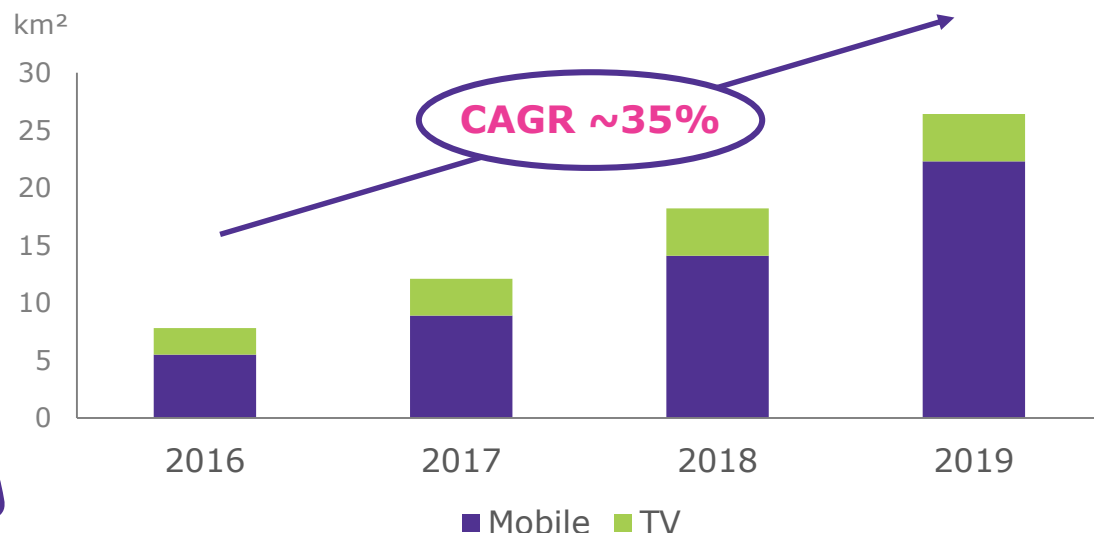
- Among top 3 OLED material provider
- Unrivalled experience and expertise in displays
- Long & intimate relationships with all display producers
- Recent capacity expansion to serve growing demand

## our ambition

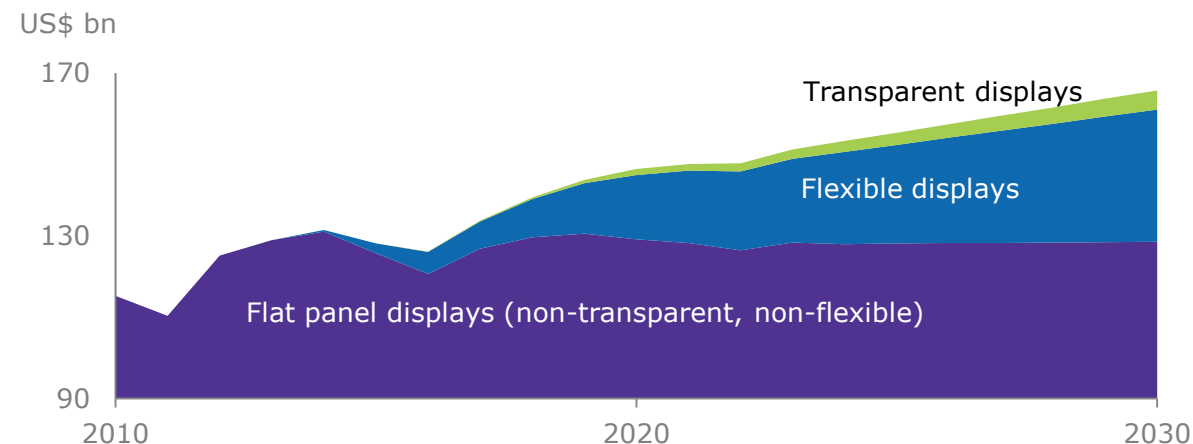
## solution provider

- Supplier of all OLED stack layers
- Excellence in vapor & printable materials
- In-house testing of materials
- Tailor-made solutions for customers

## Announced OLED capacity expansion<sup>1</sup>

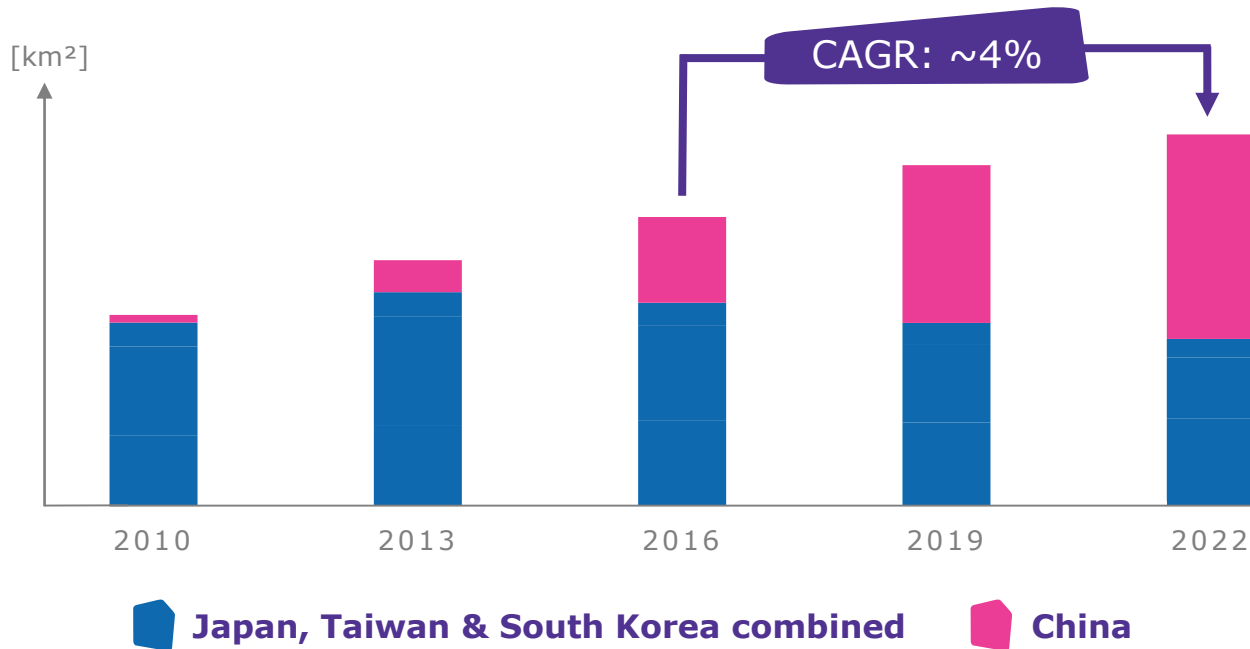


## Display market development<sup>1</sup>



# Merck KGaA, Darmstadt, Germany will leverage its capabilities to address shift towards more dynamic Chinese market

Share of global display production capacities by region [km<sup>2</sup>]\*



## Panel market dynamics in China

- Strong capacity build-up since 2012
- Historically main focus on local market supply with low to medium end displays
- Possibility to enter into global and higher-end markets in the future

## Leverage Company's competitive advantage

- *Customer proximity*: Reallocate resources to improve specific customer support
- *Application and production know-how*: Develop technologies that translate into commercial value
- *Continuous innovation*: Investments in Shanghai R&D hub to support local customers

**Capacity growth will benefit our leading supply capabilities especially from 2019**

## Challenges in LC displays amid various opportunities for novel applications

### LC for display applications



#### Maintain leadership position in a more challenging environment:



##### Innovation

Two new modes SA-VA and UB-Plus in tests with several customers



##### Know-how

Unrivalled understanding of displays to solve customer challenges with new facilities, especially GEN 10



##### Customer

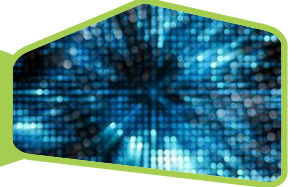
Presence in all customer locations versus more local focus of competitors



##### IP protection

>2,000 patents and rigorous enforcement of IP

### NOVEL Liquid crystals applications



#### Drive innovation and create further market demand:



LC Windows

LC-Window production facility to start production in Q4 2017 – first project realizations expected in 2018



LC Antennas

Completed product testing with partner Kymeta – expected launch for special applications in 2018



Lighting guiding

Collaboration with Hella and Porsche progressing well. Market demand for high resolution headlamps increasing.



# Liquid crystals OFFER a variety of opportunities



1

3

4

5

2

6

1. Adaptive lighting for automotive
2. Adaptive lighting for architecture
3. Smart antenna
4. Liquid crystal windows for architecture
5. Holography
6. Free form LCD

# Integrated Circuit Materials

## Leading market positions in profitable niches supported by technology trends

### ICM<sup>1</sup> sales by end use



■ Memory      ■ Logic  
■ Foundry<sup>2</sup>      ■ Packaging  
■ Other

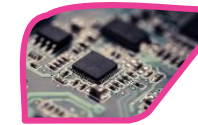
### Product portfolio



Lithography materials



Dielectric materials



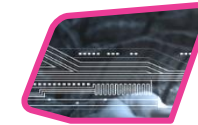
Conductive pastes



Process materials



Silica materials



Deposition materials

### Growth drivers and differentiation

- Volume growth is generally driven by wafer starts, estimated to grow with a CAGR of ~5% until 2022
- Merck KGaA, Darmstadt, Germany **outgrowing market** due to:
  - **Innovative** solutions, **broad** portfolio offering and **global** company footprint
  - Benefit from **smaller and more complex** structures (3D chip architecture)
  - Strong **process expertise & application knowhow** enabling cost-efficient production for our customers (improved yield, lower energy, less material)

# We have a strong position and will benefit further from complex technological advances and underlying market trends

## Market drivers and technological trends

**Miniaturization:** Devices are becoming smaller with better performance

- Need for enabling materials to reduce size (Moore's law)

**Mobility:** Everyone is continuously connected without direct power supply

- More chips needed for local energy production
- Energy storage → smaller batteries with higher density

**Internet of Things:** Everything is continuously connected

- More gadgets and devices that include chips
- Increasing amount of communication and sensor chips

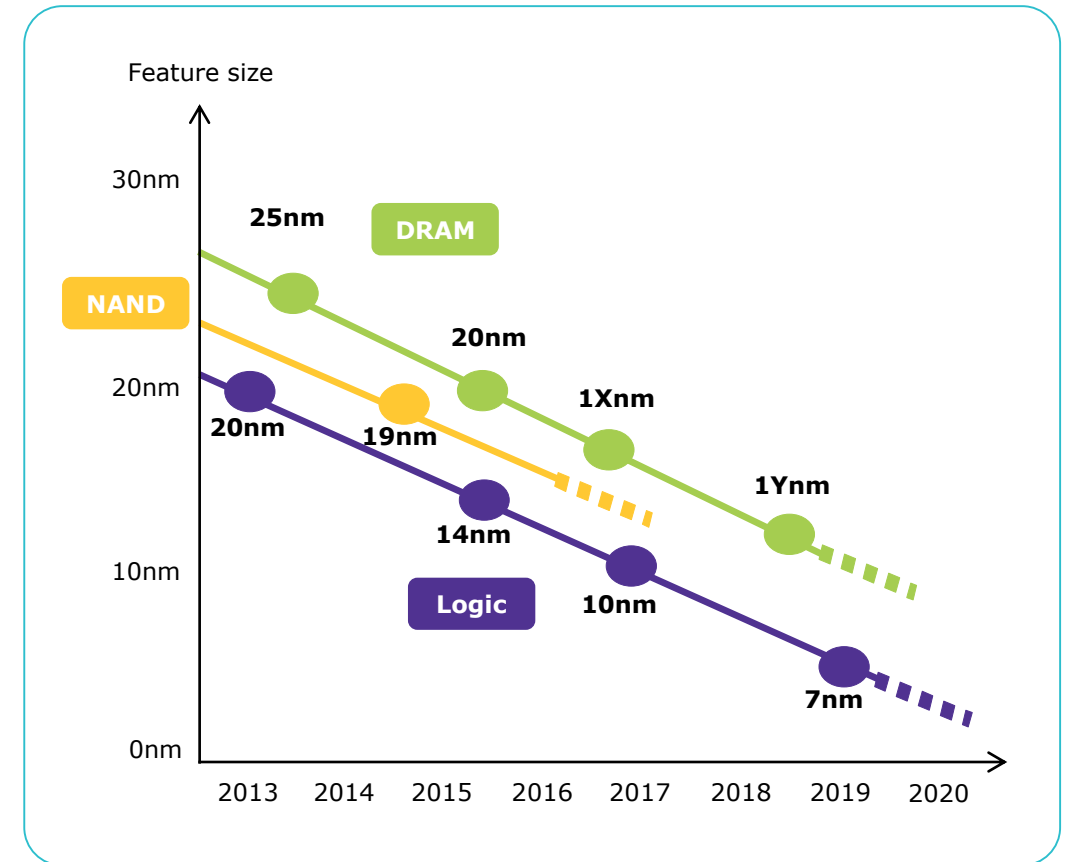
**Big Data:** Increasing need for intelligent data storage

- Switch from hard disk drives (HDD) to solid state drives (SSD)

## Selected competitors

- Tokyo Ohka Kogyo
- Dow Electronic Materials
- Nissan Chemicals
- JSR

## Feature sizes develop as predicted by Moore's law





# Pigments and Functional Materials

## Driving innovation by combining color & function

### Pigments & Functional Materials sales by end use



■ Decorative Materials

### Product portfolio

#### Decorative



Color cosmetics

Plastics

Printing

Car coatings

#### Functional



Laser marking

Coating & Printing

Personal care

Security

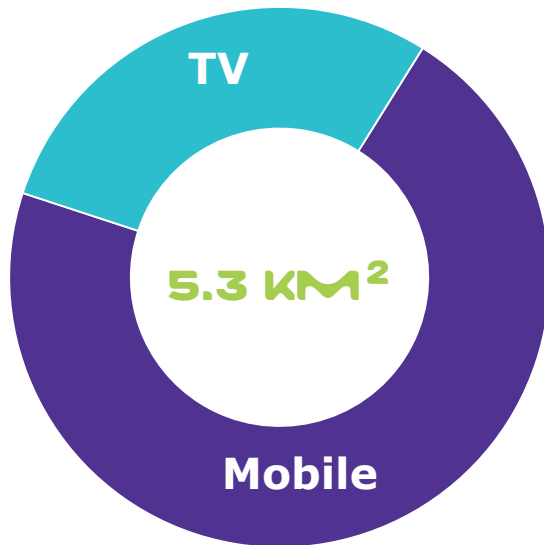
### Growth drivers and differentiation

- Volume growth for established decorative business is generally driven by rising living standards in line with GDP\*
- Addressable market increasing from €2 bn to €5 bn due to **further expansion into functional markets** combining color and function
- Factors of differentiation to outperform market growth:
  - Broad product portfolio with **unique high-end products**
  - **Global footprint** and diverse customer base ensuring good market access
  - Strong know-how of end applications of our customers enabling **increase of share-of-wallet** and **expansion into new applications**

## Our leading OLED business is well set to exploit display market opportunities

### OLED Shipment Area\*

[km<sup>2</sup>]



### Product portfolio

#### Evaporable OLED Materials



#### Printable OLED Materials



### Growth drivers and differentiation

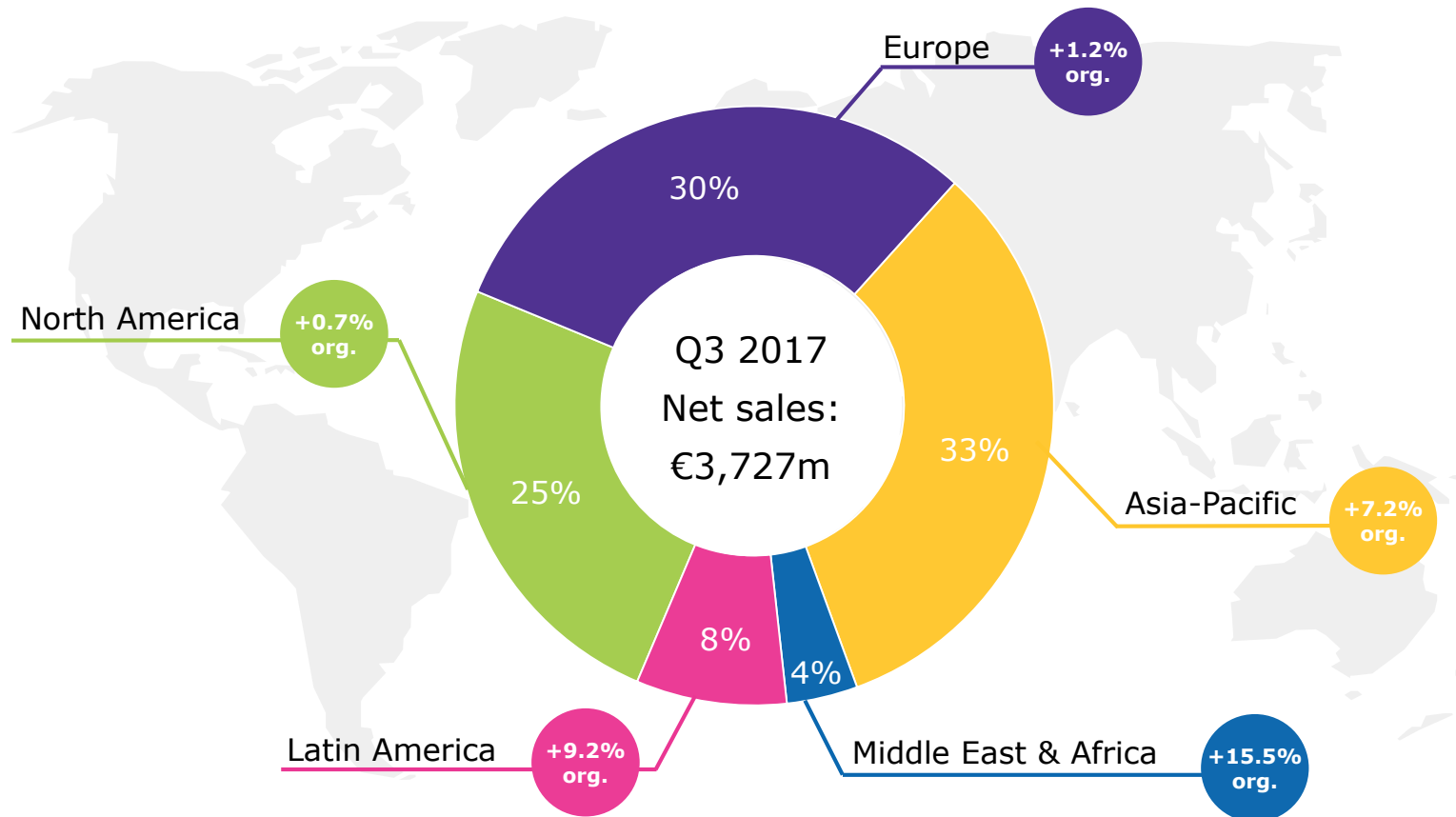
- Volume growth is driven by large investments of OLED panel manufacturers, especially in the mobile market segment
- Strong **R&D and licensing** activities to strengthen our market share
- Factors of differentiation:
  - Broad product portfolio of **evaporable and printable** high-end materials
  - Intimate **customer relations and application labs** in China, Taiwan & Korea
  - Strong supply chain, production capacity and **superior quality** standards



# 05 FINANCIAL OVERVIEW

# Organic growth in all regions

## Regional breakdown of net sales [€ m]



## Regional organic development

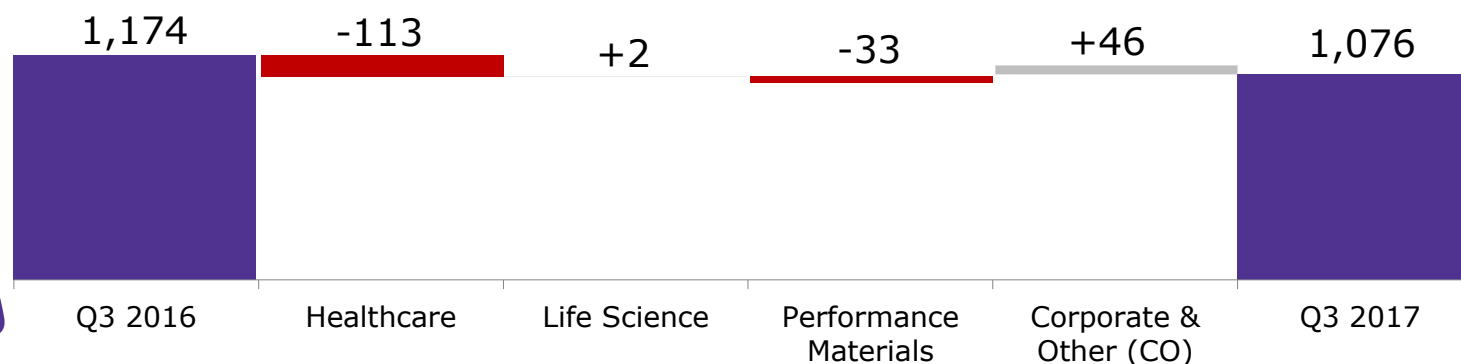
- Growth in Europe reflects solid demand in Life Science, almost offset by competition for Rebif, Erbitux and Gonal-f
- North America benefits from Life Science growth and Bavencio more than offsetting ongoing Rebif decline
- Strong growth in APAC driven by General Medicine, Fertility and Life Science outweighing LC normalization
- Very strong performance in LATAM and MEA across all major businesses

# Investments in Healthcare and softness in Liquid Crystals burden EBITDA pre

## Q3 2017 YoY net sales

	Organic	Currency	Portfolio	Total
Healthcare	5.8%	-3.4%	-1.2%	<b>1.2%</b>
Life Science	4.8%	-3.9%	0.4%	<b>1.3%</b>
Performance Materials	-1.5%	-3.8%	0.0%	<b>-5.3%</b>
Group	4.2%	-3.7%	-0.4%	<b>0.1%</b>

## Q3 YoY EBITDA pre contributors [€ m]



<sup>1</sup>Integrated Circuit Materials; <sup>2</sup>Long Term Incentive Plan  
Totals may not add up due to rounding

- Healthcare reflects strong growth in General Medicine, Consumer Health and Fertility
- Solid organic growth in Life Science driven by all businesses
- Organic growth of ICM<sup>1</sup>, Pigments and OLED is outweighed by ongoing market share normalization in Liquid Crystals
- FX headwinds across all businesses
- Healthcare contains investments in M&S and R&D, partially offset by milestone payments for Bavencio
- Life Science reflects organic growth offset by negative business mix and FX
- Performance Materials lower due to LC normalization, usual price declines and FX
- CO contains FX hedging gains and LTIP<sup>2</sup> benefits



## Q3 2017: Overview of key figures

### Key figures

[€m]	Q3 2016	Q3 2017	Δ
Net sales	3,724	<b>3,727</b>	0.1%
EBITDA pre	1.174	<b>1,076</b>	-8.3%
Margin (in % of net sales)	31.5%	28.9%	
EPS pre	1.70	<b>1.51</b>	-11.2%
Operating cash flow	1,067	<b>758</b>	-29.0%

[€m]	Dec. 31, 2016	Sept. 30, 2017	Δ
Net financial debt	11,513	<b>10,483</b>	-8.9%
Working capital	3,486	<b>3,755</b>	7.7%
Employees	50,414	<b>52,843</b>	4.8%

### Comments

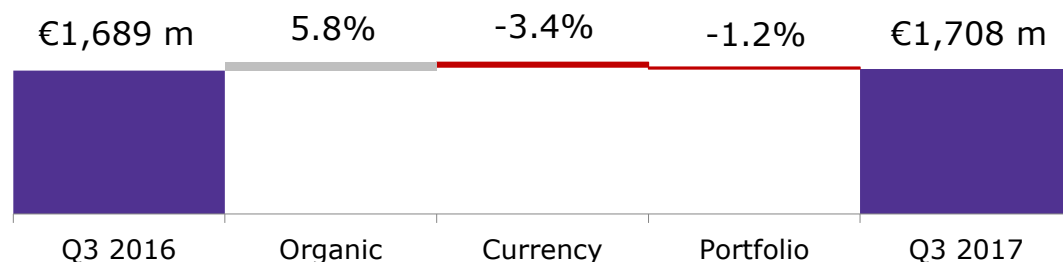
- EBITDA pre decline reflects investments in Healthcare and ongoing LC market share normalization
- EPS pre down due to lower EBITDA pre
- Lower operating cash flow driven by lower profit & changes in working capital
- Net financial debt benefits from healthy cash flow and Biosimilars divestment
- Working capital reflects increased receivables in Healthcare, higher inventories in all businesses
- Higher headcount related to growth initiatives in Healthcare and Life Science

# Healthcare: Investments in future growth weigh on profitability

## Healthcare P&L

[€m]	Q3 2016	Q3 2017
Net sales	1,689	<b>1,708</b>
Marketing and selling	-623	<b>-666</b>
Administration	-65	<b>-71</b>
Research and development	-322	<b>-423</b>
EBIT	375	<b>581</b>
EBITDA	560	<b>752</b>
EBITDA pre	565	<b>453</b>
Margin (in % of net sales)	33.5%	<b>26.5%</b>

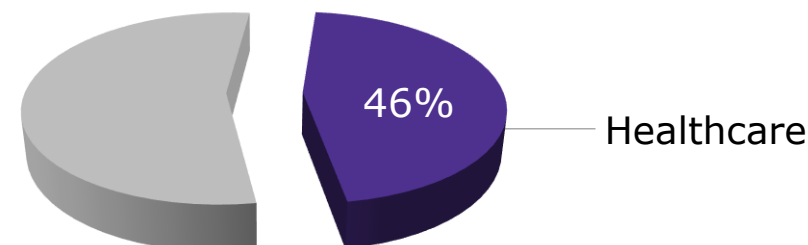
## Net sales bridge



## Comments

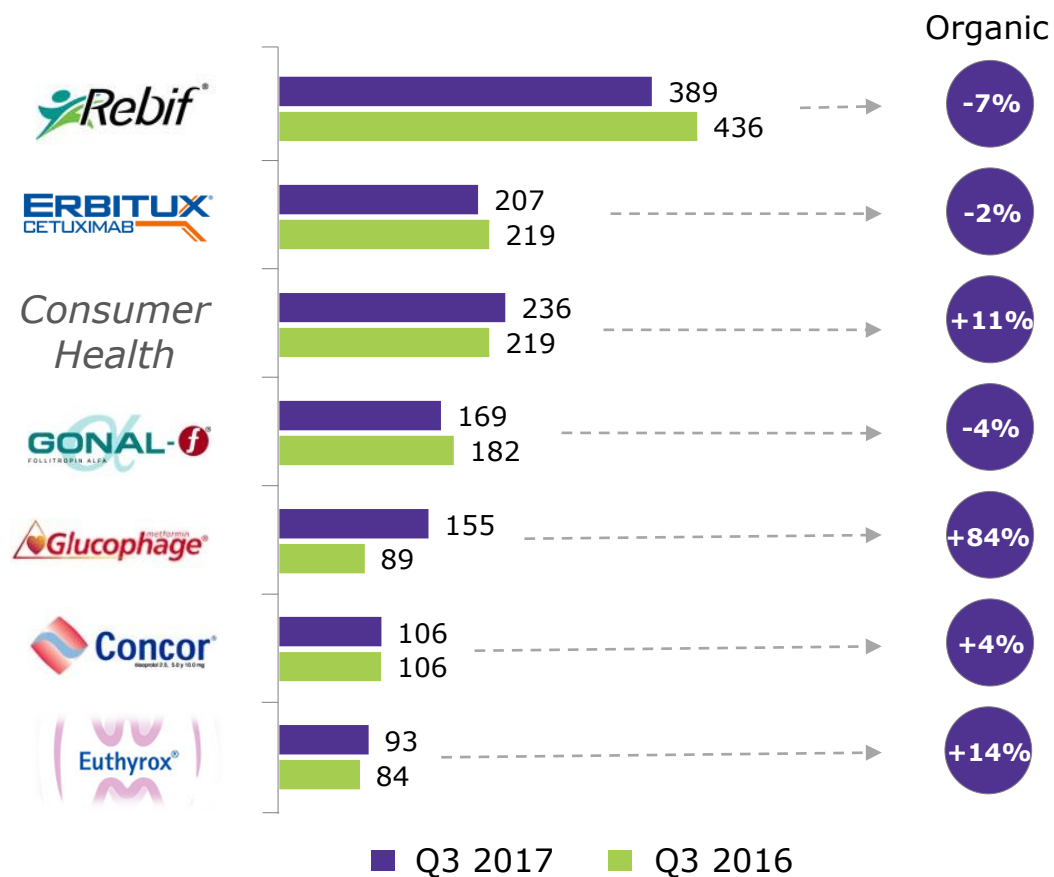
- Rebif declines due to competition in U.S. & EU, partially offset by U.S. pricing
- Organic decline of Erbitux due to competition and price pressure in EU
- Fertility portfolio back to growth, despite Gonal-f still facing tough base LY
- Consumer Health with double-digit growth driven by strategic brands in all growth markets
- Marketing & selling reflects Bavencio and Mavenclad launches
- R&D costs visibly ramping up, LY contained ~€40 m provision releases
- EBITDA pre reflects higher R&D and launch costs, exceeding income from milestone payments for Bavencio and organic growth

## Q3 2017 share of group net sales

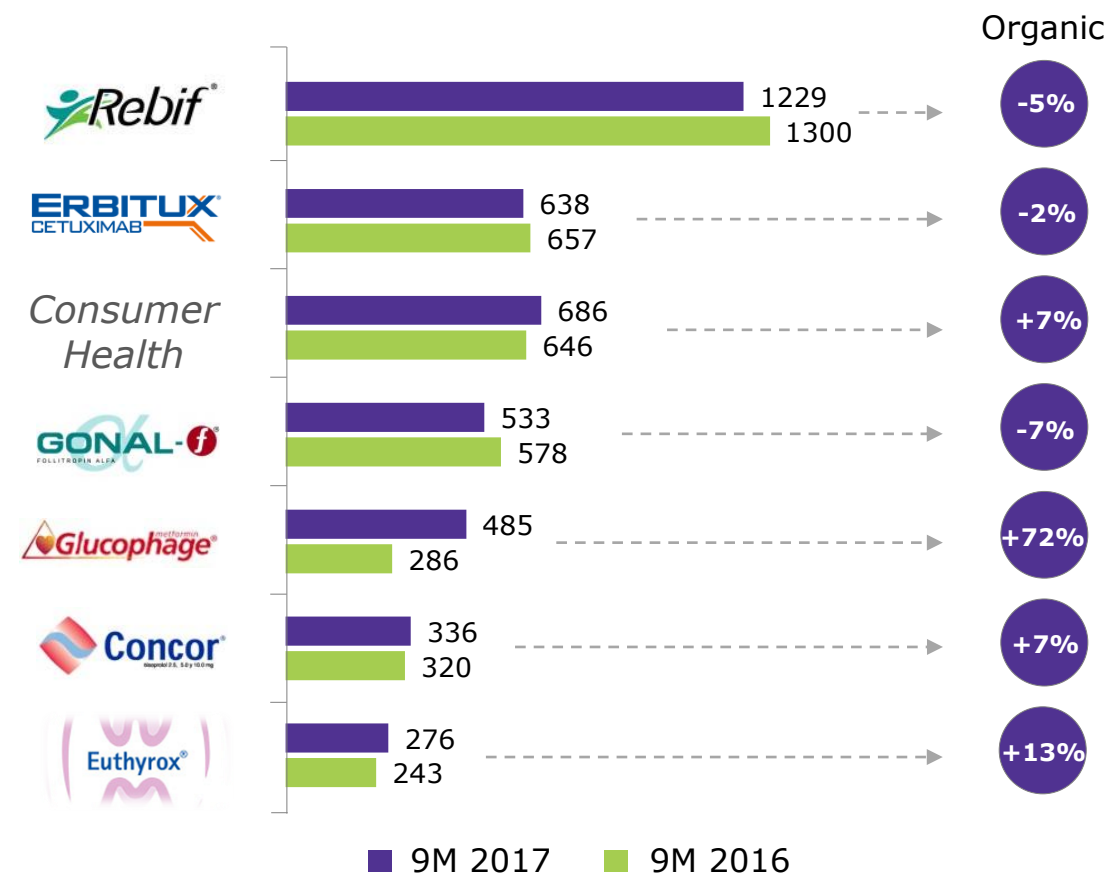


# Healthcare organic growth by franchise/product

Q3 2017 organic sales growth [%]  
by key product [€ m]



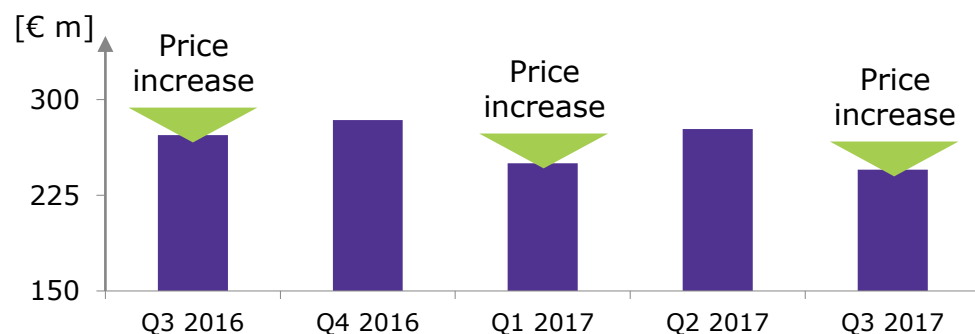
9M 2017 organic sales growth [%]  
by key product [€ m]



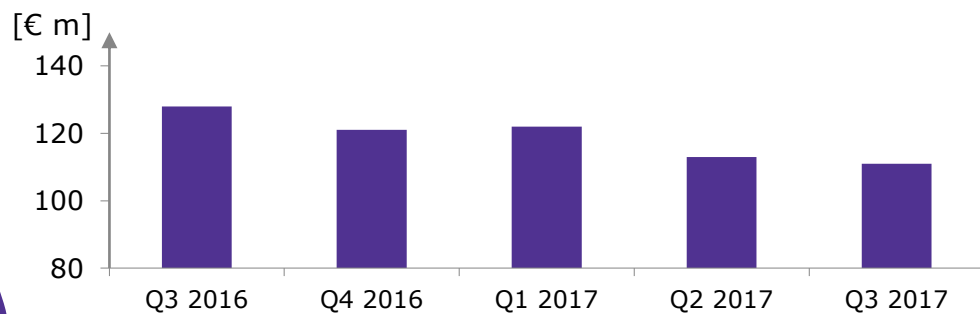
# Rebif: Competitive landscape in U.S. and Europe

## Rebif sales evolution

### North America



### Europe



Q3 drivers  
-5.1% org.

- Price
- Volume
- FX

Q3 drivers  
-12.1% org.

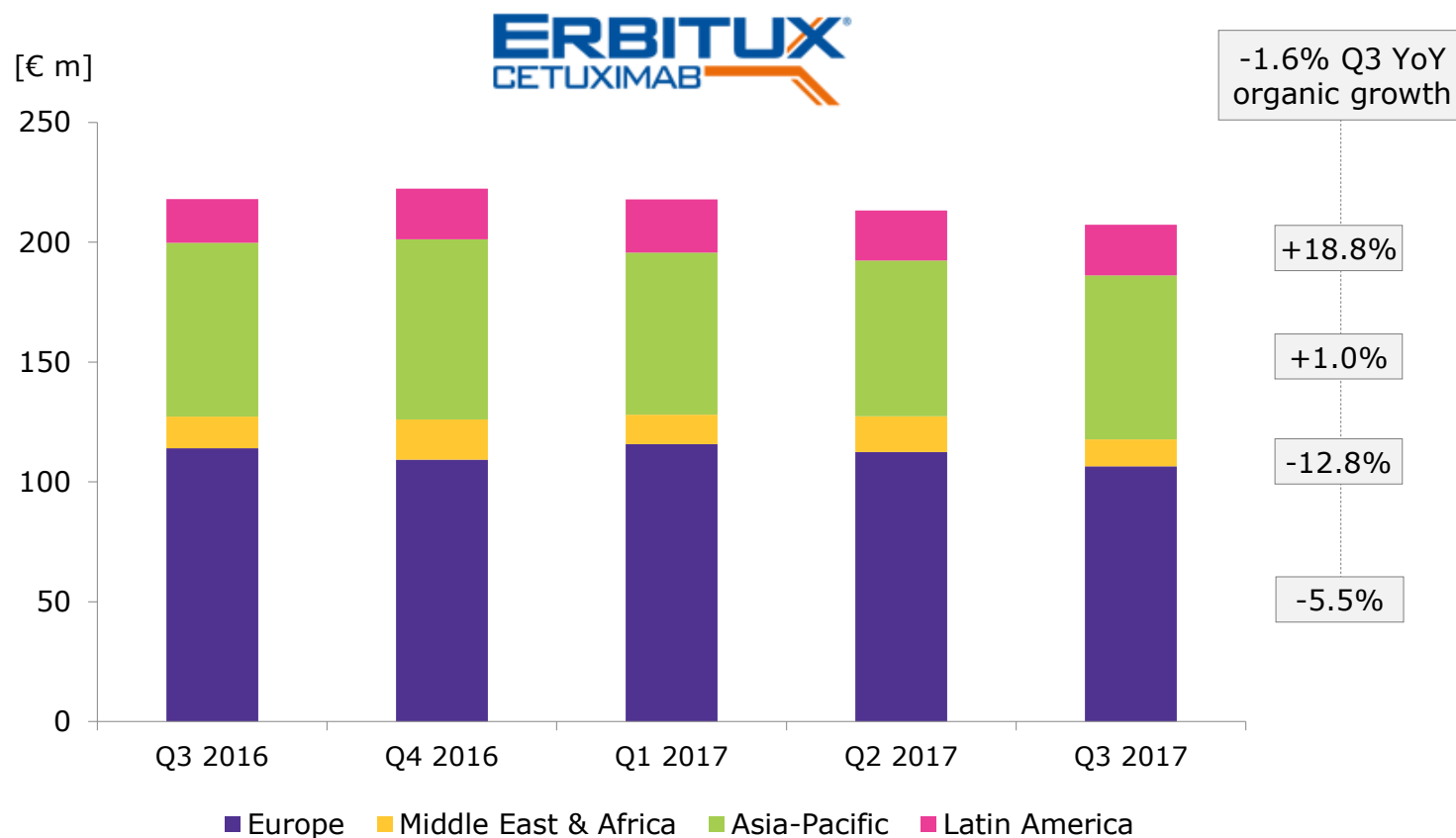
- Price
- Volume

## Q3 2017 Rebif performance

- Rebif sales of €389 m in Q3 2017 reflect organic decline of -6.9% & FX headwinds
- Competition-driven U.S. volume erosion mitigated by price increases
- Market shares within interferons stable due to high retention rates and long-term track record
- Competition from orals and occasional price adjustments cause ongoing organic decline in Europe

# Erbitux: A challenging market environment

## Erbitux sales by region



## Q3 2017 Erbitux performance

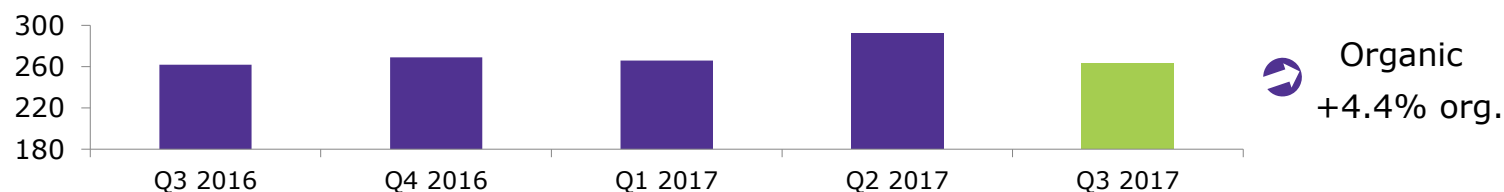
- Sales decline to €207 m driven by slight organic decline and FX headwinds
- Europe impacted by competition, price reductions and shrinking market size due to increasing immuno-oncology trials
- APAC with slight growth driven by new reimbursement uptake in Taiwan
- LATAM strong especially in Brazil; MEA affected by tender phasing

# Strong organic growth of General Medicine driven by all major products

## Sales evolution

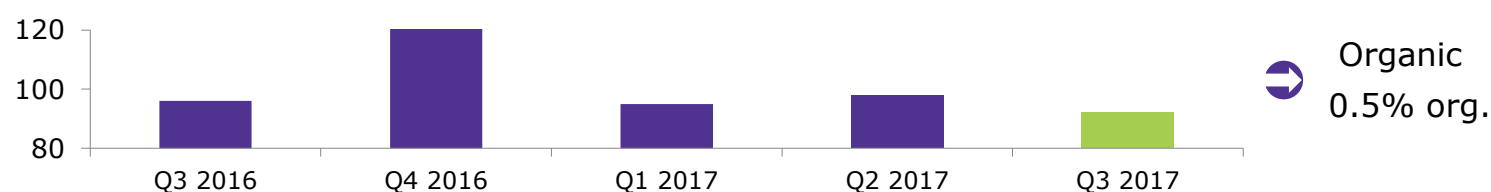
### Fertility

[€ m]



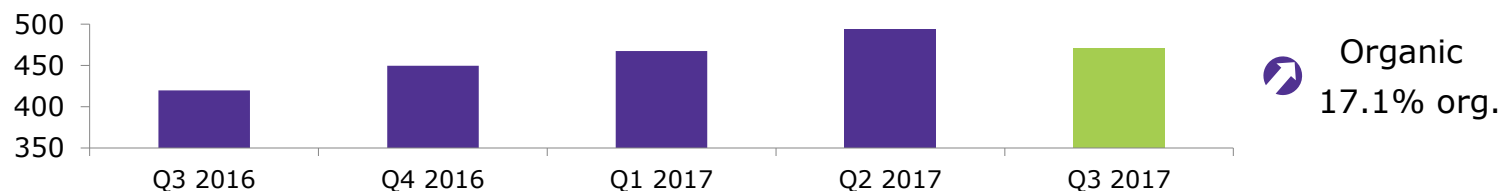
### Endocrinology

[€ m]



### General Medicine\*

[€ m]



## Q3 2017 organic drivers

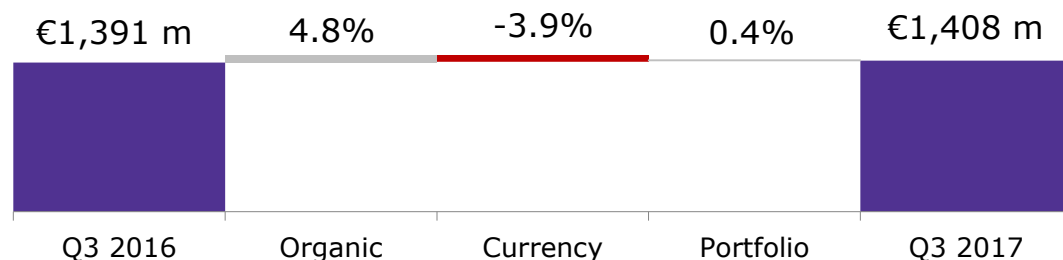
- Gonal-f still negative against high base LY and competition from biosimilars in Europe more than offsetting growth in China
- Rest of Fertility portfolio continues to grow double-digit, all regions contributing
- Endocrinology flat as growth in LATAM and EU is offset by lower demand in U.S.
- General Medicine benefits from Glucophage repatriation in China
- Euthyrox and Concor post healthy growth mainly driven by higher volumes in EU

# Life Science: Solid organic growth amid negative mix and FX headwinds

## Life Science P&L

[€m]	Q3 2016	Q3 2017
Net sales	1,391	<b>1,408</b>
Marketing and selling	-414	<b>-412</b>
Administration	-56	<b>-59</b>
Research and development	-63	<b>-60</b>
EBIT	216	<b>220</b>
EBITDA	399	<b>401</b>
EBITDA pre	424	<b>426</b>
Margin (in % of net sales)	30.5%	<b>30.2%</b>

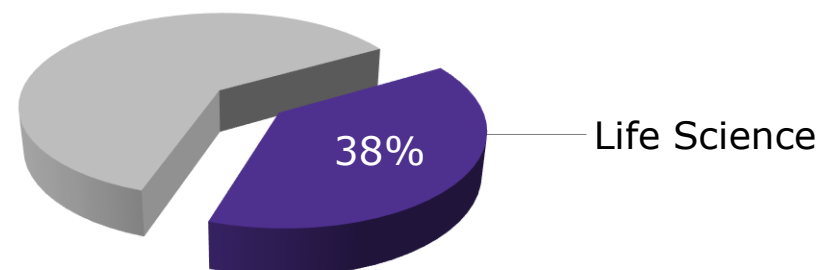
## Net sales bridge



## Comments

- Process Solutions posts solid organic growth due to strong demand for single-use products & services, while key accounts remain soft
- Applied Solutions shows good organic growth, driven by strong demand in Biomonitoring and Lab Water
- Research Solutions benefits from strong demand for specialty lab chemicals across all regions partially fueled by eCommerce
- Profitability reflects organic growth, offset by negative business mix and FX headwinds

## Q3 2017 share of group net sales

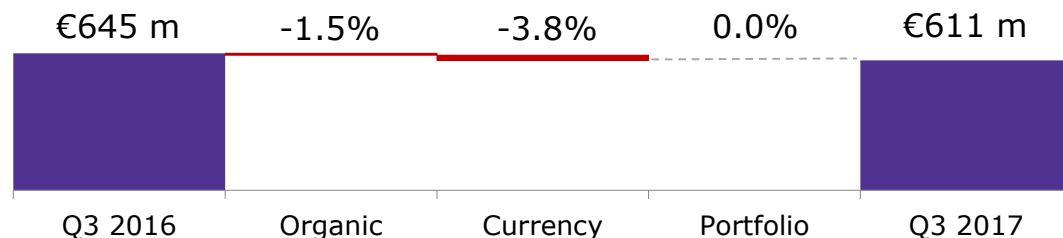


# Performance Materials: LC market share normalization impacts profitability

## Performance Materials P&L

[€m]	Q3 2016	Q3 2017
Net sales	645	<b>611</b>
Marketing and selling	-59	<b>-56</b>
Administration	-14	<b>-18</b>
Research and development	-55	<b>-57</b>
EBIT	213	<b>191</b>
EBITDA	274	<b>246</b>
EBITDA pre	282	<b>249</b>
Margin (in % of net sales)	43.7%	<b>40.7%</b>

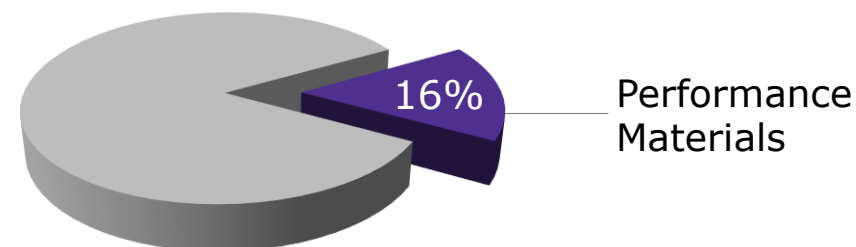
## Net sales bridge



## Comments

- Organic growth of Integrated Circuit Materials, Pigments and OLED not fully offsetting Liquid Crystals market share normalization
- Liquid Crystals facing usual price reductions without volume growth, only innovative UB-FFS technology continues to see strong demand
- OLED continues to grow on industry capacity expansion & investments
- Strong growth in ICM mainly driven by demand for dielectrics
- Growth of Pigments due to strong demand for decorative pigments in cosmetic and coating applications
- Profitability reflects business mix, usual Liquid Crystals price decline & FX

## Q3 2017 share of group net sales





## Reported figures reflect divestment of Biosimilars business

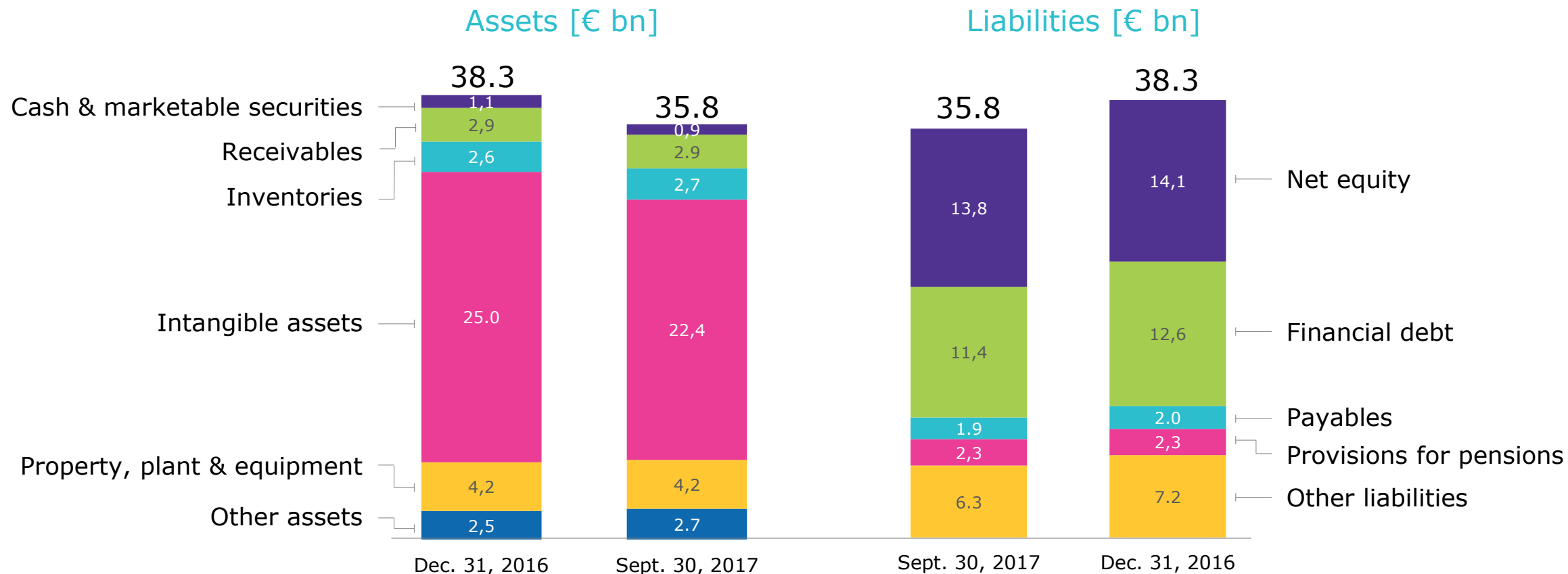
### Reported results

[€m]	Q3 2016	Q3 2017	Δ
EBIT	676	<b>901</b>	33.3%
Financial result	-67	<b>-65</b>	-2.1%
Profit before tax	609	<b>836</b>	37.2%
Income tax	-149	<b>-187</b>	25.6%
<i>Effective tax rate (%)</i>	24.4%	<b>22.4%</b>	
Net income	457	<b>645</b>	41.1%
EPS (€)	1.05	<b>1.48</b>	41.0%

### Comments

- EBIT up due to Biosimilars divestment, despite lower EBITDA pre
- Lower effective tax rate reflects divestment of Biosimilars business

## Balance sheet: Deleveraging in progress after Sigma acquisition



- Total assets decrease, while equity ratio increases to 38.5%
- Reduction in intangible assets mainly reflects FX (-€2 bn)
- Lower net equity reflects negative FX mitigated by 9M profit

- Lower financial debt due to bond repayments and FX
- Other liabilities decrease driven by profit transfer to E. Merck KG, Darmstadt, Germany

## Cash flow: Strong focus on cash generation

### Q3 2017 – cash flow statement

[€m]	Q3 2016	Q3 2017	Δ
Profit after tax	460	<b>649</b>	189
D&A	434	<b>419</b>	-15
Changes in provisions	4	<b>-50</b>	-54
Changes in other assets/liabilities	36	<b>99</b>	63
Other operating activities	1	<b>-328</b>	-329
Changes in working capital	131	<b>-31</b>	-162
Operating cash flow	1,067	<b>758</b>	-309
Investing cash flow	-223	<b>-90</b>	133
thereof Capex on PPE	-171	<b>-197</b>	-26
Financing cash flow	-702	<b>-844</b>	-142

### Cash flow drivers

- Profit after tax includes gain from Biosimilars divestment, which is neutralized in other operating activities
- Changes in provisions reflects swing in LTIP provision adjustment
- Changes in working capital include higher receivables from Glucophage repatriation & higher inventories; LY contained factoring
- Investing cash flow contains higher Capex and Biosimilars cash proceeds ~€150 m
- Financing cash flow reflects €700 m euro-bond repayment in September and bank loan reduction LY

# Exceptionals in Q3 2017

## Exceptionals in EBIT

[€m]	Q3 2016		Q3 2017	
	Exceptionals	thereof D&A	Exceptionals	thereof D&A
Healthcare	6	0	-317	-17
Life Science	25	0	24	0
Performance Materials	8	0	2	0
Corporate & Other	25	0	29	0
Total	63	0	-261	-17

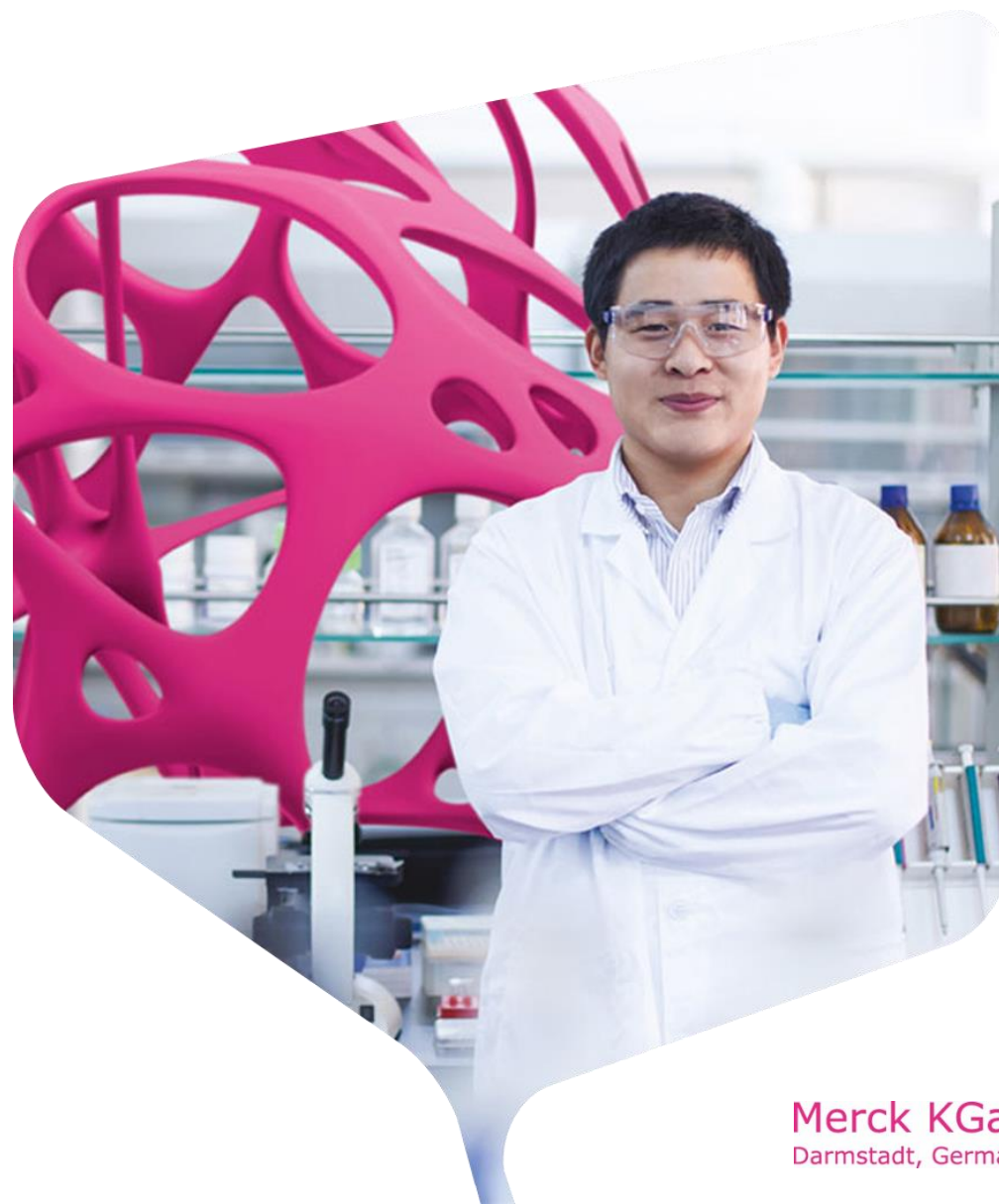
# Exceptionals in 9M 2017

## Exceptionals in EBIT

[€m]	9M 2016		9M 2017	
	Exceptionals	thereof D&A	Exceptionals	thereof D&A
Healthcare	-245	71	-366	-84
Life Science	207	0	86	3
Performance Materials	21	0	25	7
Corporate & Other	42	0	60	0
Total	25	71	-195	-74

## Financial calendar

Date	Event
March 8, 2018	Q4 2017 Earnings release
April 27, 2018	Annual General Meeting
May 15, 2018	Q1 2018 Earnings release
August 9, 2018	Q2 2018 Earnings release



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