Meet Novartis Management Overview

Investor Presentation
May 23, 2019
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Our external environment is reshaping what it takes to lead in the long-term

- Explosion in data science
- New understanding of human biology
- New therapeutic platforms
- Rising standard of care
- Pricing pressure
- Convergence of tech and health

Companies that focus their capital on leading science, cutting-edge platforms, and medicines with substantial absolute efficacy, will win
We aim to become a leading medicines company
Powered by advanced therapy platforms and data science

We are a diversified medicines company

Driving growth through cutting-edge platforms

Passionate about productivity and margins

Building a new culture and lasting impact
We aim to become a leading medicines company
Powered by advanced therapy platforms and data science

We are a diversified medicines company
Driving growth through cutting-edge platforms
Passionate about productivity and margins
Building a new culture and lasting impact
## Focused on medicines, diversified across therapeutic areas and platforms

EvaluatePharma data for FY 2018  See appendix for references

<table>
<thead>
<tr>
<th>Company</th>
<th>Revenue split, % medicines¹</th>
<th>Rx</th>
<th>Gx</th>
<th>Other</th>
<th>TAs²</th>
<th>Blockbusters³</th>
<th>Cell</th>
<th>Gene</th>
<th>RLT</th>
<th>RNAi</th>
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<tbody>
<tr>
<td>Novartis</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>15</td>
<td>X</td>
<td>X</td>
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<td>8</td>
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<td>Company 11</td>
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<td>9</td>
<td>5</td>
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<td>Company 12</td>
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<td>10</td>
<td>4</td>
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<td>Company 13</td>
<td>48%</td>
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<td>11</td>
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<td>X</td>
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</table>

¹ Revenue split, % medicines: Rx - Rx, Gx - Gene, Other - Other.

² TAs: Tx, Ga, etc.

³ Blockbusters: Blockbusters, etc.

⁴ Presence in advanced therapy platforms: RLT, RNAi, etc.
### Building depth across our core therapeutic areas

<table>
<thead>
<tr>
<th>ONCOLOGY</th>
<th>PHARMACEUTICALS</th>
<th>BIOPHARMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardio-Metabolic</td>
<td>IHD</td>
<td>Neuroscience</td>
</tr>
</tbody>
</table>

**Select commercial assets**
- Kymriah®
  - New indications
- Piqray® (BYL719)
  - Breast
- Orizanizumab (SEG101)
  - Sickle cell
- PDR001 combo
  - Metastatic melanoma
- ABL001
  - GRL
- ACZ885
  - Lung
- 177Lu-PSMA-617
  - nCRPC

**Select pipeline assets and opportunities**
- Entresto®
  - HFpEF, post-MI
- Cosentyx®
  - nAxSpA
- LNP023
  - Renal diseases
- CFZ533
  - Transplant / Sjögren’s
- TQJ230
  - OVR
- Troplifexor (LJN452)
  - NASH
- VAY785
  - NASH
- LMO070
  - SMA
- Ofatumumab (OMB157)
  - MDS
- CNP520
  - Pancreatitis
- SAF312
  - Chronic ocular pain
- MOR106
  - AD

**ONCOLOGY**
- ABL001
- ACZ885
- 177Lu-PSMA-617

**PHARMACEUTICALS**
- Entresto®
- Cosentyx®
- LNP023
- CFZ533
- TQJ230
- Troplifexor
- VAY785
- LMO070
- Ofatumumab
- CNP520
- SAF312
- MOR106

**BIOPHARMA**
- Kymriah®
- Piqray® (BYL719)
- Orizanizumab (SEG101)
- PDR001 combo
- ABL001
- ACZ885
- 177Lu-PSMA-617

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country. See appendix for references.*
## Expanding the game-board with advanced therapy platforms

<table>
<thead>
<tr>
<th>(illustrative)</th>
<th>Small molecules</th>
<th>Large molecules</th>
<th>Cell therapy</th>
<th>Gene therapy</th>
<th>Radioligand therapy</th>
<th>RNAi therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncology</td>
<td>Targeted protein degradation</td>
<td>Novel biomaterials²</td>
<td>CAR-T</td>
<td>Novel manufacturing</td>
<td>NET</td>
<td>Early targets</td>
</tr>
<tr>
<td>Cardio-Metabolic</td>
<td>Novel antibodies²</td>
<td>CRISPR³</td>
<td>AAV9</td>
<td>ApoCIII⁵</td>
<td>Lp(a)⁵</td>
<td></td>
</tr>
<tr>
<td>IHD</td>
<td>Transcription factors</td>
<td>Novel biomaterials</td>
<td>Experimental serotypes</td>
<td>AAV2⁴</td>
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<tr>
<td>Neuroscience</td>
<td>Transcription factors</td>
<td>Novel biomaterials</td>
<td>AAV9</td>
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<tr>
<td>Ophthalmology</td>
<td>Inhaled biologics</td>
<td>Inhaled biologics</td>
<td>Experimental serotypes</td>
<td>AAV2⁴</td>
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<tr>
<td>Respiratory</td>
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</tbody>
</table>

1. Partnership with the Wyss Institute for Biologically Inspired Engineering at Harvard University and the Dana-Farber Cancer Institute  
2. Collaboration with Xencor  
3. Collaborations with Intellia Therapeutics and Caribou Biosciences  
4. Collaboration with Spark on Luxturna®  
5. Collaboration with Akcea
### Advancing a highly productive and valuable pipeline

<table>
<thead>
<tr>
<th>Scale</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>200+</td>
<td>25+</td>
</tr>
<tr>
<td>Projects in clinical development</td>
<td>Potential blockbusters(^1) in development</td>
</tr>
<tr>
<td>500+</td>
<td>18</td>
</tr>
<tr>
<td>Ongoing clinical trials(^2)</td>
<td>Advanced platform therapies in clinical development</td>
</tr>
<tr>
<td>60+</td>
<td>#1</td>
</tr>
<tr>
<td>Major submissions planned 2019-2021(^3)</td>
<td>Most valuable pipeline according to external ranking(^4)</td>
</tr>
</tbody>
</table>

1. Blockbuster defined as peak sales >USD 1bn for either a new molecular entity across all indications or for a single new indication of a previously launched product  
2. Across NIBR and GDD  
4. Source: Evaluate Pharma 2018, outlook to 2024. Ranked #1 in terms of: (1) value creation from advanced therapies, (2) highest pipeline value by sales 2018-24, and (3) value creation 2018-24 from recently launched and pipeline products.
Global scale and leadership in strategic markets

US
Limited exposure to US healthcare system reforms¹
Multiple upcoming launches expected to increase our sales

33%

Europe
#1 pharma company in Europe by sales²
Deep experience navigating difficult pricing and reimbursement environments

39%

Rest of World
Pioneering advanced therapies in Japan with Kymriah® approval and AVXS-101 Sakigake designation
Strong position in China with 10 NME approvals and 14 NDRL listings since 2017; on track to be a top 3 market in the next 2 years

21%

Canada & Latin America

7%

¹ Due to highly innovative and differentiated portfolio, limited exposure to Medicare Part B, 340B
² Source: EvaluatePharma 2018 FY sales

% of 2018 FY sales excluding Alcon and Sandoz proposed US portfolio sale to Aurobindo
Building data science and digital capabilities

**Sense Bridge**
Transforming clinical trial operations

- Tracks, analyzes and predicts the status of 500+ active trials in 70+ countries involving 80k+ patients in real time
- Other modules enable selection of best trial sites, enrollment tracking, predicting trial risks, drug supply calculations, etc.

**ACTalya**
Making sales reps more efficient

- Combines predictive analytics with digital campaign management tools to guide our sales reps towards the “next best action” with each customer they serve
- Piloted in 2018 with 500 reps across 6 countries; scaling up to 7k reps in 2019

**AI-driven Finance**
Improving finance operations

- Leveraging AI to improve all planning, forecasting and resource allocation activities
- Initial focus is on sales, P&L and cash forecasting & optimization; results show AI is at least as good as internal plans
We remain disciplined and shareholder-focused in our capital allocation

<table>
<thead>
<tr>
<th>Novartis priorities</th>
<th>1. Investments in organic business</th>
<th>Renewed focus on core medicines business with successful spin-off of Alcon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Growing annual dividend in CHF</td>
<td>Committed to maintain strong and growing dividend with no adjustment for Alcon spin-off</td>
</tr>
<tr>
<td></td>
<td>3. Value-creating bolt-ons</td>
<td>Announced acquisition of Xiidra(^1); aim to spend up to ~5% of market cap per year on M&amp;A and BD&amp;L</td>
</tr>
<tr>
<td></td>
<td>4. Share buybacks</td>
<td>Repurchased 12.6m shares on the 2(^{nd}) trading line 2019 YTD(^2); plan to complete share buyback(^3) of up to USD 5bn by end of 2019</td>
</tr>
</tbody>
</table>

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1. Announced acquisition of global rights; closing expected in 2H19, subject to customary closing conditions  
2. As of May 17, 2019  
3. Share buyback of up to USD 5bn announced on June 29, 2018
# Xiidra® acquisition: Strong strategic fit and attractive economics

<table>
<thead>
<tr>
<th>Strong strategic fit</th>
<th>with Novartis leading ophthalmic portfolio and pipeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear blockbuster potential</td>
<td>given high unmet medical need with strong product profile</td>
</tr>
<tr>
<td>Significant synergies</td>
<td>with Novartis front-of-the-eye commercial infrastructure</td>
</tr>
<tr>
<td>Good financial return profile</td>
<td>strict financial discipline applied; expected to be profitable 2020 and margin accretive 2021; deal structure adds tax benefit</td>
</tr>
</tbody>
</table>

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1. Announced acquisition of global rights; closing expected in 2H19, subject to customary closing conditions  
2. Ex-US only
Our growth prospects are strong
Expecting strong sales growth regardless of Gilenya® Gx

Illustrative sales¹ FY 2018–2022
in cc

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country. See appendix for references.
# Benefits and risks to the new focused Novartis

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation-driven, which payers and patients value</td>
<td>Uncertain and evolving reimbursement environment</td>
</tr>
<tr>
<td>Able to focus management attention and capital</td>
<td>More concentrated exposure to cyclical patent expiries</td>
</tr>
<tr>
<td>Easier to deliver margin ambition in a less complex organization</td>
<td>Critical to stay on top of new advances in science</td>
</tr>
<tr>
<td>Potential for breakout financial performance</td>
<td>Contingent on launch excellence and productivity efforts</td>
</tr>
</tbody>
</table>
We aim to become a leading medicines company
Powered by advanced therapy platforms and data science

We are a diversified medicines company
Driving growth through cutting-edge platforms
Passionate about productivity and margins
Building a new culture and lasting impact
In-line brands provide strong foundation for growth

<table>
<thead>
<tr>
<th>Q1 sales</th>
<th>Growth vs. PY</th>
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<tbody>
<tr>
<td>USD m</td>
<td>USD m</td>
</tr>
<tr>
<td>791 m</td>
<td>211 m</td>
</tr>
<tr>
<td>357 m</td>
<td>157 m</td>
</tr>
<tr>
<td>106 m</td>
<td>100 m</td>
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<tr>
<td>307 m</td>
<td>50 m</td>
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<td>91 m</td>
<td>47 m</td>
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<td>45 m</td>
<td>33 m</td>
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<tr>
<td>297 m</td>
<td>30 m</td>
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<tr>
<td>281 m</td>
<td>26 m</td>
</tr>
<tr>
<td>258 m</td>
<td>24 m</td>
</tr>
</tbody>
</table>

Growth vs. PY:

- 41% vs. PY
- 85% vs. PY
- nm
- 24% vs. PY
- 115% vs. PY
- nm
- 18% vs. PY
- 20% vs. PY
- 20% vs. PY

1. Not meaningful  2. Combined sales of Tafinlar® and Mekinist®
10+ potential blockbuster launches¹ planned up to 2021

- **Mayzent®** (launched)
  - SPMS

- **Zolgensma®**
  - SMA Type 1

- **Piqray®** (BYL719)
  - Advanced breast cancer

- **Brolucizumab** (RTH258)
  - nAMD

**2019**

- **Cosentyx®**
  - nrAxSpA

- **Entresto®**
  - HFpEF

- **OMB157**
  - Relapsing MS

- **PDR001 combo**
  - Metastatic melanoma

- **QVM149**
  - Asthma

- **SEG101**
  - Sickle cell disease

**2020**

- **Zolgensma®**
  - SMA Type 2/3

- **177Lu-PSMA-617**
  - mCRPC

- **QAW039**
  - Asthma

**2021**

- **Piqray®**
  - Advanced breast cancer

- **Mayzent®**
  - SPMS

- **Zolgensma®**
  - SMA Type 1

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country. See appendix for references.*
Zolgensma® (AVXS-101): Robust data show clinically transformative impact across broad spectrum of SMA

**Pre-symptomatic**

**Type 1**

**Type 1**

**Type 2**

1. The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xioi), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities.
Piqray®* (BYL719): Potential to be the first and only therapy for the most common mutation in HR+ aBC

Pi3K: Central oncogenic pathway deregulated in cancer

- Poised to be the first and only therapy for advanced breast cancer (aBC) patients with a PIK3CA mutation
- ~40% of HR+/HER2- breast cancer patients have a PIK3CA mutation, associated with poor prognosis\(^1,2\)
- Nearly doubled median PFS in SOLAR-1 study\(^3\)
- Ready to launch with FDA-approved companion diagnostic
- Initiating pivotal clinical trials in HER2+ aBC and TNBC; planning additional studies across PIK3CA-mutation driven cancers

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country. See appendix for references.
With new and planned launches, Novartis continues to lead across the MS disease spectrum

Patient Profiles

25-35 years old
RMS patients, first line first switch

~85% of MS patients

~40 years old
Transitioning or have transitioned to SPMS

~75-80% of RMS patients

MS – multiple sclerosis; PPMS – primary progressive MS; RRMS – relapsing–remitting MS; SPMS – secondary progressive MS; EDSS – Expanded Disability Status Scale

1. National MS society
Ofatumumab (OMB157) subcutaneous anti-CD20 for relapsing MS on track for submission Q4 2019

OFA suppresses new MS lesions >90% (MIRROR Ph 2b)¹

Phase 3 program for Ofatumumab²

**Potential key benefits for patients:**
- Similar efficacy to other anti-CD20s, but in a low dose (20mg) monthly subcutaneous administration, due to higher affinity to CD20³
- Faster B cell repletion upon discontinuation⁴
- Targeted to the lymph nodes with potential to partially preserve the immune system⁵
- No need for pre-medications; convenience of at-home injections

See appendix for references
### Fevipiprant (QAW039): Disease-modifying potential in asthma, Ph3 readouts on track for end 2019

#### Potential for disease modification

<table>
<thead>
<tr>
<th>% reduction in ASM mass</th>
<th>Fevipiprant</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n=13</td>
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</table>

-16.2% (p=0.034)

Airway smooth muscle mass reduction in asthma with Fevipiprant

#### Robust clinical program to realize full potential

<table>
<thead>
<tr>
<th>All five Ph3 enrolled</th>
<th>LUSTER 1 &amp; 2 (GINA 4/5)</th>
<th>exacerbation trial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SPIRIT (GINA 3/4/5)</td>
<td>safety</td>
</tr>
<tr>
<td></td>
<td>ZEAL 1 &amp; 2 (GINA 3/4)</td>
<td>lung function FEV1</td>
</tr>
</tbody>
</table>

Ph2 data: Reduced sputum eosinphils by 72%<sup>2,3</sup>

Pre-clinical data:
- Highly selective DP2
- Superior potency
- High selectivity
- Clean safety profile

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Phase 2 pipeline with multiple potentially transformational programs

- Presbyopia
- Cartilage regeneration
- CNI-free transplantation
- Stroke recovery
- Chronic renal diseases
- Novel CAR-T manufacturing
Progressing gene, cell and radioligand platforms with 18\(^1\) projects in development

## Gene therapy

<table>
<thead>
<tr>
<th>Product</th>
<th>Indication</th>
<th>Preclinical PoC</th>
<th>IND Enabling</th>
<th>First-in-Humans</th>
<th>Confirming</th>
<th>Launched</th>
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</thead>
<tbody>
<tr>
<td>Zolgensma®</td>
<td>SMA (IV)</td>
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<tr>
<td>AVXS 101 (IT)</td>
<td>SMA (IT)</td>
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<td></td>
</tr>
<tr>
<td>CPK850</td>
<td>Retinitis pigmentosa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVXS 101</td>
<td>Retinitis pigmentosa</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>AVXS 201</td>
<td>Argyrophilic Neuropathy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVXS 401</td>
<td>Undisclosed</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>AVXS 601</td>
<td>Undisclosed</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

## Cell therapy

### 1. Gene therapy: 3 (AVXS-101, CGF166, CPK850); cell therapy: 12 (DLBCL in 1st relapse, r/r follicular lymphoma, r/r DLBCL in combo with pembrolizumab, adult r/r ALL, r/r CLL in combo with ibrutinib, pediatric NHL, 1st line high risk pediatric and young adult ALL, r/r DLBCL in combo with ibrutinib, BCMA&CD19, CD22&CD19, CD123, EGFRv3); radioligand: 3 (\(^\text{177Lu-PSMA-617}\), \(^\text{177Lu-PSMA-R2}\), \(^\text{177Lu-NeoB}\))

## Radioligand therapy

<table>
<thead>
<tr>
<th>Product</th>
<th>Disease Target</th>
<th>Status</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Bio</th>
<th>ETP</th>
<th>NDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>(^\text{177Lu-PSMA-617})</td>
<td>Prostate cancer (mCRPC)</td>
<td>Phase II study completed (Q2 2019)</td>
<td>Therapeutic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(^\text{177Lu-PSMA-R2})</td>
<td>Prostate cancer (mCRPC)</td>
<td>Phase II study initiated (Q2 2019)</td>
<td>Therapeutic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(^\text{177Lu-NeoB})</td>
<td>Prostate cancer (mCRPC)</td>
<td>Phase I study completed (Q2 2019)</td>
<td>Therapeutic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

1. Gene therapy: 3 (AVXS-101, CGF166, CPK850); cell therapy: 12 (DLBCL in 1st relapse, r/r follicular lymphoma, r/r DLBCL in combo with pembrolizumab, adult r/r ALL, r/r CLL in combo with ibrutinib, pediatric NHL, 1st line high risk pediatric and young adult ALL, r/r DLBCL in combo with ibrutinib, BCMA&CD19, CD22&CD19, CD123, EGFRv3); radioligand: 3 (\(^\text{177Lu-PSMA-617}\), \(^\text{177Lu-PSMA-R2}\), \(^\text{177Lu-NeoB}\))  
2. Luxturna® marketed ex-US
2019 expected catalysts to continue the momentum

<table>
<thead>
<tr>
<th>Catalysts</th>
<th>Selected examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key approvals</td>
<td>Zolgensma®¹ SMA Type 1 (US/EU/JP)</td>
</tr>
<tr>
<td></td>
<td>Mayzent® SPMS (US/EU/JP)</td>
</tr>
<tr>
<td></td>
<td>Brolucizumab (RTH258) Neovascular AMD (US)</td>
</tr>
<tr>
<td></td>
<td>Piqray®² (BYL719) Breast cancer (US)</td>
</tr>
<tr>
<td>Major submissions</td>
<td>Ofatumumab (OMB157) Relapsing MS (US/EU)</td>
</tr>
<tr>
<td></td>
<td>Crizanlizumab (SEG101) Sickle cell disease (US/EU)</td>
</tr>
<tr>
<td></td>
<td>Brolucizumab (RTH258) Neovascular AMD (US/EU/JP)</td>
</tr>
<tr>
<td></td>
<td>INC280 NSCLC (US/JP)</td>
</tr>
<tr>
<td>Major late-stage readouts</td>
<td>Zolgensma®¹ SMA Type 2</td>
</tr>
<tr>
<td></td>
<td>Fevipiprant (QAW039) Asthma</td>
</tr>
<tr>
<td></td>
<td>Entresto® HFpEF</td>
</tr>
<tr>
<td></td>
<td>Cosentyx® nrAxSpA</td>
</tr>
<tr>
<td></td>
<td>Ofatumumab (OMB157) Relapsing MS</td>
</tr>
<tr>
<td></td>
<td>PDR001 combo Metastatic melanoma (US/EU)</td>
</tr>
</tbody>
</table>

1. The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xioi), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities.  
2. The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country.
We aim to become a leading medicines company
Powered by advanced therapy platforms and data science

We are a diversified medicines company
Driving growth through cutting-edge platforms
Passionate about productivity and margins
Building a new culture and lasting impact
Committed to driving consistent margin expansion

Innovative Medicines
Core margin (%)

Key drivers:

+ Acceleration of key growth drivers
+ Resource allocation and productivity programs in commercial units
+ Cross-divisional synergies: Novartis Technical Operations, Novartis Business Services, Procurement

- Generics (mainly Afinitor®, Sandostatin®, LAR®, Exjade®/Jadenu®, and tail end of Glivec®)¹
- Launch investments for potential future blockbusters

¹. Gilenya® US compound patent expiration August 2019; dosing regimen patent expiration December 2027

Meet Novartis Management | May 23, 2019 | Investor Presentation
**Strong focus on commercial excellence**
To create successful, sustained and persistent global brands

**Launch excellence**
- Earlier, integrated planning for priority launches
- Deep insights into patient and physician journey
- Leveraging our scale and sharing learnings

**Post-launch excellence**
- Functional upskilling, new capabilities
- Data and analytics to optimize marketing mix
- High-tech, high-touch customer engagement

**Enabled by:**
- Externally-focused culture, capabilities and competitive mindset
- Deep discipline in execution
NTO transformation well underway
Proof-points since end 2016 (post NTO integration, pre-transformation)

- **Network transformation**
  - Announced 13 site exits

- **Headcount reduction**
  - Reduced 1800+ FTEs

- **Warehouse consolidation**
  - Eliminated 95 out of 210 commercial warehouses

**Contributing to goal of ~USD 2bn savings overall² by 2020**

1. FP = finished product, API = active pharmaceutical ingredient
2. Across NTO, NBS and Procurement

**Supplier consolidation**
- Reduced suppliers for indirect materials by ~30%
- Reduced suppliers for FP and API¹ by ~20%

**Data & digital improvement levers**
- Investing in automation and advanced analytics to drive better performance
NBS driving an ambitious efficiency agenda

Footprint
Accelerating footprint shift to low-cost locations

Procurement
Tightening our approach to Procurement
- ~USD 16bn of 3rd party spend across the company
- Revisiting terms with top 50 suppliers
- Consolidating broader supplier base
- Brought in procurement executive from Adidas to lead effort

Technology
Investing in automation and next-generation technology to improve efficiency across business services
- M&S content management
- Order-to-cash
- HCP experience platform
- Sales & operations planning

Contributing to goal of ~USD 2bn savings overall\(^1\) by 2020

1. Across NTO, NBS and Procurement
Sandoz focused on a five-point transformation plan

- **Portfolio & Innovation Strategy**: Shift portfolio to more differentiated areas
- **Portfolio Delivery**: Ensure timely delivery to key markets
- **Cost-competitive & Flexible Supply**: Drive COGS and generic mindset to increase margins
- **Resource Allocation**: Agile M&S allocation in fast-changing markets
- **Operating Model & Governance**: Simplify how we work
We aim to become a leading medicines company
Powered by advanced therapy platforms and data science

We are a diversified medicines company

Driving growth through cutting-edge platforms

Passionate about productivity and margins

Building a new culture and lasting impact
Culture transformation is key to our success
Strong focus on developing leaders and empowering associates in 2019

<table>
<thead>
<tr>
<th>Developing leaders</th>
<th>Empowering associates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immersion course for top 300 leaders</td>
<td>Crowdsourcing initiatives</td>
</tr>
<tr>
<td>Upward feedback for all leaders</td>
<td>Continuous learning platform</td>
</tr>
<tr>
<td>Candid Conversations series</td>
<td>Bold parental leave policy</td>
</tr>
</tbody>
</table>
Focused effort to build lasting trust with society
Sub-committee of the Executive Committee tracking progress

Ethical Standards
Embedding principles-based decision-making
Strengthened approach to risk management
Established Ethics, Risk & Compliance function

Pricing and Access
Ranked #2 in Access to Medicines Index
Brought LIC & LMIC prices in line with EU5 average
Reduced delay from first launch to LMIC to <1 year

Global Health Challenges
Renewed commitment to malaria and leprosy
Launched sickle cell disease partnership in Ghana
Joined Global Chagas Disease Coalition

Corporate Citizenship
Joined the UN Equal Pay International Coalition
Became the first major pharma company to support the UN LGBTI standards
New climate targets endorsed by the Science Based Targets initiative

Stakeholder Engagement
Published Novartis in Society report with increased level of transparency
Increased reporting on Financial, Environmental and Social (FES) impact on society
## Concluding thoughts
### Group key messages

<table>
<thead>
<tr>
<th>Number</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transformation of Novartis into diversified medicines company is progressing well</td>
</tr>
<tr>
<td>2</td>
<td>Strong foundation for growth with 15 in-market blockbusters, catalyst-rich pipeline and leadership in advanced therapy platforms</td>
</tr>
<tr>
<td>3</td>
<td>Clear path to expand margins through acceleration of key growth drivers, together with productivity efforts in NTO and NBS</td>
</tr>
<tr>
<td>4</td>
<td>Continuing a multi-year journey to build a new culture and lasting impact on society</td>
</tr>
</tbody>
</table>
Meet Novartis Management 2019
Development: advanced therapy platforms and pipeline summary
May 23, 2019
# Catalyst-rich pipeline and strong focus operational execution

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Catalyst-rich pipeline with over 25 submissions with blockbuster potential</td>
</tr>
<tr>
<td>2</td>
<td>Multiple 2019 pipeline milestones with potential to accelerate 5-10 year growth trajectory</td>
</tr>
<tr>
<td>3</td>
<td>Building out advanced therapy platform capabilities to complement small molecule / biologics</td>
</tr>
<tr>
<td>4</td>
<td>Strengthening operational execution with extensive use of data and digital technologies</td>
</tr>
</tbody>
</table>
Novartis development pipeline leads the industry in its scale and value

<table>
<thead>
<tr>
<th>Scale</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>200+ Projects in clinical development</td>
<td>25+ Potential blockbusters(^1) in confirmatory development</td>
</tr>
<tr>
<td>500+ Ongoing clinical trials(^2)</td>
<td>18 Advanced platform therapies in clinical development</td>
</tr>
<tr>
<td>60+ Major submissions planned 2019-2021(^3)</td>
<td>#1 Most valuable pipeline according to external ranking(^4)</td>
</tr>
</tbody>
</table>

1. Blockbuster defined as peak sales >$1bn for either a new molecular entity across all indications or for a single new indication of a previously launched product.  
2. Across NIBR and GDD.  
4. Source: Evaluate Pharma 2018, Outlook to 2024. Ranked #1 in terms of: (1) value creation from advanced therapies, (2) highest pipeline value by sales 2018-24, and (3) value creation 2018-24 from recently launched and pipeline products.
Novartis size offers unique benefits

A pipeline to transform Standard of Care

<table>
<thead>
<tr>
<th>% of pipeline</th>
<th>No. of programs¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>73%</td>
<td>TQJ230: antisense oligonucleotide against Lipoprotein(a) for CVRR²</td>
</tr>
<tr>
<td>18%</td>
<td>UNR844: R-Lipoic acid (R-LA) choline ester (LACE) for presbyopia</td>
</tr>
<tr>
<td>9%</td>
<td></td>
</tr>
</tbody>
</table>

Size and scale to make big bets targeting areas of high unmet need

Establishing advanced therapy platforms

- **Gene therapy**
  - Aavisis
  - Luxturna

- **Cell therapy**
  - KyMRIAH

- **Radioligand therapy**
  - Lutathera
  - Endocyte

Internal Data: GDD pipeline as of April 2019. ¹ Novartis internal assessment. ² CVRR = cardiovascular risk reduction. ³ Market ex-US.
We are delivering on all near-term catalysts ...

### Catalysts

<table>
<thead>
<tr>
<th>Key approvals</th>
<th>Selected examples</th>
</tr>
</thead>
</table>
| **15** | **Zolgensma™**<sup>1</sup>  
SMA Type 1 (US/EU/JP)  
**Mayzent™<sup>2</sup>**  
SPMS (US/EU/JP) | **Brolucizumab (RTH258)**  
Neovascular AMD (US)  
**Piqray®<sup>3</sup>**  
Breast Cancer (US) |
| Major submissions | **Ofatumumab (OMB157)**  
Relapsing MS (US/EU)  
**Crizanlizumab (SEG101)**  
Sickle Cell Disease (US/EU) | **Brolucizumab (RTH258)**  
Neovascular AMD (US/EU/JP)  
PDR001 combo  
Metastatic Melanoma (US/EU) |
| Major late-stage readouts | **Zolgensma™**<sup>1</sup>  
SMA Type 2  
**Fevipiprant (QAW039)**  
Asthma | **Entresto®**  
HFpEF  
**Cosentyx®**  
nrAxSpA | **Ofatumumab (OMB157)**  
Relapsing MS  
PDR001 combo  
Metastatic Melanoma |

1. The brand name Zolgensma™ has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xxx), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities.  
2. Approved by the FDA in Q1.  
3. The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country.
... and building a pipeline with 25+ potential blockbusters

Potential blockbusters\(^1\) by planned submission year\(^2\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Product</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021</td>
<td>Entresto®</td>
<td>HFpEF</td>
</tr>
<tr>
<td>2022</td>
<td>OMB157</td>
<td>Relapsing MS</td>
</tr>
<tr>
<td>2019</td>
<td>PDR001 combo</td>
<td>Metastatic Melanoma</td>
</tr>
<tr>
<td>2019</td>
<td>QVM149</td>
<td>Asthma</td>
</tr>
<tr>
<td>2019</td>
<td>RTH258</td>
<td>hNAMD</td>
</tr>
<tr>
<td>2019</td>
<td>SEG101</td>
<td>Sickle Cell Disease</td>
</tr>
<tr>
<td>2019</td>
<td>Zolgensma™</td>
<td>SMA Type 2/3</td>
</tr>
<tr>
<td>2019</td>
<td>177Lu-PSMA-617</td>
<td>mCRPC</td>
</tr>
<tr>
<td>2019</td>
<td>ABL001</td>
<td>CML</td>
</tr>
<tr>
<td>2019</td>
<td>ACZ885</td>
<td>Lung cancer</td>
</tr>
<tr>
<td>2021</td>
<td>ZPL389</td>
<td>Atopic Dermatitis</td>
</tr>
<tr>
<td>2022</td>
<td>QGE031</td>
<td>CSU / CIU</td>
</tr>
</tbody>
</table>

1. Blockbuster defined as peak sales >$1bn for either a new molecular entity across all indications or for a single new indication of a previously launched product.
2. For NMEs submission year represents year of lead indication.
3. The brand name Zolgensma™ has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xioi), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities.
4. Including NASH portfolio of combination products.
Early innovative assets target areas of high unmet need

<table>
<thead>
<tr>
<th>LNP023</th>
<th>TQJ230</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Chemical Structure" /></td>
<td><img src="image" alt="Antisense Oligonucleotide" /></td>
</tr>
<tr>
<td><strong>Oral complement Factor B inhibitor</strong>&lt;br&gt;Potential first disease modifying treatment option for several rare renal diseases</td>
<td><strong>Antisense oligonucleotide</strong>&lt;br&gt;Potential to be first medicine approved to treat high Lp(a)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Iscalimab (CFZ533)</th>
<th>Ligelizumab (QGE031)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Iscalimab" /></td>
<td><img src="image" alt="Ligelizumab" /></td>
</tr>
<tr>
<td><strong>Fully human IgG1 mAb against CD40</strong>&lt;br&gt;Potential for one organ transplant to last the patient’s lifetime</td>
<td><strong>Humanized anti-IgE Antibody</strong>&lt;br&gt;Potential for disease modification in chronic spontaneous urticaria</td>
</tr>
</tbody>
</table>
Progressing gene, cell and radioligand platforms with 18¹ projects in development

1. Gene therapy: 3 (AVXS-101, CGF166, CPK850); cell therapy: 12 (DLBCL in 1st relapse, r/r follicular lymphoma, r/r DLBCL in combo with pembrolizumab, adult r/r ALL, r/r CLL in combo with ibrutinib, pediatric NHL, 1st line high risk pediatric and young adult ALL, r/r DLBCL in combo with ibrutinib, BCMA&CD19, CD22&CD19, CD123, EGFRv3); radioligand: 3 (177Lu-PSMA-617, 177Lu-PSMA-R2, 177Lu-NeoBi)

2. Luxturna® marketed ex-US
Reimagining Novartis as a medicines company powered by data and digital technologies

Data for insights

Patient engagement

Process effectiveness

All trademarks are the property of their respective owners
## Focus on operational excellence through Data & Digital

### Time

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2017</th>
<th>2018</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study start-up(^1)</td>
<td>7.3</td>
<td>4.1</td>
<td>⬇</td>
</tr>
<tr>
<td>Enrollment(^2)</td>
<td>41.9</td>
<td>39.6</td>
<td>⬇</td>
</tr>
<tr>
<td>Data-analysis &amp; reporting(^3)</td>
<td>27.5</td>
<td>22.5</td>
<td>⬇</td>
</tr>
</tbody>
</table>

### Cost

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2017 vs 2018</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient recruitment cost(^4)</td>
<td>-24%</td>
<td>⬇</td>
</tr>
<tr>
<td>Site visit cost(^5)</td>
<td>-11%</td>
<td>⬇</td>
</tr>
<tr>
<td>Data analysis cost(^6)</td>
<td>-53%</td>
<td>⬇</td>
</tr>
</tbody>
</table>

### Productivity

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2017 vs 2018</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring efficiency(^7)</td>
<td>+12%</td>
<td>⬇</td>
</tr>
<tr>
<td>Dataset production(^8)</td>
<td>+37%</td>
<td>⬇</td>
</tr>
<tr>
<td>Tables, listings and figures production(^9)</td>
<td>+34%</td>
<td>⬇</td>
</tr>
</tbody>
</table>

---

1. Time from final protocol to final protocol package
2. Time from first patient first visit to 25% enrollment (weeks)
3. Time from database lock to clinical study report
4. Grant cost paid to investigators per patient
5. Resources cost per monitoring visit
6. Resources cost per page
7. Monitoring visits per clinical research associate per week
8. Datasets per FTE
9. Tables, listings, figures per FTE
Conclusion - Development

- Robust mid- and late-stage pipeline in place, including advanced platform technologies
- Focus on operational excellence, on track to deliver all near-term pipeline goals
- Early pipeline focus addressing significant unmet need
- Embracing data & digital technologies to accelerate innovation in drug development
Planned filings 2019 to ≥ 2023

17. Psoriatic arthritis head-to-head study versus adalimumab
18. Non-alcoholic steatohepatitis
19. Anti-lymphoid head-to-head study versus adalimumab
20. Acute myeloid leukemia
21. Chronic Obstructive Pulmonary Disease
22. Secondary Progressive Multiple Sclerosis
23. IV formulation Spinal Muscular Atrophy Type 1
24. 1st line colorectal cancer / 1st line renal cell carcinoma
25. IT formulation Spinal Muscular Atrophy Type 2/3
26. Metastatic castration-resistant prostate cancer

Combination abbreviations:
fulv fulvestrant
tmx tamoxifen
gsn goserelin
NSAI Non-steroidal aromatase inhibitor
Taf Tafinlar® (dabrafenib)
Mek Mekinist® (trametinib)

1. Secondary prevention of cardiovascular events in patients with elevated levels of lipoprotein (a)
2. Triple negative breast cancer
3. Paroxysmal nocturnal hemoglobinuria
4. Chronic myeloid leukemia
5. Long acting release
6. Non-small cell lung cancer
7. Neovascular age-related macular degeneration
8. Chronic lymphocytic leukemia
9. Breast cancer
10. Diffuse large B-cell lymphoma
11. Indolent Non-Hodgkin’s lymphoma
12. Non-radiographic axial spondyloarthitis
13. Preserved ejection fraction
14. Graft versus host disease
15. Neuroendocrine tumors
16. Chronic spontaneous urticaria / chronic idiopathic urticaria

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15. Neuroendocrine tumors
16. Chronic spontaneous urticaria / chronic idiopathic urticaria
Meet Novartis Management 2019
Pharmaceuticals pipeline and in-market brands

May 23, 2019
## Index – select pipeline and in-market brands

### Select pipeline

<table>
<thead>
<tr>
<th>SLIDE</th>
<th>Product</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Brolucizumab (RTH258)</td>
<td>37</td>
</tr>
<tr>
<td>39–41</td>
<td>Fevipiprant (QAW039)</td>
<td>39–41</td>
</tr>
<tr>
<td>21–23</td>
<td>Mayzent®</td>
<td>21–23</td>
</tr>
<tr>
<td>27–31</td>
<td>Zolgensma®</td>
<td>27–31</td>
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### In-market brands

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<tr>
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<tr>
<td>11–14</td>
<td>Cosentyx®</td>
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<td>6–8</td>
<td>Entresto®</td>
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<tr>
<td>19–20</td>
<td>Gilenya®/ MS disease</td>
<td>19–20</td>
</tr>
<tr>
<td>34–36</td>
<td>Xiidra®</td>
<td>34–36</td>
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**Building depth across our core therapeutic areas**

<table>
<thead>
<tr>
<th>ONCOLOGY</th>
<th>CARDIO-METABOLIC</th>
<th>IHD</th>
<th>NEUROSCIENCE</th>
<th>OPHTHALMOLOGY</th>
<th>RESPIRATORY</th>
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<tr>
<td>Kymriah®</td>
<td>Entresto®</td>
<td>Cosentyx®</td>
<td>Brolucizumab (RTH258)</td>
<td>LUNO070</td>
<td>Fevipiprant (QAW039)</td>
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<tr>
<td>New indications</td>
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<td>mAbcolix</td>
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<tr>
<td>Piqray® (BYL719)</td>
<td>CFZ533</td>
<td>LMI070 SMA</td>
<td>UNR844</td>
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<td>Transplant / Sjögren's</td>
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<td>Presbyopia</td>
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<td>Crizanlizumab (SEG101)</td>
<td>TQJ230 CVRR</td>
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<td>Ofatumumab (OMB157)</td>
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<td>Sickle Cell</td>
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<td>MS</td>
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<tr>
<td>PDR001 combo</td>
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<td>ECF843 Dry eye</td>
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<tr>
<td>TQJ230 CVRR</td>
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</tbody>
</table>

*Select commercial assets*

*Select pipeline assets and opportunities*

- Brolucizumab (RTH258)
- LNP023: Renal diseases
- TQJ230 CVRR: Renal diseases
- ENTRESTO®: HFpEF, post-MI
- COSentyx®: NASH
- ZOLgensma®2: SMA
- Brolucizumab (RTH258): TAMD, DME, RVO
- MIRI064: SMA
- ZPL389: AD
- MOR106: AD

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country. See appendix for references.*

---

**Meet Novartis Management 2019 | May 23, 2019 | Novartis Investor Presentation**

---

**ONCOLOGY**

- Kymriah®
- Piqray® (BYL719)
- Crizanlizumab (SEG101)
- LNP023: Renal diseases
- TQJ230 CVRR

**Cardio-Metabolic**

- Entresto®
- Cosentyx®
- Zolgensma®2

**IHD**

- CFZ533: Transplant / Sjögren’s
- LMI070 SMA
- Ofatumumab (OMB157) MS

**Neuroscience**

- TQJ230 CVRR: Renal diseases
- Entresto®: HFpEF, post-MI
- Cosentyx®: NASH
- Zelengma®2: SMA

**Ophthalmology**

- Brolucizumab (RTH258): TAMD, DME, RVO
- Brolucizumab (RTH258): TAMD, DME, RVO

**Respiratory**

- LNP023: Renal diseases
- TQJ230 CVRR: Renal diseases
- ENTRESTO®: HFpEF, post-MI
- COSentyx®: NASH
- ZOLgensma®2: SMA
Cosentyx®, Entresto® and multiple near-term potential blockbuster launches expected to drive strong growth

1. Continued strong momentum for key growth drivers Cosentyx® and Entresto®, based on growing evidence base

2. Ready to launch 5 blockbuster candidates – Mayzent®, Zolgensma®, Brolucizumab (RTH258), Ofatumumab (OMB157), Fevipiprant (QAW039)

3. With recently launched products and rich pipeline, Novartis expects double-digit growth in China, capitalizing on faster and broader access

1. The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xxxx), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities
Building depth across our core therapeutic areas

<table>
<thead>
<tr>
<th>ONCOLOGY</th>
<th>PHARMACEUTICALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select</td>
<td>Cardio-Metabolic</td>
</tr>
<tr>
<td>commercial</td>
<td>IHD</td>
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<tr>
<td>assets</td>
<td>Neuroscience</td>
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<tr>
<td>pipeline</td>
<td>Respiratory</td>
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<td>assets and</td>
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<tr>
<td>opportunities</td>
<td></td>
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</tbody>
</table>

**ONCOLOGY**
- Kymriah®
  - New indications
- Piqray® (BYL719)
  - Breast
- Crizanlizumab (SEG101)
  - Sickle Cell
- PDR001 combo
  - Metastatic Melanoma
- ABL001
  - CML
- ACZ885
  - (Lyn)
- 177Lu-PSMA-617
  - mPSMA

**Cardio-Metabolic**
- Entresto®
  - HFpEF, post-MI
- LNP023
  - Renal diseases
- TQJ230
  - CVR

**PHARMACEUTICALS**
- Cosentyx®
  - nrAxSpA
- Zolgensma®
  - SMA
- Brolucizumab (RTH258)
  - nAMD, DME, RVO
- Fevipiprant (QAW039)
  - Asthma
- UNR844
  - Presbyopia
- QVM149
  - Asthma
- ECF843
  - Dry eye
- CSJ117
  - Asthma
- SAF312
  - Chronic Ocular Pain
- QBW251
  - COPD

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country. See appendix for references*
Entresto® expected to expand into new indications to become the foundational treatment in all HF

- **HFrEF**
  - 2m and 2.5m eligible patients EU/US¹
  - Foundational therapy approved in most major markets
  - In-hospital growth momentum accelerating post PIONEER-HF
  - Japan submission on track for Q3 2019
  - China NDRL inclusion expected Q4 2019

- **HFpEF**
  - 1.7m and 2.5m patients EU/US¹
  - Potentially first therapy ever to treat pEF based on PARAGON expected Q3 2019
  - PARAGLIDE to study in-hospital initiation given ~50% of all HF hospitalizations are due to pEF²
  - PARALLAX (biomarkers and functional capacity) on track for readout ahead of launch Q1 2020

- **HF prevention in post-AMI**
  - 0.3m eligible patients p.a. across EU/US
  - Entresto® as prevention of HF and CV death in high-risk post-AMI patients with LVD (40% of post-AMI population)
  - PARADISE expected to readout in Q3 2020

CV = Cardiovascular; HF = Heart Failure; HFrEF = Heart Failure with reduced Ejection Fraction; HFpEF = Heart Failure with Preserved Ejection Fraction; AMI = Acute Myocardial Infarction; LVD = Left Ventricular Dysfunction; NDRL = National Drug Reimbursement List; Post-AMI: post-acute myocardial infarction; eGFR = glomerular filtration rate.

¹. Based on NYHA II-IV and eGFR criteria
². Goyal 2016; DOI:10.1016/j.amjmed.2016.02.007
Entresto® NBrx acceleration driven by operational excellence and PIONEER data

New data on beneficial and safe in-hospital initiation in significant part of patient population...

- HF Prevalence 7.4m in US and 6.2m in EU5 of which 50% are HFrEF patients
- 0.5m hospitalizations in US and 0.7m in EU5 due to HFrEF p.a.
- Hospitalizations are an important trigger point to initiate and change treatment
- PIONEER-HF and TRANSITION provided the evidence for safe and beneficial in-hospital initiation of Entresto®

... showing positive impact on overall U.S. prescriptions

NBRx = New-to-Brand prescriptions; HF = Heart Failure; HFrEF = Heart Failure with reduced Ejection Fraction. See appendix for references
Entresto® dataset in HFpEF to exceed 8000 patients

**PARAMOUNT** – successful Ph2

**PARAGON – pivotal Ph3**

**PARALLAX, PARAGLIDE – supportive data**

### Trial

<table>
<thead>
<tr>
<th>Hemodynamic</th>
<th>Structural</th>
</tr>
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<tbody>
<tr>
<td>Cardiac stress – prognostic of outcome$^2$</td>
<td>Left ventricular pressures – prognostic of outcome$^2$</td>
</tr>
</tbody>
</table>

#### Hemodynamic

- **Prim. Endpoint:** NT-proBNP
- **23% reduction by week 12**

#### Structural

- **Sec. Endpoint:** Atrial size
- **7.8% reduction by week 36**
- **LVEF >45%, N=301 vs. valsartan**

<table>
<thead>
<tr>
<th>LVEF &gt;45% N=4822 vs. valsartan</th>
<th>Novel primary composite endpoint: CV death and total (first &amp; recurrent) HF hospitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVEF &gt;40% N=2500 vs. valsartan, enalapril, placebo</td>
<td>NT-proBNP, functional measures, symptoms</td>
</tr>
</tbody>
</table>

### Next expected milestones

- **FIR Q3 2019**
  - Basis for planned filing in Q4 2019
- **Fully enrolled, FIR Q1 2020**
  - Supportive data at launch

---

HFpEF - heart failure with preserved ejection fraction | LVEF - left ventricular ejection fraction | ADHF – acute decompensated heart failure | FIR – first interpretable results | FPFV – first patient, first visit
1. Solomon et al. LANCET 2012
2. Komajda 2011; Anand 2003; Massie 2008
The next wave of cardiometabolic programs are now advancing into late stage development

### LNP023

- Oral complement Factor B inhibitor
- Potential first disease modifying treatment option for several rare renal diseases
- Under development for IgA and Membranous Nephropathies, and C3 Glomerulopathy
- Single Ph2a/b studies in all 3 indications potentially enabling direct initiation of single Ph3 studies in coming years

### TQJ230

- Antisense oligonucleotide against Lipoprotein(a)
- Lp(a) is an independent inherited CV risk factor and 20-30% of patients with established CV disease have elevated Lp(a)
- Estimated pt potential 4m in US and 5m in EU¹²
- Currently, no medicines are approved to treat high Lp(a)
- TQJ230 demonstrated 80% Lp(a) reduction in patients with CV disease in Ph2b
- Ph3 trial to assess TQJ230 effect on CV outcomes to be initiated in Q1 2020

---

1. Potential patients are defined by the indication to be studied in the planned phase III trial for patients with elevated Lp(a) and MI, stroke or PAD. Potential eligible population dependent on trial results and label. 2. US AHA (Heart Disease & Stroke Stats 2018 update), EUS & JP Kantar Health EPI database, DRG Database, REACH Registry, Odyssey Outcome Trial. Estimates vary based on regional/ethnic variability.
Building depth across our core therapeutic areas

<table>
<thead>
<tr>
<th>Oncology</th>
<th>Pharmaceuticals</th>
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<td><strong>PHARMACEUTICALS</strong></td>
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<td>Crizanlizumab</td>
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<tr>
<td>(SEG101)</td>
<td>Respiratory</td>
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*Kymriah®, Crizanlizumab, Enresto®*, and Piqray® are approved for sale in the United States.

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country. See appendix for references.
Cosentyx® well-positioned to continue to grow in attractive segments of the immunology market

Psoriasis
- USD 15bn market expected to grow >8% p.a. through 2023 mainly driven by expansion of biologics usage
- Cosentyx® uniquely positioned to win based on strong evidence
  - Cosentyx® superiority to Enbrel® and Stelara®
  - 5-year data on sustained control of signs and symptoms
  - Strong data in joints in PsA patients and hard-to-treat persistent manifestations
  - ARROW study comparing IL-17 vs. IL-23 on track for read-out end 2019

Spondyloarthritis
- IL17s expected to grow faster than the market
- Mainly driven by increasing diagnosis rate and biologics usage
- Cosentyx® uniquely positioned compared to anti-TNFs and IL23s
  - Sustained control of signs and symptoms up to 5 years
  - High level of enthesitis resolution
  - Promising structural data across PsA and AS

Global immunology market
USD billion in 2018 and 2023E

Dermatology
- 2018: 50
- 2023E: 61

Rheumatology
- 2018: 36
- 2023E: 40

PsA = Psoriatic Arthritis. See appendix for references.
Nr-axSpA indication would complete Cosentyx® label across the SpA spectrum

US and EU patient population by indication\(^1\)

<table>
<thead>
<tr>
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<th>Spondyloarthritides</th>
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<tbody>
<tr>
<td></td>
<td>PsA</td>
<td>AS</td>
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<tr>
<td>Prevalence</td>
<td>1,642</td>
<td>1,541</td>
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<tr>
<td>Diagnosed patients(^2)</td>
<td>832</td>
<td>738</td>
</tr>
<tr>
<td>% diagnosed</td>
<td>51%</td>
<td>48%</td>
</tr>
<tr>
<td>Patients treated(^3)</td>
<td>437</td>
<td>397</td>
</tr>
<tr>
<td>% treated</td>
<td>53%</td>
<td>54%</td>
</tr>
<tr>
<td>Patients on biologics</td>
<td>136</td>
<td>107</td>
</tr>
<tr>
<td>% treated</td>
<td>31%</td>
<td>27%</td>
</tr>
</tbody>
</table>

- SpA patient population is at least as big as RA population
- 1.7m patients in EU and US suffer from nr-axSpA
- 10–40% of patients progress from nr-axSpA to AS over a period of 2–10 years\(^5\)
- Diagnosis of nr-axSpA based on MRI imaging and HLA-B27 biomarker\(^6,7\) gradually increasing, but rates remain low
- Biologics penetration in nr-axSpA only 4-8%

\(^1\) SpA = Spondyloarthritis; nr-axSpA = non-radiographic axial Spondyloarthritis; PsA = Psoriatic Arthritis; AS = Ankylosing Spondylitis; RA = rheumatoid arthritis; HLA = Heuman Leukocyte Antigen. See appendix for references
Cosentyx® Ph3 PREVENT readout in non-radiographic axial spondyloarthritis expected in Q4 2019

A Ph3, randomized, double-blind, placebo-controlled, multicenter study to evaluate the efficacy and safety of secukinumab in patients with non-radiographic axial spondyloarthritis

Enrolled
555 patients

Population
NSAID-IR, open for biologic-IR and DMARD-IR

Study start date
April 2016

LPFV (enrollment) completion date
May 2018

Primary efficacy endpoint at Weeks 16 and 52
ASAS40 response rate with secukinumab vs. placebo

ASAS40, Assessment of SpondyloArthritis International Society criteria (ASAS) 40% criteria; biologic-IR, biologic inadequate responders; DMARD-IR, disease-modifying anti-rheumatic drug inadequate responders; NSAID-IR, non-steroidal anti-inflammatory drug inadequate responders; Biologic-IR patients are patients who have had an inadequate response to not more than 1 anti-TNF agent; ClinicalTrials.gov (NCT02696031)
Generating further evidence on sustained benefit of Cosentyx® across SpA indications

<table>
<thead>
<tr>
<th>Trial</th>
<th>Objectives</th>
<th>Readout expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREVENT (nr-axSpA)</td>
<td>Efficacy and safety of Cosentyx® in nr-axSpA, compared to placebo and progression of structural changes (at 2 years)</td>
<td>Q4 2019</td>
</tr>
<tr>
<td>EXCEED (PsA)</td>
<td>Double-blinded H2H superiority vs. Humira® in active PsA patients who are intolerant or have inadequate response to DMARDs (e.g. methotrexate)</td>
<td>2019/ 2020</td>
</tr>
<tr>
<td>SURPASS (AS)</td>
<td>H2H vs. proposed adalimumab biosimilar on impact on radiographic progression (mSASSS) in active AS</td>
<td>2022</td>
</tr>
</tbody>
</table>

SpA = Spondyloarthritis; nr-axSpA = non-radiographic axial Spondyloarthritis; PsA = Psoriatic Arthritis; AS = Ankylosing Spondylitis; H2H = Head to Head; DMARDs = disease modifying anti-rheumatic drugs; mSASSS = modified Stoke Ankylosing Spondylitis Spinal Score

1. Humira® is a registered trademark of AbbVie Biotechnology Ltd.
Next wave of immunology programs well advanced in late stage development

Iscalimab (CFZ533)

- Fully human, Fc-silenced non-depleting, IgG1 mAb blocking the CD40 receptor
- Under development for renal / liver transplant and for Primary Sjögrens Syndrome
- Ph2b CIRRUS I Study (Renal Transplant) ongoing
- Ph2b TWINSS Study (Sjögren's) initiation expected in Q3
- Potential for first organ transplant to last the patient’s lifetime

Ligelizumab (QGE031)

- Humanized anti-IgE antibody, in Ph3 head-to-head superiority studies against Xolair® in CSU patients
- Under development for CSU/ CIU
- Ph2 data show complete responses (UAS7=0) sustained in over 50% of patients through 1 year of treatment
- LT (1 year) treatment well tolerated, no unexpected safety signals
- Potential for disease modification based on Ph2 data

CSU – chronic spontaneous urticarial CIU – chronic idiopathic urticaria
**Tropifexor (LJN452) – an FXR agonist for the treatment of NASH**

A novel and highly potent non-bile acid FXR agonist that has shown efficacy in preclinical models of NASH\(^1,2\)

Safe and well-tolerated in healthy volunteers at single doses up to 3000 µg

Dose-dependent pharmacodynamic elevation of fibroblast growth factor 19 (FGF19) was demonstrated as a marker of target engagement in the gut\(^3\)

Currently being evaluated in FLIGHT-FXR, a Phase 2 clinical trial in patients with NASH

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**Effect of tropifexor on marker of hepatic inflammation: ALT**

A rapid and sustained decline in ALT levels from baseline was observed with tropifexor 90 µg doses in patients from both BMI subgroups, more marked in the group with lower BMI

Geometric mean percentage change from baseline of ALT (U/L) at week 12 by BMI subgroups\(^4\)

---

4. Sanyal A, et al. *J Hepatol* 2019 70(S1) e796-797 Data is investigational. Efficacy & safety not yet established
Iscalimab (CFZ533) – first-in-class anti-CD40 medicine for transplantation and autoimmune disease

Reduces disease activity in Sjögren’s syndrome

Prevents rejection and improves kidney function after kidney transplantation

Data is investigational. Efficacy & safety not yet established.
**Building depth across our core therapeutic areas**

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| Piqray® (BYL719) Breast | LNP023 Renal diseases | CFZ533 Transplant / Sjögren’s | LMI070 SMA |
| Crizanlizumab (SEG101) Sickle Cell | TQJ230 CVR | Tropifexor (LR452) NASH | Ofatumumab (OMB157) MS |
| PDR001 combo Metastatic Melanoma | VAY785 NASH | LOU064 CSU | CNPS20 Alzheimer’s |
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| ACZ885 | ZPL389 AD | VAY785 NASH | QBW251 COPD |
| 177Lu-PSMA-617 | MOR106 AD | | |

Select commercial assets

Select pipeline assets and opportunities

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country.*

See appendix for references
Disease area leadership in multiple sclerosis supported by cutting edge innovation

Progression is recognized to start earlier than previously thought\(^1\)

Patient relevant outcomes measured through digital is the expectation\(^2\)

Real-world data and advanced analytics used to gain insights and inform decisions

Potential biomarkers, beyond MRI are becoming more accessible


Portfolio aligns to the full spectrum of Disease

Category Leadership

1\(^{st}\) oral
1\(^{st}\) in NfLs
1\(^{st}\) in pediatric MS
1\(^{st}\) s.c. B-cell therapy
1\(^{st}\) successful study in typical SPMS

Ofatumumab
(OMB157)
With new and planned launches, Novartis continues to lead across the MS disease spectrum

Patient Profiles

Relapsing MS

Transition is gradual and not well defined

Secondary progressive MS

25-35 years old
RMS patients, first line first switch

~85% of MS patients

~40 years old
Transitioning or have transitioned to SPMS

~75-80% of RMS patients

Ofatumumab (OMB157)
oral, once monthly

Mayzent®
(siponimod) tablets

MS = multiple sclerosis; PPMS = primary progressive MS; RRMS = relapsing–remitting MS; SPMS = secondary progressive MS EDSS = Expanded Disability Status Scale.
Mayzent® EXPAND study resulted in first and only oral drug proven to impact progression in typical SPMS patient

EXPAND study²: typical SPMS population with unmet need

<table>
<thead>
<tr>
<th>Age (mean): 48 years</th>
<th>Moderate to severe disability: EDSS 5.4 / 6.0 (mean/ median)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years since onset of MS (mean): 17 years</td>
<td>Relapse-free for prior 2 years (%): 64%</td>
</tr>
</tbody>
</table>

**Disability progression**

**Reduction in risk of CDP vs. placebo**

<table>
<thead>
<tr>
<th>Reduction</th>
<th>3-month</th>
<th>6-month</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>21%</td>
<td>0.013</td>
<td>0.006</td>
<td></td>
</tr>
</tbody>
</table>

Primary and secondary endpoints:

- **Primary endpoint 3-month CDP**
- **Secondary endpoint: 6-month CDP**

**Confirmed relapses**

- 55% reduction ARR³ vs. placebo (p < 0.0001)

**Cognitive processing**

- SDMT²: 2.48 points improvement from baseline, vs. placebo³ (p<0.0004)

**Brain volume loss**

- 23.4% reduction in brain volume loss vs. placebo³ (p = 0.0002)

ARR – annualized relapse rate. CDP - confirmed disability progression. EDSS - Expanded Disability Status Scale. DMT – Disease modifying treatment. See appendix for references.
Mayzent® showed significant effects on cognitive processing speed in SPMS patients

Decreased Cognitive Processing Speed (CPS) is a core underlying deficit in SPMS, affecting up to 70% of the patients.

EXPAND study (>1600 patients):
- Mayzent® (siponimod) is a brain penetrant S1P₁,₅ receptor modulator that reduces brain volume loss, reducing disability progression in patients with SPMS.
- CPS assessed with the Symbol Digit Modality Test (SDMT).

Subgroup analyses:
- Higher proportions of sustained CPS improvement with Mayzent® vs. placebo.
- Lower proportions of sustained CPS deterioration with Mayzent® vs. placebo.

HR = hazard ratios  See appendix for references.
Mayzent® the first and only oral treatment successfully studied and approved for active SPMS¹

Unique label and clinical data

- Full range of RMS indication
- Active SPMS² (EDSS range: 3.0 to 6.0)
- Efficacy
- Safety and tolerability
- No FDO (~70%)³

For a large population with unmet need

- ~250K target active SPMS patients in US
- Awareness of Mayzent® >50% of physicians in most major markets
- Initial focus on disease education
- MSProDiscuss™ launched to help target patient identification

RRMS – Relapsing Remitting Multiple Sclerosis; SPMS – Secondary Progressive Multiple Sclerosis; CPS – Cognitive Processing Speed; FDO – first dose observation  See appendix for references
Ofatumumab (OMB157) subcutaneous anti-CD20 for relapsing MS on track for submission Q4 2019

Ofatumumab suppresses new MS lesions >90% (MIRROR Ph2b)¹

Ph3 program for Ofatumumab² (ASCLEPIOS 1 & 2)

Ph3 ASCLEPIOS 1 & 2 readout expected Q3 2019


¹ Ofatumumab (OMB157) subcutaneous anti-CD20 for relapsing MS on track for submission Q4 2019

² Ph3 ASCLEPIOS 1 & 2 readout expected Q3 2019

³ Ofatumumab suppresses new MS lesions >90% (MIRROR Ph2b)
Ofatumumab (OMB157): potentially first and only highly potent precision B-Cell therapy tailored for MS patients

Maximizing unique B-cell biology ...

- More potent B-cell lysis as Ofatumumab binds to unique CD20 epitopes, with higher affinity\(^1,2,3\)
- SC administration favorable vs. IV route due to improved lymph node targeting, sparing B-cells in the spleen, higher uptake in the spinal cord and improved CNS uptake\(^5,6,7\)
- Low dose Q4W dosing: preservation of immunity through faster B-cell repletion\(^4\) upon discontinuation

... with potential for best-in-class efficacy, safety and convenience

- Expected to have high efficacy on all key measures of disease activity enabling low dose
- Fewer side effects due to specific B-cell subset targeting and faster repletion\(^4\)
- Potential for at-home once-a-month injection, requiring no pre-treatment, offering high degree of convenience

See appendix for references
Aimovig® the leading CGRP in US with further growth expected from ongoing ex-US launches

In US Aimovig® leads with 55% TRx share

Further US opportunity in diagnosis rates (currently 13%) and penetration of preventive treatments (currently 12%)

>200k patients treated to date worldwide

Aimovig® now approved in 38 countries, available in 27 countries

All trademarks are the property of their respective owners. Aimovig is co-commercialized with Amgen in the US, where Amgen records sales, and Novartis has exclusive commercialization rights for all territories excluding US and Japan.
Speed, efficacy and durability demonstrated by robust Zolgensma®¹ data at AAN

Please see posters/ AAN Novartis investor presentation (click link)

Pre-symptomatic data show benefit of early treatment
Pre-symptomatic: 2 or 3 copies of SMN2, <6 weeks of age at dosing
Rapid, age-appropriate improvement in motor function and milestone achievement:
  • 8.9-point increase from baseline in CHOP-INTEND one-month post-dosing
  • 4 patients could sit without support for ≥30 secs; 1 patient could stand with assistance for ≥22 secs
All patients alive, with no new safety signals relative to other Zolgensma® studies
Supports use of Zolgensma® as a key therapy in SMA identified through newborn screening

Rapid measurable gains in motor function, confirming START data
Type 1: <6 months of age at dosing
New interim data continued to show Zolgensma® has the potential to provide prolonged event-free survival, increases in motor function and significant milestone achievement:
  • 11 infants (50%) sitting at a mean of 6 months post-treatment, mean age of 11.9 months
  • 21/22 patients have achieved a CHOP-INTEND score ≥40
One death independently deemed unrelated
STR1VE continues to reinforce foundational role of Zolgensma® for SMA Type 1

Long-term follow-up
Long-term durability with no waning effect, reconfirms long-term value
Type 1: <6 months of age at dosing
No loss of milestones or waning of effect nearly four years post-dosing adds to evidence of long-term durability of Zolgensma®
All enrolled Cohort 2 patients (n=10) maintained motor function and milestone achievements
No patient experienced a worsening of nutritional or ventilatory requirements:
  • 2 of 4 patients who used BiPAP at the start of the LTFU period no longer require it regularly
No new treatment-related adverse events have emerged during the follow-up period

Open label, data as of March 8, 2019
2 copies: median 5.4 months of follow-up
3 copies: median 2.2 months of follow-up

Open label, data as of March 8, 2019
Mean (range) age at last follow-up: 3.9 (3.4–4.8) years
Mean (range) time since treatment: 3.7 (3.3–4.3) years

Open label, data as of March 8, 2019
Mean (range) age at last follow-up: 6.5 (6.0–6.9) years
Mean (range) time since treatment: 6.0 (5.5–6.5) years

Source: Novartis investor presentation on Zolgensma® at American Academy of Neurology Annual meeting 2019¹ The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xxx), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities

¹ The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xxx), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities
Data show potential impact of Zolgensma® in broad spectrum of SMA

☑ START, STR1VE, SPR1NT data indicate Zolgensma® provides rapid improvement in motor function and durable milestone achievement

☑ SPR1NT data shows early treatment could lead to near-normal development for pre-symptomatic patients

☑ START long term follow-up shows the long-term durability of Zolgensma® with no waning effect

☑ Expansive program with >150 patients treated & <5% of patients excluded due to elevated anti-AAV9 antibodies²

Zolgensma® potentially transformational therapy for SMA

See appendix for references
# Zolgensma®: on approval, ready to meet immediate launch demand independent of label scenario

<table>
<thead>
<tr>
<th>Institutional</th>
<th>Manufacturing</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ &gt;150 patients treated at 26 US sites</td>
<td>▪ Continuing to build supply</td>
<td>▪ Engaged with &gt;70 payers covering &gt;80% of the SMA infant population</td>
</tr>
<tr>
<td>▪ Delivery infrastructure validated for HUB, AAV9 testing and rapid product delivery</td>
<td>▪ Footprint growing with ~1 million square-feet of manufacturing space (See supplement)</td>
<td>▪ High interest in innovative contracts, expect 30% of commercial lives contracted within 30 days</td>
</tr>
</tbody>
</table>

The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xxxx), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities.
### Broad clinical program for potentially transformative spinal muscular atrophy therapy

<table>
<thead>
<tr>
<th>Delivery</th>
<th>SMA Type</th>
<th>2014-2017</th>
<th>Q1 2018</th>
<th>Q2 2018</th>
<th>Q3 2018</th>
<th>Q4 2018</th>
<th>2019</th>
<th>Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intravenous (IV)</td>
<td>Pre-symptomatic Type 1,2,3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2021</td>
</tr>
<tr>
<td></td>
<td>START</td>
<td>15 patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2033</td>
</tr>
<tr>
<td></td>
<td>STRIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2020</td>
</tr>
<tr>
<td></td>
<td>STRIVE-EU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2021</td>
</tr>
<tr>
<td></td>
<td>STRIVE-AP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TBC</td>
</tr>
</tbody>
</table>

**Intrathecal (IT)**

<table>
<thead>
<tr>
<th>Type 2</th>
<th>STRONG</th>
<th>Phase 1</th>
<th>31 / 51 patients; fully-enrolled in low-, mid-dose cohorts – data at AAN 2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1,2,3</td>
<td>REACH</td>
<td>Pending</td>
<td>TBC</td>
<td></td>
</tr>
</tbody>
</table>

---

Final design of REACH to be informed by STRONG; cutoff as of April 2019. The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xioi), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities.
Ongoing development program to address incident and prevalent populations across SMA types and regions

- SPR1NT studies pre-symptomatic population, in patients with 2 or 3 copies of SMN2
- START and STR1VE studies Type 1
- STRONG studies Type 2

### Incident population

<table>
<thead>
<tr>
<th>Region</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>270-3001</td>
<td>135-1501</td>
<td>45-501</td>
</tr>
<tr>
<td>Europe</td>
<td>330-3602</td>
<td>165-1802</td>
<td>55-602</td>
</tr>
<tr>
<td>Japan</td>
<td>24-303</td>
<td>12-153</td>
<td>4-53</td>
</tr>
</tbody>
</table>

### Prevalent population

<table>
<thead>
<tr>
<th>Region</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>1,260-1,400</td>
<td>4,590-5,100</td>
<td>3,150-3,500</td>
</tr>
<tr>
<td>Europe</td>
<td>1,540-1,680</td>
<td>5,610-6,120</td>
<td>3,850-4,200</td>
</tr>
<tr>
<td>Japan</td>
<td>112-140</td>
<td>408-510</td>
<td>280-350</td>
</tr>
</tbody>
</table>

1. Symphony claims data
3. Data on file
4. Spinal Muscular Atrophy: Introduction to SMA families: SMA Foundation
### Building depth across our core therapeutic areas

<table>
<thead>
<tr>
<th>ONCOLOGY</th>
<th>CML</th>
<th>Lung Cancer</th>
<th>Breast Cancer</th>
<th>Sickle Cell Anemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kymriah®</td>
<td>New indications</td>
<td>Entresto®</td>
<td>Cosentyx®</td>
<td>Lu-PSMA-617</td>
</tr>
<tr>
<td>Piqray® (BYL719)</td>
<td>Breast</td>
<td>LNP023</td>
<td>CFZ533</td>
<td>TQJ230</td>
</tr>
<tr>
<td>Crizanlimab (SEG101)</td>
<td>Sickle Cell</td>
<td>TQJ230</td>
<td>Tropifexor (LjN452)</td>
<td>LNP023</td>
</tr>
<tr>
<td>PDR001 combo</td>
<td>Metastatic Melanoma</td>
<td>Entresto®</td>
<td>LNP023</td>
<td>TQJ230</td>
</tr>
<tr>
<td>ABL001</td>
<td>CML</td>
<td>CML</td>
<td>mKap</td>
<td>CVRR</td>
</tr>
<tr>
<td>ACZ885</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
</tr>
<tr>
<td>Lu-PSMA-617</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHARMACEUTICALS</th>
<th>Cardio-Metabolic</th>
<th>IHD</th>
<th>Neuroscience</th>
<th>Ophthalmology</th>
<th>Respiratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entresto®</td>
<td>mKap</td>
<td>LNP023</td>
<td>CFZ533</td>
<td>TQJ230</td>
<td>Entresto®</td>
</tr>
<tr>
<td>Cosentyx®</td>
<td>mKap</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
</tr>
<tr>
<td>Zoelgensma®</td>
<td>SMA</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
</tr>
<tr>
<td>Brolucizumab (RTH258)</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
</tr>
<tr>
<td>Piqray®</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
</tr>
<tr>
<td>Ecf843</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
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</tr>
<tr>
<td>SAF312</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
<td>Lung Cancer</td>
</tr>
</tbody>
</table>

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country. See appendix for references.*
## Unmet needs

<table>
<thead>
<tr>
<th>Ocular Surface Diseases</th>
<th>An incipient, poorly understood epidemic with high unmet patient needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heterogeneity population with lack of consistent diagnosis and segmentation</td>
<td></td>
</tr>
<tr>
<td>Limited Rx therapies available, and diverse scientific hypotheses</td>
<td></td>
</tr>
<tr>
<td>Superior response rates, tolerability and onset of action are needed for better treatment outcomes</td>
<td></td>
</tr>
<tr>
<td>Widespread use of OTC therapies</td>
<td></td>
</tr>
<tr>
<td>Medical Experts expect an Ocular Surface Disease epidemic</td>
<td></td>
</tr>
</tbody>
</table>

## Ocular surface diseases strategy

<table>
<thead>
<tr>
<th>Disease</th>
<th>Treatment Approach</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammation induced Dry Eye Disease</td>
<td>Treat signs and symptoms by inhibiting the inflammatory cascade</td>
<td>Xiidra®¹ LFA-1 antagonist</td>
</tr>
<tr>
<td>Dry Eye Disease &amp; Primary Sjogren’s Syndrome</td>
<td>Next generation multi-modal biologic restoring ocular homeostasis</td>
<td>ECF843 rhLubricin</td>
</tr>
<tr>
<td>Ocular Surface Pain</td>
<td>Ocular pain</td>
<td>SAF312 TRPV1 antagonist</td>
</tr>
<tr>
<td>Meibomian Gland Dysfunction</td>
<td>Targeting underlying disease pathophysiology</td>
<td>Preclinical Asset</td>
</tr>
</tbody>
</table>

1. Announced acquisition of global rights; closing expected in 2H19, subject to customary closing conditions
**Xiidra® acquisition: Strong strategic fit and attractive economics**

<table>
<thead>
<tr>
<th>Strong strategic fit</th>
<th>with Novartis leading ophthalmic portfolio and pipeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear blockbuster potential</td>
<td>given high unmet medical need with strong product profile</td>
</tr>
<tr>
<td>Significant synergies</td>
<td>with Novartis front-of-the-eye commercial infrastructure</td>
</tr>
<tr>
<td>Good financial return profile</td>
<td>Strict financial discipline applied, expected to be profitable 2020 and margin accretive 2021; deal structure adds tax benefit</td>
</tr>
</tbody>
</table>

1. Announced acquisition of global rights; closing expected in 2H19, subject to customary closing conditions
2. Ex-US only
Novartis industry leadership and commercial infrastructure setup to continue Xiidra® success and maximize its potential

US Infrastructure
- 375 FF in-line products
- Market access expertise
- Field medical
- Retina team for anticipated RTH258 launch in Q4 2019¹

Novartis global ophthalmic 2018 sales²
- #1 in Anti-inflammatory
- #1 in Anti-allergy
- #1 in Anti-infective
- #2 in Glaucoma
- #2 in Retina (outside US)

1. Pending regulatory approval.  2. Rankings based on 2018 sales from IQVIA
Xiidra® uniquely positioned to treat both signs and symptom of dry eye disease

Dry eye disease underdiagnosed, undertreated\(^1\), increasing in incidence

First and only treatment approved for both signs and symptom of dry eye that targets inflammation

- Fast onset of action, 2 weeks to 3 months
- Tolerable safety profile

Well positioned as 2nd line therapy – vast majority of ophthalmologists want additional treatment options\(^1\)

US prescriptions expected to increase with increasing incidence and use of more effective therapies

See appendix for references
Brolucizumab (RTH258) achieved robust visual gains‡ and superior fluid resolution* – on track for 4Q19 US launch¹

HAWK & HARRIER outcomes on primary and key secondary end points²

<table>
<thead>
<tr>
<th>Visual acuity</th>
<th>▪ Non-inferior to aflibercept in BCVA change from baseline to Week 48‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomical outcomes</td>
<td>▪ Significantly fewer patients with IRF and/or SRF at Weeks 16 and 48*; difference maintained at Week 96†</td>
</tr>
<tr>
<td></td>
<td>▪ Superior reductions in CST at Weeks 16 and 48*; difference maintained at Week 96†</td>
</tr>
<tr>
<td></td>
<td>▪ Fewer patients with sub-RPE fluid at Weeks 16#, 48#, and 96†</td>
</tr>
<tr>
<td></td>
<td>▪ Significantly fewer patients with disease activity at Week 16*</td>
</tr>
<tr>
<td>q12w dosing</td>
<td>▪ &gt;50% of patients maintained on q12w interval after loading through Week 48</td>
</tr>
<tr>
<td></td>
<td>▪ Over 75% of those who completed Week 48 on a q12w interval were maintained on q12w interval until Week 96</td>
</tr>
</tbody>
</table>

- Global anti-VEGF market ~10bn USD in 2018, 70% of market nAMD³
- On track for launch Q4 2019 US¹, Q1 2020 Australia/Canada¹, Q2 2020 Europe/Japan¹
- DME submission expected Q2 2021
- Brandname Beovu™ has provisionally been approved by FDA for Brolucizumab⁴

See appendix for references
# Building depth across our core therapeutic areas

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<td><em>Entresto® HFrEp, post-MI</em></td>
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<td><em>Piqray® (BYL719) Breast</em></td>
<td><em>LNP023 Renal diseases</em></td>
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<tr>
<td>ACZ885 HFrEp</td>
<td>MOR106 AD</td>
</tr>
<tr>
<td><em>177Lu-PSMA-617 PSMA-HRP</em></td>
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</tr>
</tbody>
</table>

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country. See appendix for references.*
Fevipiprant (QAW039) showing asthma disease-modifying potential with Ph3 readouts on track end 2019

Potential for disease modification

![Bar chart showing % reduction in ASM mass](#)

- Fevipiprant: n=13
- Placebo: n=14
- Fevipiprant: -16.2% (p=0.034)

Airway smooth muscle mass reduction in asthma with Fevipiprant

Robust clinical program to realize full potential

<table>
<thead>
<tr>
<th>All five Ph3 enrolled</th>
<th>LUSTER 1 &amp; 2 (GINA 4/5)</th>
<th>exacerbation trial</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPIRIT</td>
<td>(GINA 3/4/5)</td>
<td>safety</td>
</tr>
<tr>
<td>ZEAL 1 &amp; 2</td>
<td>(GINA 3/4)</td>
<td>lung function FEV1</td>
</tr>
</tbody>
</table>

Ph2 data

- Reduced sputum eosinophils by 72%²³

Pre-clinical data

- Highly selective DP2
  - Superior potency
  - High selectivity
  - Clean safety profile

---

**Fevipiprant (QAW039) development: targeting biologic efficacy with oral simplicity**

<table>
<thead>
<tr>
<th></th>
<th>Exacerbation reduction</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fevipiprant</strong></td>
<td>30–50</td>
<td></td>
</tr>
<tr>
<td><strong>Targeted efficacy profile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Benralizumab</strong></td>
<td>28–51</td>
<td></td>
</tr>
<tr>
<td><strong>Mepolizumab</strong></td>
<td>42–53</td>
<td></td>
</tr>
<tr>
<td><strong>Reslizumab</strong></td>
<td>50–59</td>
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</tr>
<tr>
<td><strong>Dupilumab</strong></td>
<td>46–67</td>
<td></td>
</tr>
</tbody>
</table>

Exacerbation reduction % reduction over 52 weeks

See appendix for references
Fevipiprant (QAW039) has the potential to address significant treatment gap in patients with unresolved asthma

Moderate to Severe asthma patients
US patient numbers

GINA 3 (Moderate)  Inhaled therapies

3.4 million

Treatment gap in asthma

3 million

GINA 5 (Severe)  Biologics

120 000

Base case: High eos
LUSTER trials positive in high eos\(^1\)
(400K pts meet Luster entry criteria\(^2\))

1.5m patients

All comers
LUSTER all comers & ZEAL trials positive

3m patients

All comers with moderate patients
LUSTER all comers & ZEAL trials positive

4.4m patients

1. High eosinophils defined as ≥ 250 cells/µL
2. Moderate to Severe refers to patients on GINA step 4/5 therapies (i.e ICS/LABA ± LAMA). Sources: CDC: US claims data.
### Ready for first- and best-in-class launches

#### 2019 Pharma launch priorities in US

<table>
<thead>
<tr>
<th>Product</th>
<th>Details</th>
</tr>
</thead>
</table>
| Brolucizumab (RTH258) | - U.S. FDA filing accepted in April with use of Priority Review Voucher  
- Pending FDA approval, US launch anticipated in Q4 2019  
- Deep US Medical and Commercial team in place with extensive retina expertise |
| Zolgensma®¹   | - >150 patients treated at 26 US sites  
- Delivery infrastructure validated for HUB, AAV9 testing and rapid product delivery  
- Expect >60 top centers ready at launch, covering 80% of infants with SMA  
- Manufacturing footprint growing with ~1 million square-feet of manufacturing space (See supplement)  
- Engaged with >70 payers covering >80% of the SMA infant population  
- High interest in innovative contracts, expect 30% of commercial lives contracted within 30 days |
| Xiidra®       | - Strong US commercial presence of 375 field force associates promoting 7 in-line products  
- Decades of experience within Optometry and Ophthalmology, deep customer relationships and insights  
- Extensive commercial and market access expertise with payers  
- Proven ability to successfully manage brands in a genericized marketplace |

¹. The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xxxx), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities.
With recently launched products and rich pipeline, Novartis expects double-digit growth in China, capitalizing on faster and broader access

Novartis position in China is strong ...

... expected to expand significantly based on a rich pipeline

### Approvals
Novartis is one of the leading MNCs in NDA approvals

### Reimbursement
All in-line brands launched before 2017 are reimbursed

### Execution
Entresto® best ever primary care launch in China, even pre-reimbursement

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual / pursued approvals</th>
<th>NDRL actual / pursued listings</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>+6; incl. Entresto® HFrEF, Xolair® Asthma, Ultibro® COPD, Exelon® Patch AD, Galvus®5, Diovan® FCT</td>
<td>+8: Lucentis® wAMD; Galvus®, Exforge®, Co-Diovan®, Onbrez®, Lescol XL®, Simulect®, Patanol®</td>
</tr>
<tr>
<td>2018</td>
<td>+6; Lucentis® DME/RVO/PM, Vigamox®, Seebr® COPD</td>
<td>(Oncology only)</td>
</tr>
<tr>
<td>2019e</td>
<td>+3; Cosentyx® PsO³, Gilenya® MS</td>
<td>+6: Entresto®, Lucentis® RVO/DME/CNV, Vigamox®, Exelon® Patch, Ultibro®, Xolair®</td>
</tr>
<tr>
<td>2020e</td>
<td>+5; Cosentyx® AS, Mayzent® SPMS</td>
<td></td>
</tr>
<tr>
<td>2021e</td>
<td>+5; Entresto® HFpEF, Xolair® CIU/CSU, Fevipiprant® Asthma;</td>
<td>+3</td>
</tr>
<tr>
<td>2022e</td>
<td>+1; Entresto® Post-AMI</td>
<td>+5</td>
</tr>
<tr>
<td>2023e</td>
<td>+3; Brolucizumab (RTH258) wAMD/DME; Aimovig® CM/EM</td>
<td>+1</td>
</tr>
</tbody>
</table>


See appendix for references
Enhancing productivity, patient care and engagement through digital solutions – examples

**DRIVING PRODUCTIVITY**

ACTalya Personal Assistant

Unleashing the power of data and technology to give our reps real-time, streamlined, personalized data to make their **100 000 daily interactions** with HCPs more personalized, efficient and impactful

**PLAN OF SCALE & IMPACT:** Equip all Novartis sales reps with ACTalya worldwide

**TRANSFORMING ENGAGEMENT**

Patient Engagement Platform

Improving the patient experience from pre-diagnosis to post-Rx through transformative patient-centric solutions helping **address specific pain points along the patient journey**

**PLAN OF SCALE & IMPACT:** Form large-scale partnerships across all major markets

**IMPROVING PATIENT CARE**

Automated inhaler tracking

Improving Respiratory Care by **combining a sensor and app together with the Breezhaler device**, uniquely enabling confirmation of the inhalation and providing precise medication reminders & objective reports

**PLAN OF SCALE & IMPACT:** Partnership with Propeller Health to launch in major markets across the EU starting this year

*All Trademarks are property of their respective owners  ⭐ Solution live in at least 1 market*
Conclusion - Pharmaceuticals

- Continued strong momentum for Cosentyx® and Entresto®
- Ready to launch 5 blockbuster near-term candidates
- With recently launched products and rich pipeline, Novartis expects double-digit growth in China
Meet Novartis Management 2019
Oncology pipeline and in-market brands

May 23, 2019
## Index – select commercial and pipeline assets

### Anchor commercial assets

<table>
<thead>
<tr>
<th></th>
<th>SLIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key in-market blockbusters</td>
<td>8</td>
</tr>
<tr>
<td>Kisqali&lt;sup&gt;®&lt;/sup&gt;</td>
<td>9 – 10</td>
</tr>
<tr>
<td>Kymriah&lt;sup&gt;®&lt;/sup&gt;</td>
<td>20</td>
</tr>
<tr>
<td>Lutathera&lt;sup&gt;®&lt;/sup&gt;</td>
<td>15</td>
</tr>
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</table>

### Select pipeline assets

<table>
<thead>
<tr>
<th></th>
<th>SLIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>177Lu-PSMA-617</td>
<td>18</td>
</tr>
<tr>
<td>ABL001</td>
<td>12</td>
</tr>
<tr>
<td>Canakinumab (ACZ885)</td>
<td>25 – 26</td>
</tr>
<tr>
<td>Crizanlizumab (SEG101)</td>
<td>11</td>
</tr>
<tr>
<td>Piqray&lt;sup&gt;®1&lt;/sup&gt; (BYL719)</td>
<td>10</td>
</tr>
</tbody>
</table>

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1. The brand name Piqray<sup>®</sup> has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country.
**Building depth across our core therapeutic areas**

<table>
<thead>
<tr>
<th>ONCOLOGY</th>
<th>PHARMACEUTICALS</th>
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<tbody>
<tr>
<td>Select commercial assets</td>
<td></td>
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<tr>
<td>Kymriah®</td>
<td></td>
</tr>
<tr>
<td>New indications</td>
<td></td>
</tr>
<tr>
<td>Piqray® (BYL719)</td>
<td></td>
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<tr>
<td>Breast</td>
<td></td>
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<tr>
<td>Crizanlizumab (SEG101)</td>
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<tr>
<td>Sickle Cell</td>
<td></td>
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<tr>
<td>PDR001 combo combo</td>
<td></td>
</tr>
<tr>
<td>Metastatic Melanoma</td>
<td></td>
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<tr>
<td>ABL001</td>
<td></td>
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<tr>
<td>CML</td>
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<tr>
<td>ACZ885</td>
<td></td>
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<tr>
<td>Lung</td>
<td></td>
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<tr>
<td><strong>177Lu-PSMA-617</strong></td>
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<td><strong>177Lu-PSMA-617</strong></td>
<td></td>
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<tr>
<td><strong>177Lu-PSMA-617</strong></td>
<td></td>
</tr>
<tr>
<td>Select pipeline assets and opportunities</td>
<td></td>
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<tr>
<td>Entresto®</td>
<td></td>
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<tr>
<td>HRPEF, post-MI</td>
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<tr>
<td>LNP023</td>
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<tr>
<td>Renal diseases</td>
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<td>TQJ230</td>
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<td>CVRR</td>
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<td>Tropifexor (LJN452)</td>
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<tr>
<td>NASH</td>
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<tr>
<td>VAY785</td>
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<tr>
<td>NASH</td>
<td></td>
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<tr>
<td>LOU064</td>
<td></td>
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<td>CSU</td>
<td></td>
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<td>Ligelizumab (QGE031)</td>
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<tr>
<td>CSU</td>
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<td>ZPL389</td>
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<td><strong>177Lu-PSMA-617</strong></td>
<td></td>
</tr>
<tr>
<td><strong>177Lu-PSMA-617</strong></td>
<td></td>
</tr>
</tbody>
</table>

*The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country. See appendix for references*
Leading oncology business, driving growth in four distinct platforms

1. Novartis is one of the leading Oncology companies with growth opportunities in Targeted Therapy, Cell Therapy, Radioligand Therapy and Immunotherapy.

2. Rich portfolio with 7 in-market blockbusters and 3 recent launches with blockbuster potential and a strong, unique pipeline across our 4 platforms.

3. Promising pipeline, integrating the best from internal and external innovation, positions Novartis to continue to lead in Oncology with 4 potential blockbuster launches planned by 2021.
**2018 Oncology sales up +9% cc driven by recent launches\(^1\) and growth drivers\(^2\)**

**Net Sales Oncology BU**
USD billion, % cc

<table>
<thead>
<tr>
<th>Year</th>
<th>Recent Launches(^1)</th>
<th>Growth Drivers(^2)</th>
<th>Base Business(^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>12.8</td>
<td></td>
<td>85%</td>
</tr>
<tr>
<td>2017</td>
<td>12.3</td>
<td>21%</td>
<td>79%</td>
</tr>
<tr>
<td>2018</td>
<td>13.4</td>
<td>25%</td>
<td>72%</td>
</tr>
</tbody>
</table>

**Potential Future Growth**

- + Strong uptake of recent launches
- + Growth drivers deliver double-digit performance
- + Resource allocation/productivity to fuel strategic investment (i.e. launches, China)

- - Generic impact (Afinitor\(^\circledR\), Exjade\(^\circledR\), Glivec\(^\circledR\) and Sandostatin LAR\(^\circledR\))
- - Healthcare cost containment / pricing

---

1. Recent launches include Kisqali\(^\circledR\), Kymriah\(^\circledR\), Lutathera\(^\circledR\).
2. Growth drivers include Promacta\(^\circledR\)/Revolade\(^\circledR\), Jakavi\(^\circledR\) (marketed by Novartis ex-USA), Tafinlar\(^\circledR\)+ Mekinist\(^\circledR\).
Deep pipeline across four distinct platforms is expected to continue driving differentiation and growth.

**Targeted therapies (TT)**
- ABL001 in CML (3rd line & 1st line add-on)
- Piqray®, in PIK3CA mutated HR+HER2- advanced breast cancer, HER2+ advanced breast cancer, TNBC
- INC280 in NSCLC, single agent
- SEG101 in sickle cell disease

**Radioligand therapies (RLT)**
- 177Lu PSMA-617 in prostate cancer
- 177Lu PSMA-R2 in prostate cancer
- 177Lu NeoB in breast cancer, GIST, GBM, neuroblastoma, ovarian, head & neck, esophageal

**Cell & Gene**
- Kymriah®
  - r/r DLBCL in 1st relapse
  - r/r follicular lymphoma
  - combinations (pembro; ibrutinib) in r/r DLBCL
  - 1st line high risk pediatric and young adult ALL
  - Adult ALL
  - CLL
- Other targets: BCMA&CD19, CD22&CD19, CD123, EGFRv3

**Immunotherapies (IO)**
- ACZ885 in
  - adjuvant NSCLC
  - 1st line NSCLC
  - 2nd line NSCLC
- PDR001+Tafinlar®+Mekinist® in metastatic melanoma
- PDR001+LAG525+carboplatin in TNBC
- PDR001+INC280 in 2nd line NSCLC

Projects included are those with planned filings in US and/or EU. 1. All select pipeline assets are either investigational or being studied for (a) new use(s). Efficacy and safety have not been established. There is no guarantee that they will become commercially available for the use(s) under investigation. 2. The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country.
Deep pipeline across four distinct platforms is expected to continue driving differentiation and growth

Targeted therapies (TT)

Radioligand therapies (RLT)

Cell & Gene

Immunotherapies (IO)

Anchor commercial assets

Select pipeline assets¹ and opportunities

Targets included are those with planned filings in US and/or EU become commercially available for the use(s) under investigation

1. All select pipeline assets are either investigational or being studied for (a) new use(s). Efficacy and safety have not been established. There is no guarantee that they will become commercially available for the use(s) under investigation

2. The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country.
Key in-market Oncology blockbusters delivering high double-digit growth since 2017

**Net Sales**
USD million

<table>
<thead>
<tr>
<th>FY 2017</th>
<th>FY 2018</th>
<th>Q1 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5bn</td>
<td>3.3bn</td>
<td>3.3bn</td>
</tr>
</tbody>
</table>

- **Tafinlar® + Mekinist®** (grew +18% cc in Q1 2019 vs. PY)
  - 28k BRAF+ melanoma and NSCLC patients p.a. in G7
  - Standard of care in BRAF+ targeted therapy
  - Launch of lung and adjuvant melanoma progressing well
  - Ph3 triplet with PDR001 study in 1L BRAF+ metastatic melanoma read out expected H2 2019

- **Promacta®/Revolade®** (grew +24% cc in Q1 2019 vs. PY)
  - 86k eligible ITP patients p.a. in G7
  - Market leader in TPO-RA class and gaining share outside of the class in ITP
  - Launched 1L SAA in US
  - Implemented unique analytical tool, DROID², to optimize marketing mix

- **Jakavi®** (grew +20% cc in Q1 2019 vs. PY)
  - 37k MF and PV patients treated with Jakavi ex-US
  - Standard of care in 1L MF and in 2L PV in most countries, where launched
  - Ph3 studies in acute and chronic GVHD results expected in H2 2019 12,5k new GVHD cases per year in G6³

---
1. Jakavi is a registered trademark of Novartis AG in countries outside the United States. Jakafi is a registered trademark of Incyte Corporation.
2. DROID is an acronym that stands for data repository for optimization, insights and decision-making.
3. UK, France, Germany, Italy, Spain and Japan.
Kisqali® gaining share in front line

Net sales
USDm

<table>
<thead>
<tr>
<th></th>
<th>Q2'18</th>
<th>Q3'18</th>
<th>Q4'18</th>
<th>Q1'19</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>72</td>
<td>60</td>
<td>91</td>
<td></td>
</tr>
</tbody>
</table>

LTM¹ Q1 2019 net sales: USD 283m

- **CDK 4/6 with largest body of first line evidence** regardless of combination partner or menopausal status while maintaining patients’ quality of life

- **Overall survival results from MONALEESA-7** with Kisqali® (ribociclib)* plus endocrine therapy in premenopausal women with HR+/HER2- advanced breast cancer, to be presented at ASCO

---

1. Last twelve months
2. Reimbursement agreements in Europe had a temporary impact on Q4 growth in the region

Kisqali® was developed by the Novartis Institutes for BioMedical Research (NIBR) under a research collaboration with Astex Pharmaceuticals.
Next pioneering medicine, Piqray®* (BYL719), expected to be the first and only therapy for aBC patients with PIK3CA mutation

PI3K: Central oncogenic pathway deregulated in cancer

- ~40% of HR+/HER2- breast cancer patients have a PIK3CA mutation, associated with poor prognosis\(^1,2\)
- Nearly doubled median PFS in SOLAR-1 study\(^3\)
- Ready to launch with FDA-approved companion diagnostic
- Initiating pivotal clinical trials in HER2+ aBC and TNBC; planning additional studies across PIK3CA-mutation driven cancers

\(^*\)The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country

SEG101 (crizanlizumab) increased proportion of patients free from VOC and delayed these crises

Proportion of patients free from VOC for the study period

<table>
<thead>
<tr>
<th></th>
<th>Placebo</th>
<th>Crizanlizumab 5 mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion</td>
<td>16.9%</td>
<td>35.8%</td>
</tr>
<tr>
<td>Difference</td>
<td>&gt; 2x</td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>0.013</td>
<td></td>
</tr>
</tbody>
</table>

VOCs are associated with increased morbidity / mortality, can result in stroke, as well as organ damage or failure.

Median for crizanlizumab 5 mg/kg vs. placebo
4.07 vs 1.38 months

References:
1. VOC that led to healthcare visit; p < 0.001 (log rank p-value); HR (95%CI) = 0.50 (0.33, 0.74); Kutlar et al, Am J Hematol. 2018 Oct 8. doi: 10.1002/ajh.25308.
ABL001: Potential game changer to address unmet needs in CML with a unique mechanism of action

- 50-70% of patients do not achieve MR4.5 by 5 years with existing treatments\(^1,2\)
- ABL001 is a first-in-class, potent and selective allosteric BCR-ABL inhibitor, which has a complementary mode of action with TKIs
- A potential game changer in CML which may bring more patients into deeper response faster, enabling the opportunity for TFR
- Expect to file in 3L by 2021 and in 1st line add-on in 2024

---

Preparing for potential first- and best-in-class launches; select launch examples in US

| Piqray®¹ (BYL719)  | Anticipated to be launched with FDA approved companion diagnostic for PIK3CA testing (Qiagen)  
|                    | Entered into agreement with Foundation Medicine to develop plasma and tissue test  
|                    | Engaged with payers covering over 80% of the target population in the US  |

| SEG101 (crizanlizumab)  | Breakthrough therapy designation granted by FDA in December 2018 for the prevention of vaso-occlusive crisis in sickle cell disease  
|                      | Filing on track to be completed by 1H 2019  
|                      | Engagements with payers and legislators ongoing  
|                      | Expected to launch in H1 2020  |

| INC280 (capmatinib)²  | Achieved Breakthrough Therapy Designation from FDA  
|                      | Developing NGS-based CDx for submission using tumor tissue, with plasma-based “liquid biopsy” version to follow  
|                      | Expected to launch in H2 2020  |

RTR = Real-Time Review  
1. The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country  
2. Capmatinib (INC280) licensed to Novartis by Incyte Corporation
Deep pipeline across four distinct platforms is expected to continue driving differentiation and growth

- **Targeted therapies (TT)**
- **Radioligand therapies (RLT)**
- **Cell & Gene**
- **Immunotherapies (IO)**

### Anchor commercial assets

- ABL001 in CML (3rd line & 1st line add-on)
- Piqray® in PIK3CA mutated HR+/HER2- advanced breast cancer, HER2+ advanced breast cancer, TNBC
- INC280 in NSCLC, single agent
- SEG101 in sickle cell disease

### Select pipeline assets¹ and opportunities

- Kymriah® in
  - r/r DLBCL in 1st relapse
  - r/r follicular lymphoma
  - combinations (pembro; ibrutinib) in r/r DLBCL
  - 1st line high risk pediatric and young adult ALL
  - Adult ALL
  - CLL
- Other targets: BCMA&CD19, CD22&CD19, CD123, EGFRv3

- ACZ885 in
  - adjuvant NSCLC
  - 1st line NSCLC
  - 2nd line NSCLC
- PDR001+Tafinlar®+Mekinist® in metastatic melanoma
- PDR001+LAG525+carboplatin in TNBC
- PDR001+INC280 in 2nd line NSCLC

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2. The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country.

Projects included are those with planned filings in US and/or EU. Become commercially available for the use(s) under investigation in any country.
Successful launch of Lutathera® demonstrates high potential of targeted radioligand therapies (RLT)

Lutathera® is an innovative RLT

- RLT involves the systemic administration of a radiopharmaceutical to deliver cytotoxic radiation to a tumor
- The peptide is designed to target somatostatin receptors with high binding affinity

Lutathera® strong uptake continues

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Net sales USD million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2’18</td>
<td>24</td>
</tr>
<tr>
<td>Q3’18</td>
<td>56</td>
</tr>
<tr>
<td>Q4’18</td>
<td>81</td>
</tr>
<tr>
<td>Q1’19</td>
<td>106</td>
</tr>
</tbody>
</table>

- Over 2,000 NET patients treated in the US since Jan 2018 launch
- Broad US payer coverage with over 85% of lives covered
- Positive momentum in EU launch w/ several favorable reimbursement decisions expected this year
- Expected to reach blockbuster status

1. Last twelve months
Novartis building leadership in RLT with highly-complex, scaled, on-demand manufacturing capability

Order to Lu-177 supplier (1 week prior to shipment to factory)

Irradiation of target (Lu-176) at Reactor to Lu-177 (6 days)

Lu-177 shipment (1 day)

Receive Lu-177 at factory (1 day; or over weekend)

Lutathera production and shipment (Production 1-5 days after receipt)

Time of injection (48 hours after end of production)

Calibration time

2 weeks
RLT platform with growing pipeline in solid tumors

Endocyte further establishes leadership position

- **Expands Novartis RLT platform**
  - $^{177}$Lu-PSMA-617 potentially first-in-class PSMA radioligand therapy in mCRPC
  - Opportunity to further develop $^{177}$Lu-PSMA-617 to enter earlier lines of therapy

- **Ph3 VISION trial enrollment ongoing for $^{177}$Lu-PSMA-617 in mCRPC**
  - Expected read-out and filing in 2020

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<table>
<thead>
<tr>
<th>Product</th>
<th>Disease (target)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>$^{177}$Lu PSMA 617</td>
<td>Prostate cancer (PSMA)</td>
<td>Therapeutic Phase III VISION study initiated 2Q 2018</td>
</tr>
<tr>
<td>$^{177}$Lu PSMA-R2</td>
<td></td>
<td>Therapeutic Phase III study initiated 2Q 2018</td>
</tr>
<tr>
<td>$^{68}$Ga PSMA-R2</td>
<td></td>
<td>PET Diag. Phase II study initiated 2Q 2018</td>
</tr>
<tr>
<td>$^{18}$F CIT1057</td>
<td></td>
<td>PET Diagnostic Ph I study completed</td>
</tr>
<tr>
<td>$^{177}$Lu NeoB</td>
<td>Breast cancer (GIST GBM Neuroblastoma Ovarian Head &amp; Neck Oesophageal (GRPR))</td>
<td>Therapeutic Phase I study to open 1H 2019</td>
</tr>
<tr>
<td>$^{68}$Ga NeoB</td>
<td></td>
<td>PET Diagnostic Phase II study initiated 2Q 2018</td>
</tr>
<tr>
<td>$^{177}$Lu FF-10158</td>
<td>Glioblastoma (Integrin Alphavbeta 3/5)</td>
<td>Therapeutic Preclinical</td>
</tr>
<tr>
<td>$^{68}$Ga FF-10158</td>
<td></td>
<td>PET Diag. Preclinical</td>
</tr>
</tbody>
</table>
**177Lu-PSMA-617 has strong Ph2 data in mCRPC**

PSA response % (N=50)

- <30%: 13/50 (26%)
- ≥30%: 37/50 (74%)
- ≥50%: 32/50 (64%)

### Treatment emergent adverse events attributable to 177Lu-PSMA-617

<table>
<thead>
<tr>
<th>Event</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry mouth</td>
<td>29 (58%)</td>
<td>4 (8%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Lymphocytopenia</td>
<td>7 (14%)</td>
<td>13 (26%)</td>
<td>16 (32%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>13 (26%)</td>
<td>3 (6%)</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Fatigue</td>
<td>10 (20%)</td>
<td>3 (6%)</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Anaemia</td>
<td>1 (2%)</td>
<td>4 (8%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>6 (12%)</td>
<td>6 (12%)</td>
<td>3 (6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Bone Pain</td>
<td>1 (2%)</td>
<td>4 (8%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>12 (24%)</td>
<td>2 (4%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Anorexia</td>
<td>8 (16%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Dry eyes</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Renal injury</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Weight loss</td>
<td>3 (6%)</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

### PSA PFS

- 50 patients

<table>
<thead>
<tr>
<th>PSA response %</th>
<th>Survival probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50%</td>
<td>PSA ≥ 50%: 8.3 months</td>
</tr>
<tr>
<td>≥50%</td>
<td>PSA &lt;50%: 4.2 months</td>
</tr>
</tbody>
</table>

Median 6.9 months

### Overall Survival

- 50 patients

<table>
<thead>
<tr>
<th>PSA response %</th>
<th>Survival probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50%</td>
<td>PSA ≥ 50%: 18.0 months</td>
</tr>
<tr>
<td>≥50%</td>
<td>PSA &lt;50%: 8.7 months</td>
</tr>
</tbody>
</table>

Median 13.3 months

---


2. 177Lu-PSMA-617 is an investigational drug not approved for use - study protocol is not designed to confirm efficacy or safety.
Deep pipeline across four distinct platforms is expected to continue driving differentiation and growth

Targeted therapies (TT)
- ABL001 in CML (3rd line & 1st line add-on)
- Piqray® in PIK3CA mutated HR+/HER2- advanced breast cancer, HER2+ advanced breast cancer, TNBC
- INC280 in NSCLC, single agent
- SEG101 in sickle cell disease

Radioligand therapies (RLT)
- 177Lu PSMA-617 in prostate cancer
- 177Lu PSMA-R2 in prostate cancer
- 177Lu NeoB in breast cancer, GIST, GBM, neuroblastoma, ovarian, head & neck, esophageal

Cell & Gene
- Kymriah® in
  - n DLBCL in 1st relapse
  - n follicular lymphoma
  - combinations (pembro; ibrutinib) in n DLBCL
  - 1st line high risk pediatric and young adult ALL
  - Adult ALL
  - CLL
- Other targets: BCMA&CD19, CD22&CD19, CD123, EGFRv3

Immunotherapies (IO)
- ACZ885 in
  - adjuvant NSCLC
  - 1st line NSCLC
  - 2nd line NSCLC
- PDR001+Tafinlar®+Mekinist® in metastatic melanoma
- PDR001+LAG525+carboplatin in TNBC
- PDR001+INC280 in 2nd line NSCLC

Projects included are those with planned filings in US and/or EU
1. All select pipeline assets are either investigational or being studied for (a) new use(s). Efficacy and safety have not been established. There is no guarantee that they will become commercially available for the use(s) under investigation
2. The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country
Progressing with capacity expansion and reimbursement to deliver Kymriah® to every patient in need

Global capacity expansion

- Completed CellforCure acquisition
- Wider commercial specifications are approved in EU, Switzerland, Australia, Japan, Canada
- Cleared by the FDA to further increase Morris Plains capacity

Global reimbursement expansion

- North America
- Europe
- Asia
- Oceania

- At least 1 indication reimbursed
- Approved / engaged with payers
- Manufacturing collaboration

- LTM¹ Q1 2019 net sales: USD 109 m
- Treated over 900 patients worldwide²
- Reimbursed at least with 1 indication in 16 countries

1. Last twelve months.  2. Includes patients treated with Kymriah® in both clinical trial and commercial settings.
Pipeline of 10 clinical programs and 4 FIH, with large pre-clinical effort

<table>
<thead>
<tr>
<th>CAR-T type</th>
<th>Indication</th>
<th>Phase 1</th>
<th>Phase 2/Pivotal</th>
<th>Phase 3</th>
<th>Submitted</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD19 CAR-T</td>
<td>Pediatric &amp; young adult r/r ALL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>US, EU</td>
</tr>
<tr>
<td>CD19 CAR-T</td>
<td>r/r DLBCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>US, EU</td>
</tr>
<tr>
<td>CD19 CAR-T</td>
<td>DLBCL in 1st relapse</td>
<td></td>
<td></td>
<td></td>
<td>Started 2019</td>
<td></td>
</tr>
<tr>
<td>CD19 CAR-T</td>
<td>r/r FL</td>
<td></td>
<td>Started 2018</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD19 CAR-T</td>
<td>r/r DLBCL in combination with pembrolizumab</td>
<td>Started 2018</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD19 CAR-T</td>
<td>Adult r/r ALL</td>
<td></td>
<td></td>
<td></td>
<td>Starting 2019</td>
<td></td>
</tr>
<tr>
<td>CD19 CAR-T</td>
<td>r/r CLL combination with ibrutinib</td>
<td></td>
<td></td>
<td></td>
<td>Starting 2019</td>
<td></td>
</tr>
<tr>
<td>CD19 CAR-T</td>
<td>Pediatric NHL</td>
<td></td>
<td></td>
<td></td>
<td>Started 2018</td>
<td></td>
</tr>
<tr>
<td>CD19 CAR-T</td>
<td>1st line high risk pediatric and young adult ALL</td>
<td></td>
<td></td>
<td></td>
<td>Starting 2019</td>
<td></td>
</tr>
<tr>
<td>CD19 CAR-T</td>
<td>r/r DLBCL combo with ibrutinib</td>
<td></td>
<td></td>
<td></td>
<td>Starting 2019</td>
<td></td>
</tr>
<tr>
<td>Other targets (UPenn partner)</td>
<td>BCMA&amp;CD19, CD22&amp;CD19, CD123, EGFRv3</td>
<td>Started 2018</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Advances in novel CAR-Ts as monotherapies and combination strategies in collaboration with UPenn

**aCD123 CAR-T for AML**
- JEZ567: lentivirally transduced T cells expressing anti-CD123 chimeric antigen receptors in r/r adult AML
- Opened Dec 2018, 2 patients treated and no safety issues

**CAR-T aCD22 + CAR-T aCD19 combo for ALL**
- JJO686 + LXG250 in r/r adult and ped ALL to prevent resistance
- Opened Oct 2018, 6 patients treated with aCD22 monotherapy and no safety issues
- Clinical activity to be presented at upcoming meeting

**CAR-T aBCMA + CAR-T aCD19 combo for MM**
- MCM998 + LXG250 in MM, opened June 2018
- Phase A – r/r MM responding to last line of therapy – 6 patients treated, no new safety signals
- Phase B – randomized, upfront MM – 2 patients treated
Deep pipeline across four distinct platforms is expected to continue driving differentiation and growth

<table>
<thead>
<tr>
<th>Targeted therapies (TT)</th>
<th>Radioligand therapies (RLT)</th>
<th>Cell &amp; Gene</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anchor commercial assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABL001 in CML (3rd line &amp; 1st line add-on)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piqray®, in PIK3CA mutated HR+/HER2- advanced breast cancer, HER2+ advanced breast cancer, TNBC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INC280 in NSCLC, single agent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEG101 in sickle cell disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Select pipeline assets¹ and opportunities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>177Lu PSMA-617 in prostate cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>177Lu PSMA-R2 in prostate cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kymriah® in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– r/r DLBCL in 1st relapse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– r/r follicular lymphoma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– combinations (pembro; ibrutinib) in r/r DLBCL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– 1st line high risk pediatric and young adult ALL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Adult ALL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– CLL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other targets: BCMA&amp;CD19, CD22&amp;CD19, CD123, EGFRv3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Projects included are those with planned filings in US and/or EU become commercially available for the use(s) under investigation in any country

¹. All select pipeline assets are either investigational or being studied for (a) new use(s). Efficacy and safety have not been established. There is no guarantee that they will become commercially available for the use(s) under investigation. ². The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country.

1. ACZ885 in
   - adjuvant NSCLC
   - 1st line NSCLC
   - 2nd line NSCLC
2. PDR001+Tafinlar®+Mekinist® in metastatic melanoma
3. PDR001+LAG525+carboplatin in TNBC
4. PDR001+INC280 in 2nd line NSCLC
Novartis is taking a rigorous approach to IO assets for development, setting a high bar for advancement

- Taking a rigorous approach to prioritizing assets for development
- Looking for single agent activity, or synergetic combinations with appropriate control arms

<table>
<thead>
<tr>
<th>Asset</th>
<th>Indication</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDR001+Tafinlar®+Mekinist®</td>
<td>Melanoma</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>ACZ885</td>
<td>NSCLC, 1st line</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>ACZ885</td>
<td>NSCLC, 2nd line</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>ACZ885</td>
<td>NSCLC, adjuvant</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Lutathera® + nivolumab</td>
<td>SCLC</td>
<td></td>
<td>Started in 2017</td>
<td></td>
</tr>
<tr>
<td>PDR001+LAG525+carboplatin</td>
<td>TNBC</td>
<td></td>
<td>Started in 2018</td>
<td></td>
</tr>
<tr>
<td>PDR001+INC280</td>
<td>2nd line NSCLC</td>
<td></td>
<td>Started in 2018</td>
<td></td>
</tr>
<tr>
<td>Kymriah® + pembrolizumab</td>
<td>r/r DLBCL</td>
<td></td>
<td>Started in 2018</td>
<td></td>
</tr>
</tbody>
</table>
ACZ885 (canakinumab) reduced lung cancer incidence and mortality based upon exploratory analysis in CANTOS

Lung cancer incidence

Dose-dependent effect, 67% relative risk reduction (canakinumab 300mg)

- In agreement with FDA in 2010, incident cancers were adjudicated by a blinded independent committee of Oncologists
- Data on incident cancers including cancer deaths were collected as (serious) adverse events and analyzed in a prospective fashion

Development programs for three Ph3 trials (CANOPY) of canakinumab in NSCLC on track

<table>
<thead>
<tr>
<th>Indication</th>
<th>Ph3 trial name and code</th>
<th>Patient population</th>
<th>Trial design</th>
<th>Planned filing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjuvant NSCLC</td>
<td>CANOPY-A NCT03447769</td>
<td>High-Risk Stage II-III</td>
<td>Canakinumab vs. placebo (N=1500 with 1:1 randomization) after post-resection chemotherapy</td>
<td>2022</td>
</tr>
<tr>
<td>1(^{st}) line mNSCLC</td>
<td>CANOPY-1 NCT03631199</td>
<td>No prior therapy Stage IIIb or IV, Squamous or Non-Squamous, No EGFR, ALK alterations</td>
<td>Platinum doublet chemotherapy and pembrolizumab with or without canakinumab (N=627 with 1:1 randomization)</td>
<td>2021</td>
</tr>
<tr>
<td>2(^{nd}) line mNSCLC</td>
<td>CANOPY-2 NCT03626545</td>
<td>Stage IIIb or IV, previously treated with platinum-based doublet chemotherapy and PD-(L)1 inhibitor, No EGFR, ALK alterations</td>
<td>Docetaxel with or without canakinumab (N=226 with 1:1 randomization)</td>
<td>2021</td>
</tr>
</tbody>
</table>
Uniquely positioned to create new standards of care through novel immuno-therapy and combinations

<table>
<thead>
<tr>
<th>Novel Immuno-therapy (IO)</th>
<th>Novel Combinations*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solo or combo</strong></td>
<td><strong>IO/IO</strong></td>
</tr>
<tr>
<td>TGFβ (NIS793) +/- PD1</td>
<td>CD73 + Adenosine R (NIR178) +/- PD-1 in multiple solid tumors</td>
</tr>
<tr>
<td>Adenosine R (NIR178) +/- PD1</td>
<td>PDR001 + TGFβ Multiple Solid Tumors</td>
</tr>
<tr>
<td>CD73 (NZV930) +/- PD1</td>
<td></td>
</tr>
<tr>
<td>Het IL-15 (NIZ985) +/- PD1</td>
<td></td>
</tr>
<tr>
<td>TLR7 ISAC (NJu395) +/- PD1</td>
<td></td>
</tr>
<tr>
<td>TLR7 (LHC165) +/- PD1</td>
<td></td>
</tr>
<tr>
<td>LAG3 (LAC525) +/- PD1</td>
<td></td>
</tr>
<tr>
<td>Degrader (DKY709) +/- PD1</td>
<td></td>
</tr>
<tr>
<td>TIM3 (MBG453) +/- PD1</td>
<td></td>
</tr>
<tr>
<td>TIM3 (MBG453) + HMA +/- PD1</td>
<td></td>
</tr>
<tr>
<td>STING (MIW815)¹ +/- PD1 or CTLA4</td>
<td></td>
</tr>
<tr>
<td>CSF-1 (MCS110) +/- PD1</td>
<td></td>
</tr>
<tr>
<td>CSF-1R (BLZ945) +/- PD1</td>
<td></td>
</tr>
<tr>
<td><strong>Solo</strong></td>
<td><strong>CAR-T/IO</strong></td>
</tr>
<tr>
<td>PD1 (PDR001)</td>
<td>CAR-T EGFRviii + pembrolizumab in Glioblastoma</td>
</tr>
<tr>
<td>CD123 x CD3 (SQZ622)²</td>
<td>Kymriah® + pembrolizumab in DLBCL</td>
</tr>
<tr>
<td>GITR (GWN323)</td>
<td></td>
</tr>
<tr>
<td><strong>Solo</strong></td>
<td><strong>TT/IO</strong></td>
</tr>
<tr>
<td>PD1 (PDR001)</td>
<td>Tafinlar® + Mekinist® + PDR001 in Melanoma</td>
</tr>
<tr>
<td>CD123 x CD3 (SQZ622)²</td>
<td>MET (INC280) + PDR001 in Lung Cancer</td>
</tr>
<tr>
<td>GITR (GWN323)</td>
<td>SHP2 (TNO155) + PDR001 in Lung Cancer</td>
</tr>
<tr>
<td><strong>Solo</strong></td>
<td><strong>RLT/IO</strong></td>
</tr>
<tr>
<td>PD1 (PDR001)</td>
<td>Lutathera® + PD1 in Neuroendocrine Tumors</td>
</tr>
<tr>
<td>CD123 x CD3 (SQZ622)²</td>
<td>PSMA-617 + PD1 in mCRPC³</td>
</tr>
<tr>
<td>GITR (GWN323)</td>
<td></td>
</tr>
</tbody>
</table>

Novartis Oncology leveraging data and digital to enable customer engagement

DROID\textsuperscript{1} initiative is creating a platform to integrate high-quality data and provide actionable insights

Single “data lake” repository that will incorporate 90+ external and internal high-quality data sources

Faster, reliable assessment of 120 KPIs & complex algorithms to **translate data into predictive insights**

User-centric visualization to more rapidly identify actionable opportunities and solutions; all oncology brands are included

---

\textsuperscript{1} DROID is an acronym that stands for data repository for optimization, insights and decision-making
Conclusion - Oncology

Unique position across 4 platforms with expertise in innovating within and across the platforms

Growing our current and future in-market blockbusters and focused on success of new launches

Robust pipeline across diverse platforms to create innovative medicines, alone and in combination, to treat cancer
Meet Novartis Management Research overview

May 23, 2019
Leading center of therapeutics discovery research with proven record of delivering innovative therapies

1. Deep pipeline of ~90 new molecular entities prioritized and optimized for transformative potential and resourced for competitive advantage

2. Advanced therapy platforms and technologies, including targeted protein degradation, cell & gene therapy and expansive chemical libraries

3. Focused research strategy leveraging internal and external innovation, fueled also by strategic out-licensing to capture ROI and enable patient access
<table>
<thead>
<tr>
<th>NIBR</th>
<th>Scientists</th>
<th>Discovery programs</th>
<th>Disease areas</th>
<th>New molecular entities</th>
<th>USD 2.6bn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6,000</td>
<td>340</td>
<td>8</td>
<td>~90</td>
<td>Research &amp; early development</td>
</tr>
</tbody>
</table>
Portfolio perspective

Strategic disease area leadership

Focused commitment in our disease areas

Disciplined project selection

Critically evaluated against expanded set of parameters

Best at first-in-class

With emphasis on pursuing transformative innovation

Ruthless prioritization

And commitment to making decisions that enable focused resourcing

ONC/O - Oncology/Immuno-Oncology; OPH - Ophthalmology; RESP - Respiratory; NEURO - Neuroscience; ATI - Autoimmunity, Transplantation, and Inflammation; CVM - Cardiovascular Metabolic; NITD - Novartis Institutes for Tropical Diseases; MSD - Musculoskeletal Diseases; FIC - First-in-Class; BIC - Best-in-Class; ID - Infectious Diseases
A productive internal therapeutics engine

1. Kymriah® and Gilenya® were in-licensed into NIBR pre-PoC
NIBR vital to delivering a promising pipeline through origination, execution and evaluation of external opportunities

<table>
<thead>
<tr>
<th>Oncology</th>
<th>Cardio-Metabolic</th>
<th>Neuroscience</th>
<th>IHD</th>
<th>Respiratory</th>
<th>Ophthalmology</th>
<th>Global Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kymriah®</td>
<td>LNP023</td>
<td>Gilenya®</td>
<td>Cosentyx®</td>
<td>Fevipilprant (QAW039)</td>
<td>Brolucizumab (RTH258)</td>
<td>KAF156 Malaria</td>
</tr>
<tr>
<td>New indications</td>
<td>Renal disease</td>
<td>MS</td>
<td>InAxSpA</td>
<td>Asthma</td>
<td>AMD</td>
<td></td>
</tr>
<tr>
<td>Piqray® (BYL719)</td>
<td>Breast cancer</td>
<td>Entresto®</td>
<td>Mayzent®</td>
<td>Tropifexor</td>
<td>Lucentis®</td>
<td>KAE609 Malaria</td>
</tr>
<tr>
<td>ACZ885, Capmatinib (INC280)</td>
<td>Lung</td>
<td>TOJ230</td>
<td>LMA070</td>
<td>Ligilizumab</td>
<td>Luxturna®</td>
<td>Crizanlizumab (SEG101)</td>
</tr>
<tr>
<td>PDR001 Combo</td>
<td>Melanoma</td>
<td>MDA</td>
<td>SMA</td>
<td>OSU / CIU</td>
<td>OSU</td>
<td>Sickle cell disease</td>
</tr>
<tr>
<td>Lu-Pu-PSMA-617</td>
<td>mCRPC</td>
<td>CNPS20</td>
<td>Alzheimer’s</td>
<td>CFZ333</td>
<td>Transplant / SJögren’s</td>
<td>Sickle cell disease</td>
</tr>
<tr>
<td>VPM087</td>
<td>CRC / RCC</td>
<td>Aimovig®</td>
<td>Migraine</td>
<td>VAY736</td>
<td>Multiple diseases</td>
<td>Sickle cell disease</td>
</tr>
<tr>
<td>Lutathera®</td>
<td>NET</td>
<td>Zolgensma®</td>
<td>SMA</td>
<td>VAY785</td>
<td>NASH</td>
<td>Sickle cell disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ofatumumab (OMB157)</td>
<td>Relapsing MS</td>
<td>ZPL389</td>
<td>Atopic dermatitis</td>
<td>Sickle cell disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MOR106</td>
<td>Atopic dermatitis</td>
<td>Sickle cell disease</td>
</tr>
</tbody>
</table>

1. Aimovig® is developed in collaboration with Amgen. 2. The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xioi), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities. 3. Announced acquisition of global rights; closing expected in 2H19, subject to customary closing conditions. 4. Luxturna® marketed ex-US. 5. Per license agreement, EirGenix Inc. is responsible for development and manufacturing; Sandoz has rights to commercialize in all markets except China and Taiwan. 6. Per license agreement, Gan&Lee is responsible for development and manufacturing; Sandoz has rights to commercialize in EU, US, Switzerland, Japan, South Korea, Canada, Australia and New Zealand 7. The brand name Piqray® has been provisionally approved by the FDA for the investigational product alpelisib (BYL719), but the product itself has not been approved for sale in any country.
Technology platforms accelerating drug discovery

CAR-T
- Cancer cell
- T-cell

CRISPR
- DNA Encoding Libraries

AAV
- Targeted Protein Degradation

Covalent Binders
- Radiopharmaceuticals

mRNA
- Novel IO Rx Delivery

All trademarks are the property of their respective owners.
Novartis cell & gene therapy

**AAV¹**
Zolgensma®
Spinal muscular atrophy

**CAR-T²**
CD22 CAR-T (JJO686) in Ph1 studies in combination with CD19 CAR-T (LXG250) to prevent resistance

**CRISPR³**
Increase in F-cell number and HbF expression upon editing of SCD patient PB derived CD34+ cells

Probability of event-free survival

CD19- relapse patient

HbF+ Cell


Meet Novartis Management | May 23, 2019 | Novartis Investor Presentation
Establishing leadership in AAV gene therapy

The inflammasome

The NLRP3 (nucleotide-binding domain, leucine-rich repeat-containing receptor pyrin domain containing 3) pathway plays a critical role in the body’s innate immune system, serving as a danger sensor. When activated, NLRP3 triggers an inflammatory response via the assembly of a multi-protein complex called the inflammasome.

**IL-1β Inhibition as cancer therapy**
Dose dependent risk reduction with canakinumab in fatal lung cancer incidence of up to 77%

**Cumulative incidence fatal lung cancer**

![Graph showing cumulative incidence fatal lung cancer](image)

**Hypothesis**: Inhibition of IL-1β blocks the tumor-promoting effects of myeloid cells in the tumor microenvironment, inhibiting cancer cell growth and metastasis, and promoting a protective immune response augmented by PD-1 inhibition.

**Novartis Inflammasome pipeline**

<table>
<thead>
<tr>
<th>Description</th>
<th>Status</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canakinumab; Anti-IL-1β ACZ885</td>
<td>Ph3</td>
<td>Excl. marketed indications: Lung cancer, Bechet</td>
</tr>
<tr>
<td>Gevokizumab; Anti-IL-1β VPM087</td>
<td>Ph2</td>
<td>Colorectal, gastroesophageal, renal cell cancers</td>
</tr>
<tr>
<td>Anti-IL-18</td>
<td>Ph1</td>
<td>TBD</td>
</tr>
<tr>
<td>IFM2427 NLRP3</td>
<td>Ph1</td>
<td>TBD</td>
</tr>
<tr>
<td>NLRP3 LMW</td>
<td>Research</td>
<td>TBD</td>
</tr>
</tbody>
</table>

Identification of potent inhibitors with excellent overall profile

2. Data is investigational. Efficacy & safety not yet established.
Novartis Oncology – balanced mid-stage pipeline
Uniquely positioned to create new standards of care through combinations of treatment approaches

<table>
<thead>
<tr>
<th>Targeted Therapies</th>
<th>Immunotherapies</th>
<th>CAR-T</th>
<th>Radioligand Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tafinlar® + Mekinist®</td>
<td>PDR001</td>
<td>Kymriah®</td>
<td>Lutathera® (Somatostatin Receptor)</td>
</tr>
<tr>
<td>Capmatinib (INC280) (cMet)</td>
<td>Anti-IL-1β</td>
<td>BCMA</td>
<td>PSMA-617 &amp; PSMA-R2 (Prostate-Specific Membrane Antigen)</td>
</tr>
<tr>
<td>LHX254 (B,C Raf)</td>
<td>CSF-1</td>
<td>CD22</td>
<td>NeoB (Gastrin-Releasing Peptide Receptor)</td>
</tr>
<tr>
<td>TNO155 (SHP2)</td>
<td>Anti-TGFβ</td>
<td>CD123</td>
<td>FF10158 (Integrin)</td>
</tr>
</tbody>
</table>

Potential next wave combinations - Integration of therapeutic approaches

- Kymriah® + Pembro
- EGFRviii + PDR001
- Tafinlar® + Mekinist® + PDR001
- INC280 + PDR001
- LHX254 + Trametinib
- SHP2 + PDR001

- Lutathera® + Nivolumab
- PSMA-617 + Pembro
- Jakavi® + TGFβ
- PDR001 + TGFβ

Selected compounds
External innovation

300+ academic and 50+ industry alliances focused on areas of mutual scientific interest

Alliances bring ideas, capabilities and talent to complement internal innovation

Few companies bring scientific and platform expertise along with resources to pursue external innovation so ambitiously

Bringing outside innovation inside

New paths to patients

All trademarks are the property of their respective owners.
Strategic out-licensing to capture return on investment and enable patient access

18 agreements from 2015 to date

- Significant cash upfronts
- Equity stake
- Upside potential from future royalties

Number of agreements

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015 - 16</td>
<td>2</td>
</tr>
<tr>
<td>2017</td>
<td>3</td>
</tr>
<tr>
<td>2018 - Q1 2019</td>
<td>13</td>
</tr>
</tbody>
</table>
## Conclusion - Research

1. **Deliver transformative innovation and curate a first-in-class pipeline**

2. **Partner of choice, unbiased acceleration of the most promising internal and early external opportunities**

3. **Deploy a suite of advanced technology platforms in an effort to drug targets that were previously considered “undruggable”**

4. **Sustain focus on targeted cancer therapies while expanding into new modalities alone and in combination**
Meet Novartis Management 2019
Sandoz
May 23, 2019
**Sandoz a global leader in generics and biosimilars, transforming to stay ahead of the competition**

1. Sandoz a global leader in generic and biosimilar medicines, focusing on higher-margin differentiated products. Ex-US >70% of sales, driving gross margin expansion

2. Biosimilars remain key global growth driver
  -leading with 8 biosimilars on the market and 10+ in the pipeline

3. Sandoz becoming leaner and more agile to drive sustainable sales and margin growth in a rapidly-moving generics environment
Sandoz outperforming key competitors in a challenging and fragmented environment

Top global Gx players by 2018 net sales (USD bn)\(^1,2\)

<table>
<thead>
<tr>
<th>Player</th>
<th>2018 Net Sales (USD bn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mylan</td>
<td>11.4</td>
</tr>
<tr>
<td>Teva</td>
<td>10.4</td>
</tr>
<tr>
<td>Sandoz</td>
<td>9.9</td>
</tr>
<tr>
<td>Sun</td>
<td>4.1</td>
</tr>
<tr>
<td>Stada</td>
<td>2.8</td>
</tr>
<tr>
<td>Dr. Reddy's</td>
<td>2.2</td>
</tr>
<tr>
<td>Sanofi</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Global generics industry 2018\(^2\)

- **Global USD 224bn sales (+3% vs. PY)**
  - **US USD 71bn (-4%)**
  - **Ex-US USD 153bn (+6%)**

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1. Sales based on published figures; absolute net sales for Sun, DRR, Stada and Sanofi were converted to USD using internal Novartis exchange rates; growth rates in cc are organic growth estimates, internal analysis. All trademarks are the property of their respective owners.
2. IQVIA figures, including Bio and OTC.
3. Sanofi organic growth rate includes negative impact of Zenliva divestment, while estimated cc growth rate is inorganic only.
# Sandoz shaping its portfolio to drive sustainable and profitable growth

## Sandoz portfolio (sales 2018)

<table>
<thead>
<tr>
<th>Biopharmaceuticals¹</th>
<th>Expected market growth (CAGR 2018-23, approximate⁴)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.4</strong> USD bn Sandoz sales</td>
<td><strong>15%</strong></td>
</tr>
<tr>
<td>8 Products in market</td>
<td></td>
</tr>
<tr>
<td>10+ Assets in pipeline</td>
<td></td>
</tr>
<tr>
<td>80 USD bn originator product sales in scope</td>
<td></td>
</tr>
</tbody>
</table>

## Differentiated Therapeutics

| ~30-35% of Sandoz Retail Gx sales, mostly branded Gx² | 7% |
| 1¹st Prescription digital therapeutics in US | |
| 20+ Value-added medicines³ in development | |

## Standard generics

| ~65-70% of Sandoz Retail Gx sales | 1% |
| Deep global development & production expertise | |
| Strong capabilities in select segments (e.g. injectables) | |

---

1. Biopharmaceuticals comprises biosimilars, contract manufacturing and Glatopa®.
2. Branded Gx are products that are promoted / branded, definition is internal and largely dependent on market type rather than molecule.
3. VAMs are known molecules that offer improvements, address unmet needs and add value by a) improving efficacy, safety or tolerability, b) improving administration, ease of use, c) offering new therapeutic use (indication, population). Include 505(b)(2) in US.
4. Internal estimates.
Sandoz is outperforming competition in Europe – Region Europe delivers 50% of total Sandoz sales

#1 off-patent medicines company with 11.3% market share

#1 or #2 generics player in 11 geographies

Growing above market across 14 countries

European leader in six therapeutic areas

Strong brands across Rx, OTC and biosimilar markets

1. EU Gx Market (Rx + OTC + Bio), excl. Mature Brands
2. 11 geographies represent 48% of EU Gx market sales except for growing above market: Full year 18, Internal sales FY 2018.
3. Cardiovascular and Metabolism, Pain, Oncology, Hormones, Derma, Transplant. Source: IQVIA Midas data (Feb. 19)
Sandoz focused on a five-point transformation plan

- **Portfolio & Innovation Strategy**: Shift portfolio to more differentiated areas
- **Portfolio Delivery**: Ensure timely delivery to key markets
- **Cost-competitive & Flexible Supply**: Drive COGS and generic mindset to increase margins
- **Resource Allocation**: Agile M&S allocation in fast-changing markets
- **Operating Model & Governance**: Simplify how we work
Sandoz continues to drive growth in Biopharmaceuticals and Differentiated Therapeutics

FY 2018 net sales USD 9.9bn
Illustrative sales split

Includes USD 1.2bn of sales to be sold to Aurobindo

Standard Generics
Declining ~high single digit (broadly in line ex-US)

US

Ex-US

Biopharma¹
+24% vs PY in cc

Differentiated Therapeutics²
Growing ~mid single digit (primarily ex-US)

Global leader in biosimilars, eight molecules on market

Global #1 in Gx oncology and antibiotics

#1 in Europe and #1-3 in >20 countries

1. Biopharmaceuticals comprises biosimilars, contract manufacturing and Glatopa®.  2. Differentiated Therapeutics comprise branded Gx, OTC, Value Added Medicines (VAMs), Digital Therapeutics (DTx).
Sandoz driving growth in differentiated therapeutics and emerging markets, offset by US price erosion

Retail net sales
Illustrative sales split and growth

<table>
<thead>
<tr>
<th>Differentiated Therapeutics&lt;sup&gt;1,2&lt;/sup&gt;</th>
<th>Standard Generics&lt;sup&gt;2&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing ~mid single digit</td>
<td>Declining ~high single digit</td>
</tr>
</tbody>
</table>

FY 2017 | FY 2018

- Growth driven by Europe and emerging markets
- Maintaining strong position across established markets
- Broadly in line ex-US
- Focusing US on complex generics and biosimilars, plus opportunities in digital therapeutics and VAMs; plan to divest standard Gx segments to Aurobindo

1. Differentiated Therapeutics comprise branded Gx, OTC, Value Added Medicines (VAMs), Digital Therapeutics (DTx). Standard Gx comprises other products (excluding Biopharma).
2. Sales by segment are approximate, non-audited figures.
Biopharmaceuticals\(^1\) continue to grow double-digit

- Europe growing high double-digit; Q1 slower due to US price competition
- Ongoing progress in all three key areas: oncology, immunology, endocrinology
- Omnitrope\(^\circledR\), Binocrit\(^\circledR\) and Zarzio\(^\circledR\)/Zarxio\(^\circledR\) all #1 biosimilar globally
- Zarxio\(^\circledR\) the first US biosimilar, tracking ahead of originator since April 2018\(^2\)
- Pipeline continues to advance, including strategic deals

\(^1\) Biopharmaceuticals comprises biosimilars, contract manufacturing, Glatopa\(^\circledR\).
\(^2\) IQVIA

Biopharmacy y-o-y sales growth
USD, \(\% cc\)

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biopharma y-o-y sales growth</td>
<td>1.1bn</td>
<td>1.4bn</td>
</tr>
<tr>
<td>Q1 2018</td>
<td>335m</td>
<td>351m</td>
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</table>

\(\% cc\)
Sandoz a leader in biosimilars; eight marketed products and a broad pipeline

<table>
<thead>
<tr>
<th>EU / ROW</th>
<th>US</th>
<th>2006-2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
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<tbody>
<tr>
<td></td>
<td>Omnitrope Somatropin</td>
<td>RIXATHON® rituximab</td>
<td>Hyrimoz® adalimumab</td>
<td>ROW rollout</td>
<td>Erelzi etanercept</td>
</tr>
<tr>
<td>BINOCRT® epoetin alfa</td>
<td>Erelzi etanercept</td>
<td>Zessly® infliximab</td>
<td>Erelzi etanercept</td>
<td>Erelzi etanercept</td>
<td>Ziextenzo™</td>
</tr>
<tr>
<td>ZARZIO® pegfilgrastim</td>
<td>Ziextenzo™</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pending approval
Pending litigation

Launch
Biosimilar launches continue to drive Sandoz growth

Cumulative net sales from launches
USD million (illustrative only)

Leading pipeline

- Strong pipeline of 10-plus molecules, targeting ~USD 80bn in originator net annualized value
- Focus on oncology, immunology and endocrinology
- Further expanding portfolio through partnerships:
  - Three insulins with Gan&Lee
  - Several new molecules via collaboration with Biocon
  - Collaboration with EirGenix on biosimilar trastuzumab

1. Rights for each deal are for defined geographies  
Sandoz continues to be optimistic on the global biosimilar market outlook

**Critical for healthcare systems**
- Accessibility
- Affordability
- Sustainability

**Opportunities**
- Continued LoE opportunities (approx. USD 80bn in originator sales, 2019-2028)\(^1\)
- Improving EU uptake, EGM potential
- Legislative reform potential in US (e.g. Medicare reimbursement)
- Positive early performance in Japan

**Challenges**
- Tender market dynamics
- US legislative and regulatory barriers
- Need to continue educating patients and physicians about biosimilars, particularly in the US, which has seen less biosimilar launches than Europe

---

\(^1\) Internal analysis: USD 10bn through 2018, USD 8bn 2019-21, USD 70 bn 2022-28. Represents value of molecules in our pipeline, not total market.
Sales growth ex-US and product mix drive 10 straight quarters of core gross margin expansion

Ex-US sales growth (+4%, 72% of 2018 sales) fueled by higher-margin biosimilars

Underlying Retail sales growth ex-US (+2%):  
- Driven by all regions  
- Steadily moving to more differentiated portfolio

Acting decisively to drive profitable growth in new US environment

Total +5 ppts core gross margin improvement since Q4 2016

---

1. Including segments planned to be divested to Aurobindo.  
2. Underlying growth, excl. one-timers (i.e. items that are included in reported gross margin, but not in core gross margin). Incl. one-timers: +0%.
Sandoz leading in data and digital, aiming to drive further productivity and sales

**Pioneering in digital therapeutics**

- First FDA-cleared prescription digital therapeutic (reSET®¹)
- reSET-O®² launched in US in January 2019
- Working with Pear™ to expand access to these new cognitive therapies

**Pioneering use of AI in tender markets**

- Optimizing bidding strategies in tender markets by use of advanced algorithms
- Pilot in Germany already driving sales and margin
- Potential to create significant AI-based competitive advantage

¹ For treatment of Substance Use Disorder. ² For treatment of opioid use disorder
Sandoz becoming leaner and simpler, in order to invest in innovation and growth tomorrow

**Laying strong foundations**

- Simplifying how we operate, with workforce reduction of ~900 FTEs (~7% of total workforce)¹
- Aiming to realize productivity gains across total functional costs by end 2020
- Streamlining development network, with planned closure of Holzkirchen Development Center¹

**Building the future**

- Driving greater efficiency in manufacturing², to achieve significant longer-term savings
- Driving digital enablement across every aspect of our business
- Reinvesting into growth areas and securing core business competitiveness – expected to drive core ROS towards mid-20s
- Creating a sustainable growth mindset

¹. These are proposed plans for cost reduction, pending agreement by local works councils.  
². Part of USD 2bn manufacturing savings target for Novartis Group.
Conclusion – Sandoz

- Transforming to succeed long-term in a rapidly-evolving global generics market
- Expects to continue to drive growth in biosimilars and Differentiated Therapeutics
- Continues to grow sales ex-US and margin globally
References: Overview

Focused on medicines, diversified across therapeutic areas and platforms
1. Revenue split based on EvaluatePharma data for FY 2018. Revenue from medicines includes sales reported as Rx or Gx. Novartis revenue excludes Alcon and Sandoz proposed US portfolio sale to Aurobindo.
2. TA count if >$500m only
3. Blockbusters defined as sales >$1bn in Rx only
4. Presence – company expected to market a product in cell therapy, gene therapy and radioligand therapy (RLT) by 2024, according to EvaluatePharma; for RNA interference therapy (RNAi), presence based on review of available public information (EvaluatePharma, annual reports, press releases).

Building depth across our core therapeutic areas
1. Aimovig® is developed in collaboration with Amgen.
2. The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xioi), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities.
3. Announced acquisition of global rights; closing expected in 2H19, subject to customary closing conditions.
4. Luxturna® marketed ex-US.
5. Per license agreement, EirGenix Inc is responsible for development and manufacturing; Sandoz has rights to commercialize in all markets except China and Taiwan.
6. Per license agreement, Gan&Lee is responsible for development and manufacturing; Sandoz has rights to commercialize in EU, US, Switzerland, Japan, South Korea, Canada, Australia and New Zealand.

Growth prospects
1. Chart reflects new focused medicines company, which excludes Alcon and Sandoz proposed US portfolio sale to Aurobindo from all periods, and does not include impacts from Xiidra announced acquisition.
3. In collaboration with Amgen; companies co-commercialize in the US (Amgen to book Sales to third party), Novartis has exclusive rights in rest of world excluding Japan.
4. The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xioi), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities.

10+ potential blockbuster launches
1. Launch of a new molecular entity or new indication with expected peak sales >USD 1bn.
2. Approved by the FDA in Q1
3. The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xioi), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities.

Piqray®

Ofatumumab (OMB157)
References: Pharmaceuticals (1/2)
## References: Pharmaceuticals (2/2)

<table>
<thead>
<tr>
<th>Slide</th>
<th>Footnotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data show potential impact of Zolgensmab® in broad spectrum of SMA</td>
<td>The brand name Zolgensma® has been provisionally approved by the FDA for the investigational product AVXS-101 (onasemnogene abeparvovec-xxxy), but the product itself has not received marketing authorization or BLA approval from any regulatory authorities. 1. STRONG, STR1VE, SPHINT, START long term follow up data presented at AAN 2019. 2. Day J. et al. &quot;Adeno-Associated Virus Serotype 9 Antibodies in Patients With Spinal Muscular Atrophy Screened for Treatment With Onasemnogene Abeeparvovec.&quot; Muscle Dys trophy Association (MDA) 2019.</td>
</tr>
<tr>
<td>Brolucizumab achieved robust visual gains and superior fluid resolution“− on track for 4Q19 US launch</td>
<td>1. Pending regulatory approvals. 2. Data on file, HAWK &amp; HARRIER Ph3. 3. Source: Evaluate pharma (Accessed Mar 29 2019); Regeneron, Bayer, Novartis and Roche Annual Reports. Accounted anti-VEGF sales in nAMD, DME and RVO indications. 4. Brolucizumab (RTH258) has not received marketing authorization or BLA approval from any regulatory authorities.</td>
</tr>
<tr>
<td>China</td>
<td>1. IQVIA data. 2. CFDA website. 3. Approval received Q1 2019. 4. Best of best case. 5. Add-on insulin and add-on SU; scenario: China’s limited data from global studies could be accepted for NDA approval.</td>
</tr>
</tbody>
</table>
References: Oncology

<table>
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