



AstraZeneca 

August 2021

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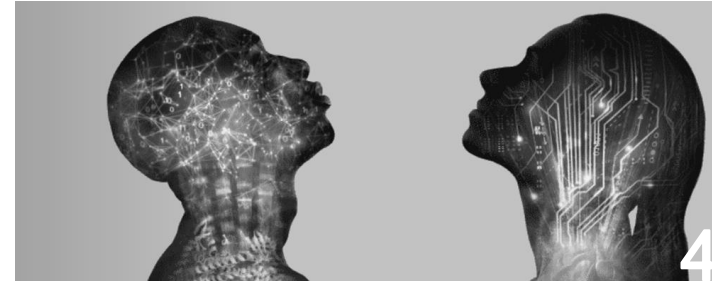


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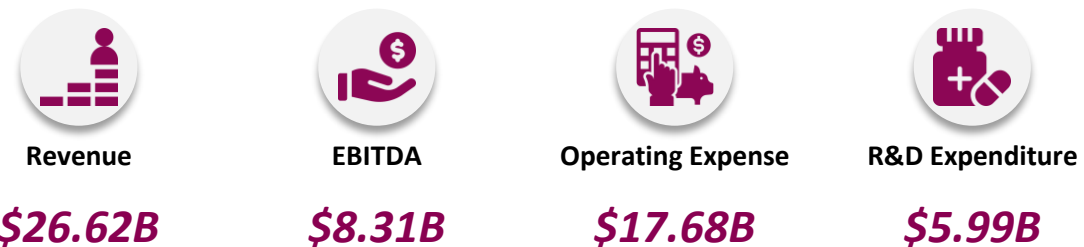
Company Snapshot

Based in Cambridge, UK, AstraZeneca operates in over 100 countries and its innovative medicines are used by millions of patients worldwide.

- Founded in 1999 and headquartered in Cambridge, UK, AstraZeneca is a British-Swedish multinational pharmaceutical and biotechnology company.
- The Company focuses on the discovery, development, and commercialization of prescription medicines.
- The Group has presence in over 100 countries and as of 2020, employed a total of 76,100 employees across four reporting regions including Emerging Markets, Europe, US, and Established Rest of the World.



Financial Performance



Source: AstraZeneca Corporate Affairs Rotational Assignment, Company Website, Annual Report, thepharmaletter, Benevolent

Technology Focus

01 Digital Data Factory

- AstraZeneca aims to build a digital data factory collaborating with AI to help in image recognition, IoT, electronic records, robotics and automation, and digital twins.
- To implement this digitisation, the Group is moving towards the cloud with AWS to build a data lake to hold data from various source systems.

02 AI Focus

- AstraZeneca's ongoing collaboration with Benevolent AI is AstraZeneca's most significant AI collaboration so far, targeted at developing drugs for Idiopathic Pulmonary Fibrosis (IPF) and Chronic Kidney Disease (CKD).

03 Key Management Churn

- In 2015, AstraZeneca appointed Ms. Pam P. Cheng as the Executive Vice President, Operations and IT. Ms. Cheng is responsible for manufacturing operations and supply chain, procurement and information technology globally.
- In 2020, Ms. Cindy Hoots joined AstraZeneca as the Chief Digital Officer and CIO. In her role, she is responsible for leveraging digital technologies to help the Group drive business outcomes.

Historical Timeline

1913-1948

- In 1913, Astra AB was founded in Södertälje, Sweden, by 400 doctors and apothecaries, for the domestic production of pharma products.
- In 1927, Borje Gabrielsson became the CEO and led the Company between 1927 and 1957
- In 1948, Astra introduced penicillin and anesthetics, initially in the form of Xylocaine in the Swedish market.

1991-1999

- In 1993, British multinational pharma company Zeneca was formed by a demerger of the pharmaceuticals and agrochemicals businesses of Imperial Chemical Industries.
- In 1994, Zeneca acquired 50% of an operator of cancer care centers in the United States named Salick Health Care with the transaction valued at \$440 million.
- In 1997, Zeneca acquired the other 50% of Salick.
- In 1999, Astra AB and Zeneca where Astra Shareholders held a 46.5% share, while Zeneca Shareholders held 53.5% and became "AstraZeneca".

2006-2010

- In 2006, AstraZeneca acquired UK-based Cambridge Antibody Technology.
- In 2007, AstraZeneca completed the acquisition of vaccine maker MedImmune and bought its drug-development pipeline for \$15.2 billion. AstraZeneca merged Antibody Technology with MedImmune and created global biologics organization known as MedImmune. In the same year, the Group acquired a British biotech Arrow Therapeutics for \$150 million.
- In 2010, AstraZeneca paid a \$520 million fine brought by the U.S. Department of Justice for promoting Seroquel for unapproved uses.

1949-1990

- In 1950, Astra AB started production of Xylocaine worldwide. During this time Astra broadened its overseas activities.
- In 1960, Astra AB joined with England's Beecham Research Laboratories to develop synthetic penicillin.
- In 1988, sales of the asthma drug Pulmicort helped propel total revenues to over SKr6.2 billion for Astra.
- In 1990, FDA requested Astra AB to change Losec's brand name to Prilosec, to avoid confusion with Sanofi-Aventis' diuretic, Lasix (furosemide).

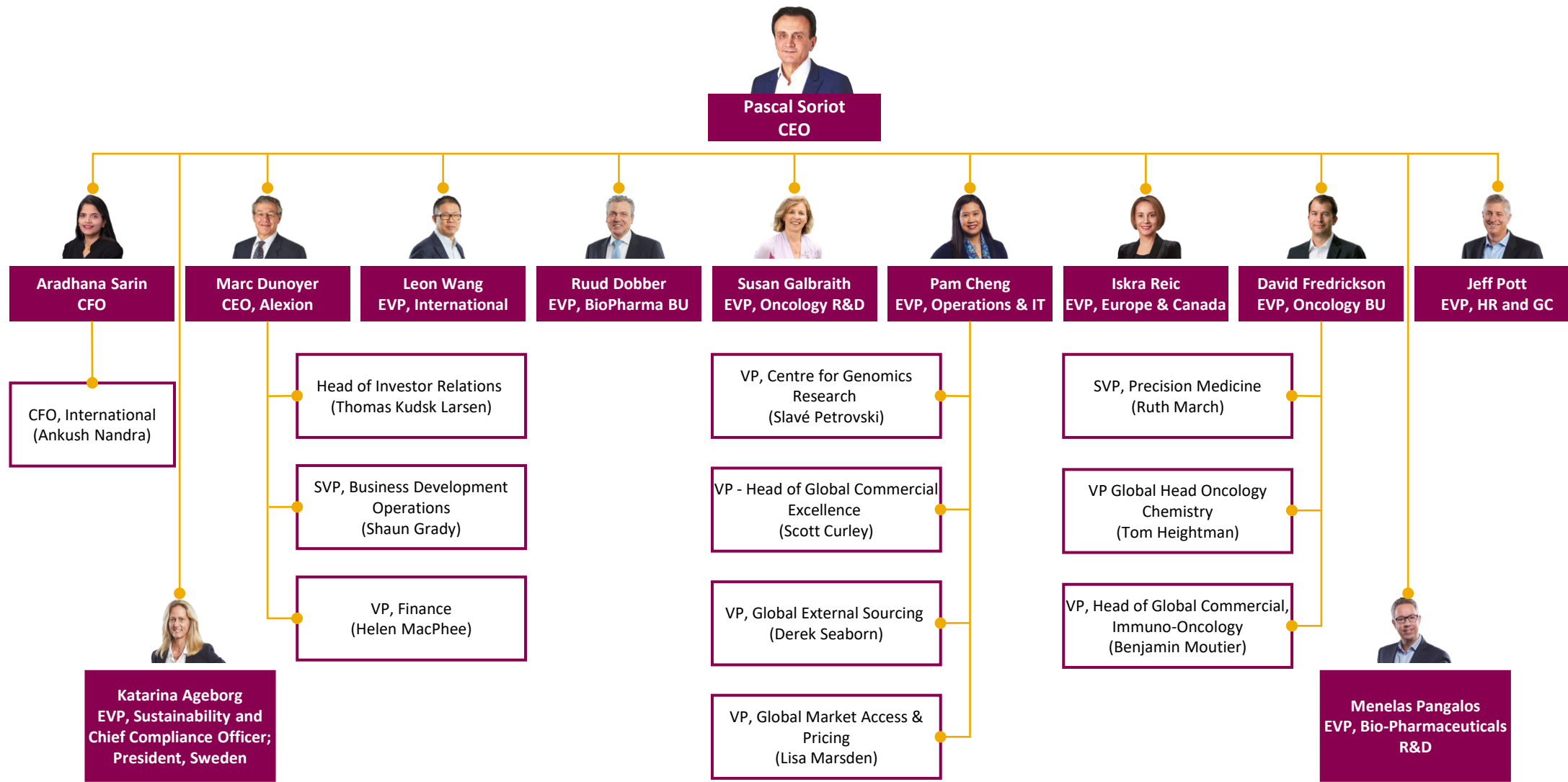
2000-2005

- In 2000, Nexium (esomeprazole) was first launched in Sweden for the treatment of acid-related diseases, such as gastroesophageal reflux disease (GERD).
- In 2005, AstraZeneca acquired a UK biotech company, for £120 million and created KuDOS Pharmaceuticals. The same year, it entered into a third collaboration agreement with Astex Therapeutics, to develop small-molecule protein kinase B (PKB) towards cancer treatment.

2011-2020

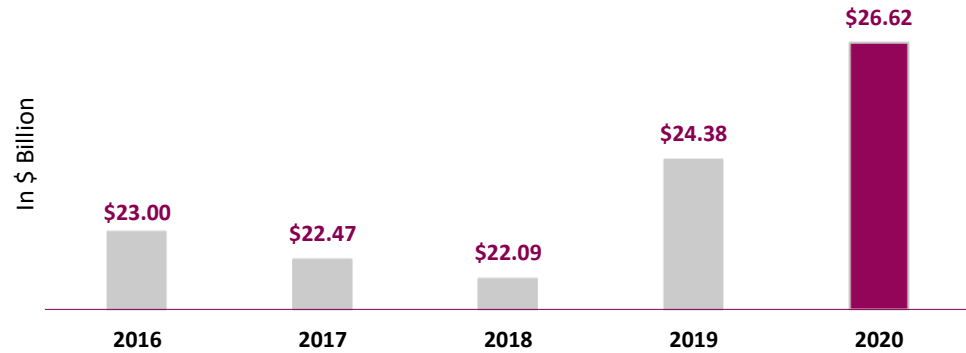
- In 2014, AstraZeneca PLC agreed to buy the rights to a portfolio of inhaled drugs from Almirall SA in a deal valued \$2.1 billion.
- In 2016, AstraZeneca acquire a 55% equity stake in Acerta Pharma, a privately-owned biopharmaceutical company based in the Netherlands and US.
- In 2020, AstraZeneca signed a definitive agreement to acquire global biopharmaceutical company Alexion Pharmaceuticals for \$39billion.

Organization Structure



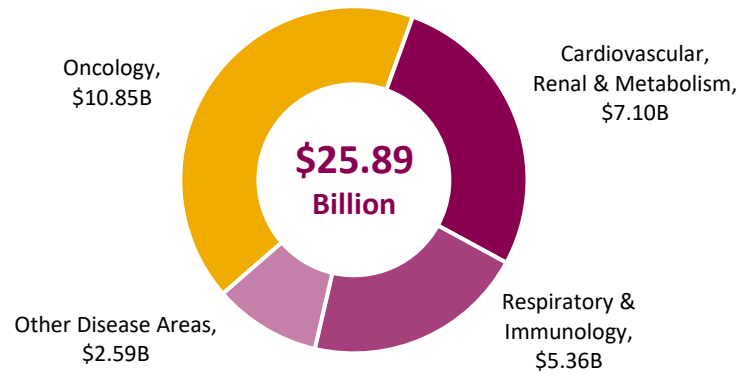
Financial Snapshot

Total Revenue (2016-2020)



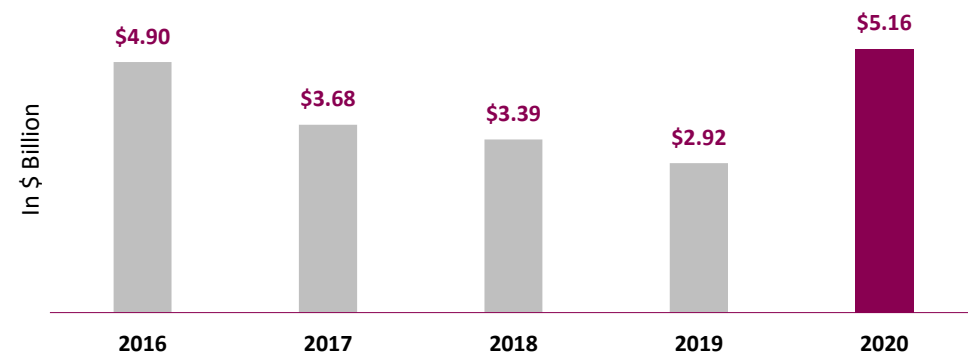
AstraZeneca’s total revenue (comprising product sales and collaboration revenue) grew by ~9% YoY in 2020, primarily driven by a 10% increase in product sales.

Product Sales – By Segment (2020)



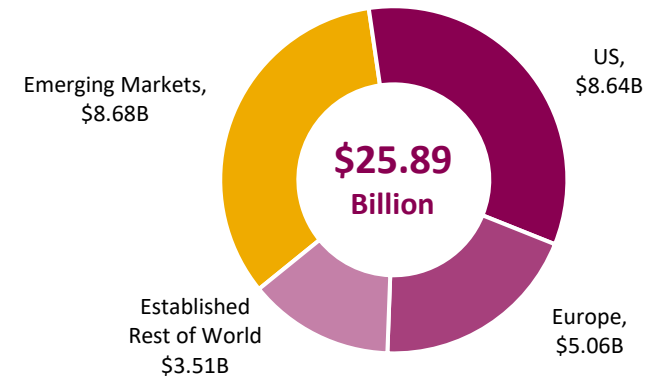
At ~42%, the highest share of the total product sales was held by the Oncology segment, followed by the Cardiovascular, Renal & Metabolism segment (~27%).

Reported Operating Profit (2016-2020)



The Group’s operating profit increased by ~77% YoY in 2020. This is mainly attributed to the accelerated product sales.

Product Sales – By Geography (2020)



~34% of the total product sales generated by the Group was from Emerging Markets. It was closely followed by the US, accounting for 33% of the total product sales.

Source: Annual Reports

Products & Services Portfolio:

1 Cardiovascular, Renal and Metabolism (CVRM)

- AstraZeneca treats patients who are suffering from cardiovascular disease, heart failure, chronic kidney disease and diabetes by advancing CVRM solutions and addressing shared risk factors between these distinct but inter-related disease areas. The group helps to provide a portfolio of potential CVRM solutions with more than 25 therapies and therapy combinations in their early-to-late-stage pipeline.
- **Brands of Medicine:** Atacand, Atacand HCT, Atacand Plus, Brilinta/Brilique, Bydureon, Byetta, Crestor, Farxiga/Forxiga, Komboglyze, Kombiglyze XR, Lokelma, Onglyza, Plendil, Modip, Splendil, Munobal, Flodil, Qtern, Seloken ZOK, Toprol-XL, Betaloc ZOK, Symlin, Tenormin, Tenormine, Prenormine, Atenol, XIGDUO, XIGDUO XR and Zestril.

2 Infection and Vaccines

- The Group treats Influenza, Respiratory Syncytial Virus (RSV) and Bacterial Infections, particularly those resistant to current antibiotics.
- AstraZeneca focuses on: Antimicrobial resistance (AMR) and Seasonal influenza.
- **Brands of Medicine:** Synagis and Fluenz Tetra/FluMist Quadrivalent.

3 Oncology

- AstraZeneca aims to transform survival by metastatic and resistant disease and providing options to treat early with the new biomarkers and therapeutic targets that cut across multiple tumour types.
- The key diseases the Group addresses are Lung Cancer, Breast Cancer, Ovarian Cancer, Haematology, Prostate Cancer, Bladder Cancer, Liver Cancer, Pancreatic Cancer and Cervical Cancer.
- **Brands of Medicine:** Arimidex, Calquence, Casodex, Cosudex, Enhertu, Faslodex, Imfinzi, Iressa, Koselugo, Lynparza, Tagrisso and Zoladex.

4 Respiratory & Immunology

- The Group helps in respiratory care, with the treatment of **Asthma** and **Chronic Obstructive Pulmonary Disease (COPD)** by biology-led treatment.
- **Brands Of Medicine:** Accolate, Accoleit, Vanticon, Bevespi Aerosphere, breztri Aerosphere, Bricanyl Respules, Bricanyl Turbuhaler, Daliresp/Daxas, Duaklir Genuair, Eklira Genuair/Tudorza/Bretaris, Fasenna, Oxis Turbuhaler, Pulmicort Respules, Pulmicort Turbuhaler, Rhinocort, Symbicort Pmdi And Symbicort Turbuhaler.





5 Neuroscience

- AstraZeneca aims to treat **Alzheimer's disease (AD)** and **Opioid-induced Constipation (OIC)**.
- **Brands of Medicine:** Diprovan, EMLA, Movantik/Moventig, Naropin, Seroquel IR, Seroquel XR, Xylocaine, Zomig, Zomig Rapimelt, Zomig Nasal Spray, Ascotop, Zomigon.

6 Gastrointestinal





- AstraZeneca aims to treat Gastrointestinal issues with their 2 main brands of medicines omeprazole and Nexium. The Group sold their Global rights to for omeprazole and sold under the Acimax, Antra, Mepral, Mopral, Omepral and Zoltum medicine names.
- **Brands of Medicine:** Losec, Gastroloc, Mopral, Omepral, Prilosec, Nexium, Vimovo.

Key Market Relationships – Technology (1/4)

Company	Background	Relationship
	<p>In April 2021, AstraZeneca selected Reify Health’s patient enrolment management platform, StudyTeam, to accelerate clinical development across its portfolio of breast cancer investigational therapy.</p>	<p>Reify Health is a cloud-based software company that develops tools for the clinical trial ecosystem. AstraZeneca has deployed Reify Health’s platform across several large global oncology clinical trials since 2019. High site engagement, supercharged workflows, and more visibility and control led to AstraZeneca’s decision to expand the usage of StudyTeam.</p>
	<p>Provider of visual computing technologies, NVIDIA, has teamed up with AstraZeneca and the University of Florida on new artificial intelligence research projects aimed at boosting drug discovery and patient care.</p>	<p>In April 2021, NVIDIA and AstraZeneca revealed a new drug-discovery model called MegaMolBART, which is aimed at "reaction prediction, molecular optimization and de novo molecular generation." MegaMolBART will be deployable on NVIDIA's platform for computational drug discovery, known as Clara Discovery, and will use a new kind of technology called transformer neural networks.</p>
	<p>In January 2021, AstraZeneca combined public cloud with NetApp, an American hybrid cloud data services and data management company, to aid Covid-19 vaccine development and roll-out.</p>	<p>NetApp was deployed to provide a data fabric that would enable data collation across the four cloud providers that AstraZeneca works with (including AWS, Microsoft Azure, Google Cloud Platform and Alibaba) and thereafter consolidate it centrally for sharing with partners and research institutes.</p>
	<p>In December 2020, AstraZeneca partnered with Qure.ai (developer of deep learning algorithms for the interpretation of radiology images) to integrate AI solutions for the early detection of lung cancer in patients across AstraZeneca’s Emerging Markets region.</p>	<p>As part of the strategic collaboration, AstraZeneca’s Emerging Markets Health Innovation Hubs worked with Qure.ai to explore the application of deep learning algorithms to identify patients with suspicious radiographic lung abnormalities and support their referral to arrive at a firm diagnosis. The collaboration also focused on overcoming barriers that limit access to diagnostic tools to support early lung cancer detection.</p>





Source: Clinical Trials Arena, MobiHealthNews, Computer Weekly, Qure.ai

Key Market Relationships – Technology (2/4)

Company	Background	Relationship
	<p>In December 2020, AstraZeneca licensed Genedata's deep learning-based image analysis software solution, Genedata Imagence, for use in high content screening (HCS) across its R&D sites.</p>	<p>Imaging assays using complex disease-relevant primary and stem cells are used across AstraZeneca's research portfolio to identify new drug targets and discover new drug candidates. Deployed in the AstraZeneca cloud, Genedata Imagence allowed the Group to standardize the use of AI across the organization so that more scientists could run these assays, extracting more and higher quality information, thereby increasing the quality of decision making on AstraZeneca's projects.</p>
	<p>In June 2020, AstraZeneca entered into a strategic partnership with UK Medtech start-up Gendius to develop its diabetes management platform Intellin® and support patients in Gulf Cooperation Council (GCC) countries, which have some of the highest rates of diabetes in the world.</p>	<p>Through the partnership with AstraZeneca, healthcare professionals across the Gulf region would use Gendius' Intellin® platform to optimize their patients' diabetes management, in order to reduce the incidence of complications such as cardiovascular disease, kidney disease, amputation, and blindness. The partnership was within the framework of AstraZeneca's Emerging Markets Health Innovation Hubs initiative.</p>
	<p>In November 2019, AstraZeneca entered into a partnership with biotechnology company Novoheart to create the first human-specific in vitro, functional model of heart failure with preserved ejection fraction (HFpEF), a common condition, especially among the elderly and women.</p>	<p>In collaboration with AstraZeneca, Novoheart used its 3-D human ventricular cardiac organoid chamber (hvCOC) technology to reproduce key phenotypic characteristics of HFpEF. The technology, also known as "human heart-in-a-jar", is a human engineered heart tissue that enables clinically informative assessment of human cardiac pump performance including ejection fraction and developed pressure.</p>
	<p>In September 2019, AstraZeneca collaborated with Schrödinger, developer of chemical simulation software, to deploy its computational platform to help the Group accelerate drug discovery efforts.</p>	<p>Schrödinger's computational platform combines physics-based modeling and machine learning to enable chemists to predict the potency of a molecule binding to a target protein. The platform was used by AstraZeneca's medicinal and computational chemists to help improve the design of compounds to identify potential new therapeutic candidates.</p>





Source: Genedata, PharmiWeb.com, FierceBiotech, Schrödinger

Key Market Relationships – Technology (3/4)

Company	Background	Relationship
	<p>In September 2019, AstraZeneca partnered with Microsoft to launch the AI Factory for Health, a European accelerator for AI-focused digital health startups.</p>	<p>The 3-month accelerator program was developed in partnership with the Inria laboratory, for startups that offer an innovative health solution based on artificial intelligence technology for patients or health professionals.</p>
	<p>AstraZeneca decided to build a data lake on AWS to hold the data from its wide range of source systems, with the help of partner Talend, an open-source data integration platform.</p>	<p>Through this partnership in 2018, AstraZeneca utilized the entire Talend Cloud suite. Talend was responsible for lifting, shifting, transforming, and delivering data into the cloud, extracting from multiple sources, and then pushing that data into Amazon S3. AstraZeneca also deployed Talend as part of the orchestration layer in its architecture.</p>
	<p>In 2016, AstraZeneca, along with its global biologics research and development arm, MedImmune, collaborated with Moderna Therapeutics for messenger RNA (mRNA) therapeutic candidates in cancer treatment.</p>	<p>The collaboration combined MedImmune’s protein engineering and cancer biology expertise with Moderna’s mRNA technology platform. This initiative was in line with the agreement announced by the companies to develop mRNA Therapeutics™ for cardiovascular, metabolic and renal diseases as well as selected targets in oncology.</p>
	<p>In 2015, Labcyte, manufacturer of liquid handling systems, entered into a partnership with AstraZeneca to develop an automated pharmaceutical compound management system based on Labcyte’s Echo® acoustic liquid handling technology.</p>	<p>Under the arrangement, Labcyte combined its acoustic liquid handling with its Access™ robotic workstations to create a compact and fully automated system to produce assay-ready plates from acoustic storage tubes.</p>

Source: Company Website, HIT Consultant, Talend, Labcyte

Key Market Relationships – Technology (4/4)

Company	Background	Relationship
	<p>In 2015, AstraZeneca inked a three-year deal with HighRes Biosolutions, a company specialising in the design and construction of innovative robotic systems, for use in the high-throughput screening of compounds.</p>	<p>Under the partnership, AstraZeneca worked with HighRes Biosolutions to tailor robotic technology first developed for the European Space Agency, to the needs of its facility. AstraZeneca had also planned to install the robots at the AstraZeneca MRC UK Centre for Lead Discovery.</p>
	<p>In 2015, AstraZeneca sought the help of Accenture to develop a digital content management tool and implement an end-to-end system that facilitates marketing planning, creative, sourcing, search and approval.</p>	<p>With the platform built, AstraZeneca engaged Accenture to provide commercial operations support through a business process outsourcing arrangement for key areas including brand and marketing services, content production and content management. It helped in low-cost content creation and the efficient reuse and approval across 60 markets.</p>
	<p>AstraZeneca signed a 5-year deal with Cognizant in 2008 to assist in clinical data management. Over the duration of the deal, Cognizant provided a range of data management services for AstraZeneca’s global clinical development programs from a centralized location.</p>	<p>Specific tasks for which Cognizant was involved include data management, clinical study-setup for electronic data capture, medical coding, adverse event reconciliation, clinical data management and training for the clinical sites and investigators. The contract with Cognizant extended an existing relationship with AstraZeneca, which engaged the firm earlier in 2004 to provide other business process and technology services.</p>
	<p>AstraZeneca and IBM signed a global strategic outsourcing agreement in 2007, covering the provision of IT infrastructure services over multiple years, across the countries AstraZeneca operates.</p>	<p>Under this agreement, IBM provided a range of IT services to AstraZeneca throughout its global organization. These cover PC management, network and communications services, including email, and computer operations support. AstraZeneca retained control of its IT technical strategy and the development and support of its application systems.</p>

Source: FierceBiotech, Accenture, Outsourcing Pharma, IBM

Technology Stack – AstraZeneca (1/4)

Digital Data Factory



Analytics and Data Science



Human Resource



Technology Stack – AstraZeneca (2/4)

Marketing



attendify

JUJUNA
Get connected. Stay connected.

MANDRILL

strike social

Segment

digimind

Qordoba

ORACLE
datalogix

mailer lite

PIXELFISH
MEDIA MARKETING & ENTERTAINMENT

sas

PrintSf.com
Print & Mail for Salesforce

alva.

NATIFY

@mailgun

DigitasLBI

Sales and Business Development



DBE™
Educate better. Sell more.

Drawloop
Now part of Nintex

ZS

Veeva CRM

ORACLE
Siebel



forecast pro

SAP
CRM

POBUCA
CONNECT

salesforce

zoominfo

sales cloud

KEA
EFFICIENCY EMPOWERED

inova

Finance and Accounting



Model N

Panaya
An Infosys Company

GEP SMART

ORACLE
HYPERION

revitas

SAP

TRINTECH

Technology Stack – AstraZeneca (3/4)

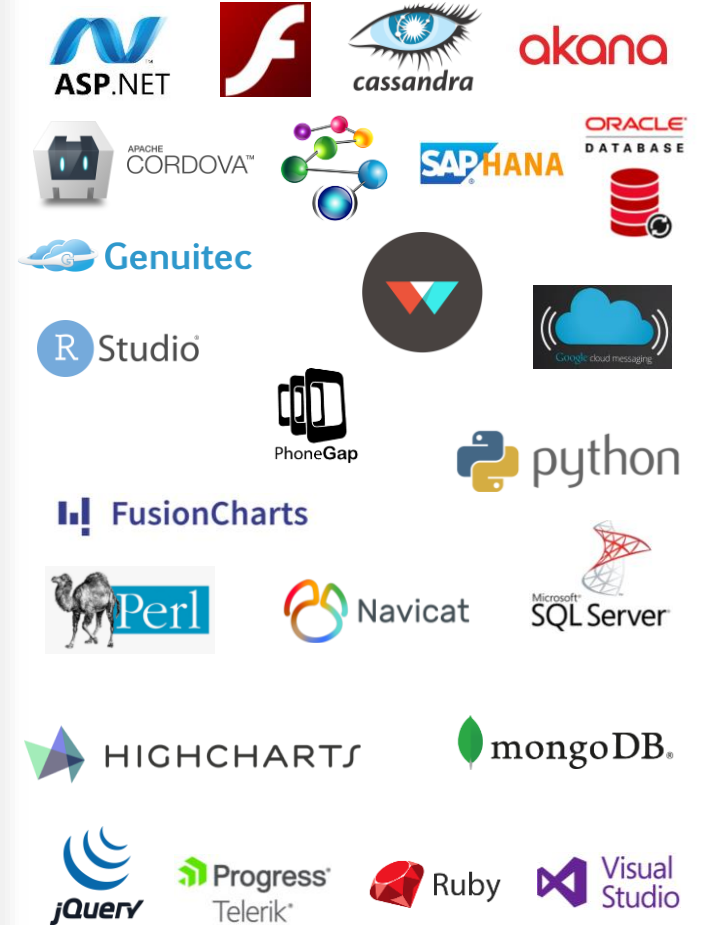
DevOps And IT



Customer support and Success



Developer



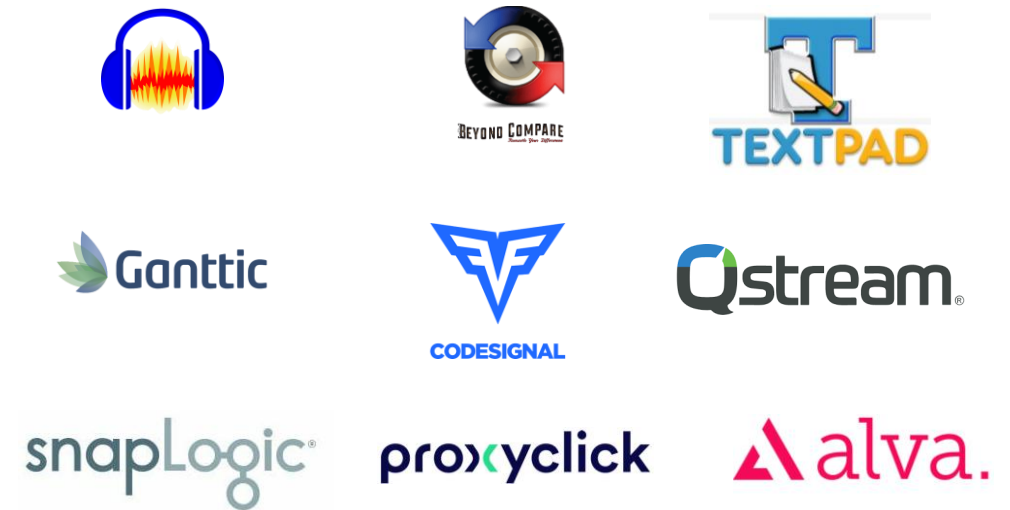
Source: G2 Stack

Technology Stack – AstraZeneca (4/4)

Productivity and Operations



Others



Strategic Investments – Technology

01 Digital Activity



Major digital health tools that the Company developed or is in process of development include the AI-based predictive tool ‘Merlin’, an insight platform ‘Control Tower’ for researchers, and other cloud-based platforms.

02 New Normal



The Company initiated the ‘New Ways of Working’ programme, implement the new and innovative practices to reflect the post-pandemic utilisation of digitisation and technology.



03 China Market

The Chinese market is the most important for the Company. Key investments such as a Global R&D centre and an AI Innovation Centre signify the steps at capitalising upon the country’s healthcare business opportunity.

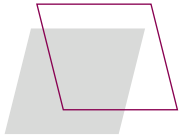


Source: Annual Report

Recent Developments (1/2)

March 2020

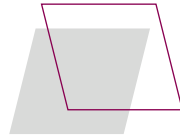
Partnership with
BrightInsight



AstraZeneca partnered with BrightInsight, a supplier of controlled Internet of Things (IoT) stage for biopharma and MedTech organizations in order to leverage applications, calculations, Software as a Medical Device (SaMD) and associated gadgets utilizing the BrightInsight Platform.

August 2020

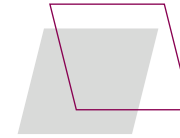
Research Partnership with
Renalytix AI



Renalytix AI, an AI-enabled in vitro diagnostics company, partnered with AstraZeneca to develop and launch medical strategies for cardiovascular, renal and metabolic diseases. The first stage of the collaboration will use KidneyIntelX, an AI-enabled in vitro diagnostic platform that will be gathering patient data from electronic medical records to generate a risk score for patients with chronic kidney disease.

September 2020

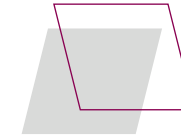
Partnership with
Accent Therapeutics



AstraZeneca joined forces with Accent Therapeutics to discover, develop and market therapeutics focusing on RNA-changing proteins (RMPs) for cancer therapy.

February 2021

Approval for
COVID Vaccines

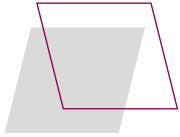


The WHO's Strategic Advisory Group of Experts on Immunization (SAGE) division issued interim recommendations for using the COVID-19 vaccine (AZD1222), developed through the collaboration of Oxford University and AstraZeneca.

Recent Developments (2/2)

February 2021

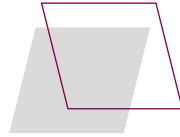
Signed letter of intent with
IDT Biologika



AstraZeneca and IDT Biologika agreed to accelerate the manufacturing process of the COVID-19 Vaccine in the second quarter of 2021 to help support Europe's immediate vaccination needs during the pandemic. Both companies plan to invest in capacity expansion at IDT Biologika's production site in Dessau, Germany, to build up to five 2,000-litre bioreactors capable of making tens of millions of doses per month.

March 2021

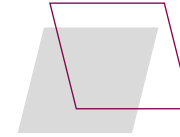
Divestment of
Viela shareholding



AstraZeneca has completed the divestment of its 26.7% ownership in Viela Bio, Inc as part of the proposed acquisition of Viela by Horizon Therapeutics plc. AstraZeneca received cash proceeds and a profit of \$775 million from this deal. The divestment does not impact the Company's financial guidance for 2021.

March 2021

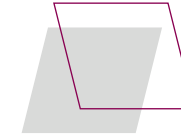
Sold stakes in
Moderna Inc



AstraZeneca sold its 7.7% stake in Moderna Inc for more than \$1 billion after the US-based biotechnology company's shares soared on the back of its coronavirus vaccine breakthrough.




July 2021

Acquisition of
Alexion






AstraZeneca completed the acquisition of Alexion Pharmaceuticals, marking the Company's entry into medicines for rare diseases. Rare diseases have a significant unmet medical need and have become a high-growth opportunity for AstraZeneca.

Competitor's Analysis (1/2)

Competitors	Revenue (2020)	Competitive Area	Key Markets	Recent Projects/Developments
	\$25.4 billion	<p>US-based Amgen focuses on six therapeutic areas, cardiovascular disease, oncology, bone health, neuroscience, nephrology and inflammation.</p>	<p>North America, South America, Europe, Asia Pacific, Middle East and Africa</p>	<p>Dec 2020 Licence agreement with Medicines Development for Global Health for AMG 634, a phosphodiesterase type 4 (PDE4) inhibitor, being investigated for the treatment of tuberculosis (TB) and erythema nodosum leprosum (ENL).</p> <p>Dec 2020 Announced submission of a New Drug Application (NDA) to the US Food and Drug Administration (FDA) for sotorasib, an investigational KRAS^{G12C} inhibitor for KRAS G12C-mutated locally advanced or metastatic non-small cell lung cancer (NSCLC).</p>
	£34.1 billion	<p>GSK brands have maintained good visibility across its three segments: Prescription Medicines, Vaccines and Consumer Healthcare.</p> <p>GSK's power brand includes Advil, Centrum, Sensodyne, Voltaren and Theraflu.</p>	<p>North America, South and Central America, Europe, Australasia, Africa Asia and Middle East</p>	<p>Feb 2021 Partnership with CureVac to jointly develop several next generation mRNA vaccines for COVID-19. GSK and CureVac aims to introduce their vaccine in 2022.</p> <p>Jan 2021 Product transfer agreement with Bharat Biotech for the world's only malaria vaccine, RTS,S/AS01E1 which was developed by GSK.</p>
	CHF 60.3 billion	<p>Roche has a range of medicines in oncology, immunology, infectious diseases, ophthalmology and diseases of the central nervous system.</p> <p>Thirty medicines developed by Roche are included in the WHO Model Lists of Essential Medicines.</p>	<p>North America, Latin America, Europe, Asia, Africa, Australia</p>	<p>Feb 2021 FDA granted Breakthrough Device Designation to their Roche's Elecsys Growth Differentiation Factor-15 (GDF-15) assay as a companion diagnostic (CDx) in cancer treatment.</p> <p>Feb 2021 Announced the submission for Emergency Use Authorization (EUA) from the FDA for a SARS-CoV-2 Rapid Antigen Test, designed for use by healthcare professionals.</p>

Source: Amgen, GSK, Pharmiweb, PR Newswire, PMLive, Roche

Competitor's Analysis (2/2)

Competitors	Revenue (2020)	Competitive Area	Key Markets	Recent Projects/Developments
	€23.25 billion	<p>Boehringer Ingelheim operates across three business areas: Human Pharma, Animal Health, and Biopharmaceutical Contract Manufacturing.</p> <p>It provides treatments for cardiovascular and metabolic diseases, oncology, diseases of the central nervous system, infectious diseases, besides a variety of biopharmaceuticals.</p>	North America, South America, Europe, Asia Australasia and Africa	<p>Jan 2021 Partnership with UK-based Enara Bio to research and develop novel targeted cancer immunotherapies, including T cell receptor (TCR) therapies and therapeutic vaccines leveraging Enara's dark antigen discovery platform.</p> <p>Dec 2020 Announced the signing of a binding agreement for acquiring all shares of NBE-Therapeutics, a clinical-stage Swiss biotechnology company. The valuation of the transaction was €1.18 billion and included contingent clinical and regulatory milestones.</p>
	¥ 981.8 billion	<p>Daiichi Sankyo, a pharmaceutical products developer engages in four businesses namely, Innovative Pharmaceutical Business, Generic Business, Vaccine business, and Over-the-counter (OTC).</p>	North America, South America, Europe and Asia	<p>Feb 2021 In partnership with Sarah Cannon Research Institute, the first patient was dosed in a phase 1 study for evaluating DS-6000 in patients with advanced renal cell carcinoma or ovarian cancer.</p> <p>Jan 2021 ViGeneron's novel engineered adeno-associated virus (vgAAV) vectors were utilised for delivering a novel therapeutic protein in collaboration with Daiichi.</p>
	\$42.68 billion	<p>Sanofi operates through three segments, namely, Pharmaceuticals, Consumer Health and Vaccines. Sanofi Pasteur, the Vaccines division is the largest producer of vaccines in the world.</p> <p>The Company sells vaccines in five areas: pediatric vaccines, influenza vaccines, adult and adolescent booster vaccines, meningitis vaccines and travel and endemic vaccines.</p>	Worldwide	<p>Feb 2021 FDA approved Sanofi's PD-1 inhibitor Libtayo (cemiplimab-rwlc) as the first immunotherapy targeted for patients with advanced basal cell carcinoma (BCC), which was previously treated with a hedgehog pathway inhibitor (HHI).</p> <p>Jan 2021 Agreement to acquire Kymab, adding KY1005 to the Group's pipeline for an upfront payment of approximately \$1.1 billion and up to \$350 million upon achievement of certain milestones.</p>

Source: Company Websites, Pharmiweb, PR Newswire, PMLive, Roche

Strengths (1/2)

01 Strong R&D Capability

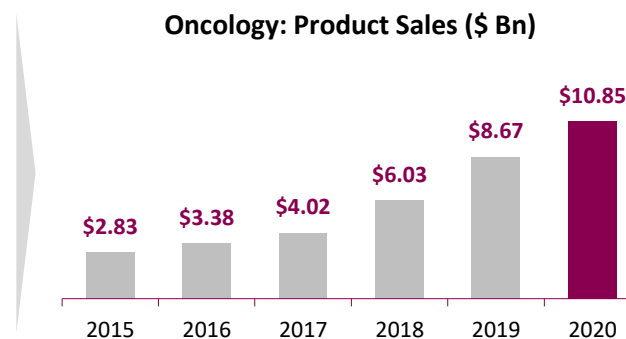
- AstraZeneca's R&D expenditure averaged \$6 billion between 2018 and 2020. Discovery and early-stage development accounted for 36% of the R&D spend. The other 64% of the R&D budget is directed towards Late-stage development.
- The Group employs around 9,200 people in its R&D centres. The three key R&D centres of the Group are in the UK, the US and Sweden. It also has centres in Japan, China and Poland. In 2019, AstraZeneca created therapy-area focused new R&D organisations responsible for discovery through late-stage development, Oncology and BioPharmaceuticals (CVRM and Respiratory).
- To improve its R&D productivity, AstraZeneca is exploring emerging technologies like Artificial Intelligence to further automate processes and increase efficiencies. For instance, in order to discover new drugs for a novel chronic kidney disease (CKD), the Group entered a strategic collaboration with BenevolentAI, a developer of AI and computational medicine technologies. The Group has also decided to establish a new AI Innovation Centre in Shanghai to capitalise on the latest digital technology in R&D, manufacturing, operations and commercialisation to help accelerate the delivery of medicines to patients in China and globally.

02 Well-Established Presence in Emerging Markets

- AstraZeneca has a well-established presence in emerging markets like China, India, Brazil and Russia which provides the Group with growth opportunities that are not available in more developed countries. According to IMF projections, emerging markets and developing economies are expected to grow at a rate of 6.3% in 2021 and 5% in 2022, while that of advanced economies is projected at 5.5% in 2021 and 4.2% in 2022. Many pharmaceutical companies, seeking respite from the flattened growth and economic uncertainties in developed countries such as the US and the UK, have turned to Emerging Markets. These markets offer advantages including rising wealth, a population base, increasing life expectancy and the rise in healthcare spending, among others.
- Emerging Markets form a key component of AstraZeneca's Product Sales, with the Group generating 34% of the total products sales (\$8.68 billion) from Emerging Markets in 2020. This was ~6.2% increase from \$8.17 billion in 2019. Among the emerging markets in which AstraZeneca operates, the Group places a special focus on China, which is one of the top five pharmaceutical markets in the world by sales. China is also AstraZeneca's second largest market globally. The Group reported a 29% increase in product sales in 2019 (prior to the COVID-19 outbreak) in China and a 10% increase in revenue in 2020 which indicates the growth opportunity in this market.

03 Strong Performance by Oncology Segment

- AstraZeneca is a leading player in the Oncology drug market. The majority share of the Group's total product sales is also generated by this segment (42% in 2020). The oncology brands like Tagrisso, Lynparza and Imfinzi are among the top performing brands of AstraZeneca responsible for driving the revenue growth.
- The Oncology segment has maintained a strong performance over the years. This segment's total sales rose by 25.14%, to \$10.85 billion in 2020, as compared to \$8.67 billion in 2019, which was a further increase of 43.78% from previous year's \$6.03 billion. The Group also has a healthy pipeline in the segment, reflecting strong demand.

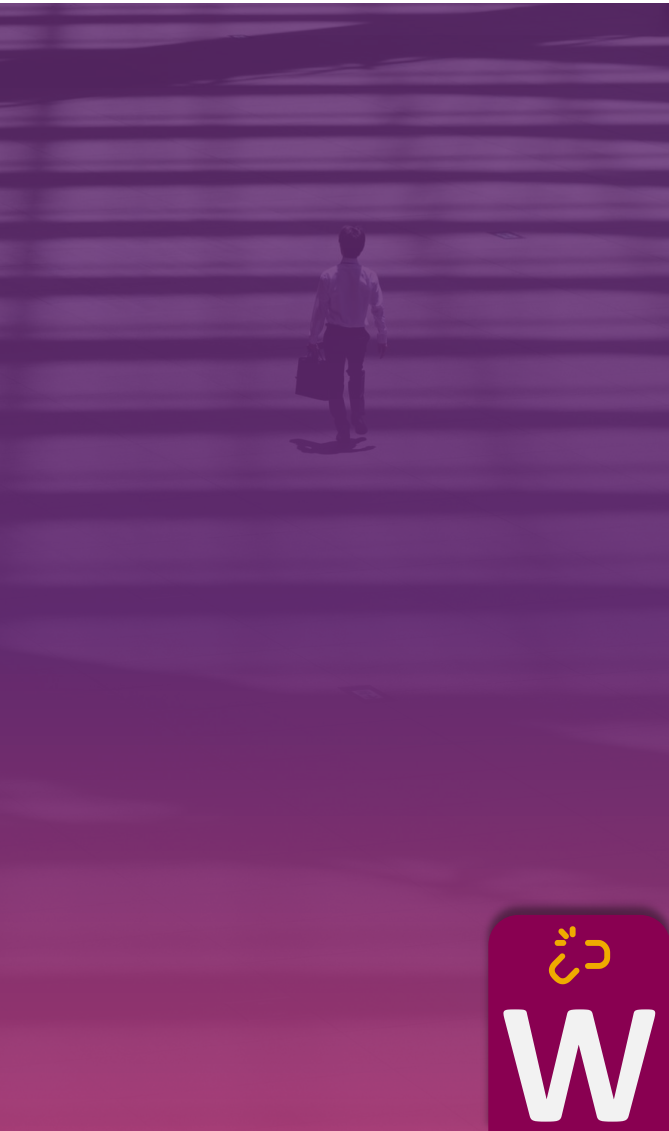


04 Strong Liquidity

- According to Fitch, AstraZeneca's liquidity position is strong, and the debt maturity profile is well spread. The Group's liquidity largely covers short-term maturities of \$1.6 billion. As of 30 June 2020, AstraZeneca had \$5.5 billion in readily available cash (as defined by Fitch after assuming \$500 million of restricted cash).
- Moody's also acknowledged that AstraZeneca's liquidity is 'excellent'. As of 30 September 2020, the Group had a cash balance of \$8 billion and short-term investments of \$0.4 billion. Further liquidity buffer is provided by access to \$4.1 billion of undrawn long-term committed bank facilities (of which \$3.4 billion matures in April 2024 and \$0.7 billion in November 2021, both with extension options), exceeding the Company's \$4 billion of short-term debt (including lease liabilities).



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01 Deleveraging Outlook

- The acquisition of Alexion and the resulting higher leverage would impose a strain between capital allocation priorities such as those including deleveraging through debt reduction, increase in dividend over time and investments (including M&A). Together, these create some uncertainty around AstraZeneca's deleveraging path. The acquisition came at a time when AstraZeneca's credit metrics were not very strong. Therefore, there remains no room for downside deviation in the operating performance. According to Moody's, AstraZeneca's (Moody's adjusted) Gross Debt/EBITDA rating may not fall below 3.0x by the end of 2022.

02 Critical Trial Failures

- AstraZeneca has faced significant amount of failure in some critical drug trials. These include:
 - COVID 19 – In June 2021, AstraZeneca's COVID antibody treatment failed in late-stage clinical trials to achieve its primary goal of preventing symptomatic Covid-19 in people recently exposed to the SARS-CoV-2 virus. A single dose of the AZD7442 long-acting antibody treatment was not effective enough in the trial of 1,121 people in the UK and US.
 - Imfinzi – In August 2019, AstraZeneca disclosed a setback for one of its key cancer treatments. It was held that a trial involving immunotherapy drug Imfinzi was no more effective than a regular chemotherapy at treating advanced lung cancer.
 - MYSTIC – In December 2017, AstraZeneca's PD-L1 inhibitor Imfinzi, when combined with the CTLA-4 blocker tremelimumab, failed to improve PFS in first-line non-small cell lung cancer. As a result, AstraZeneca's stock dropped 15% the day MYSTIC was announced, closing at \$28.88 per share.

03 Lost Opportunities from COVID Vaccine

- AstraZeneca's sales of its Covid-19 vaccine, which it had promised to sell initially without profit, failed to keep up with its costs, resulting in a hit to its earnings. The drug giant booked \$275 million in revenue in the first three months of 2021 from sales of its Covid-19 vaccine, developed in association with the University of Oxford. The Company delivered 68 million doses globally during the first quarter, far short of targets. Most of AstraZeneca's vaccine sales revenue in the quarter, at \$224 million, came from Europe, with \$43 million in sales to emerging-market countries. The numbers pale in comparison with multibillion-dollar sales forecasts of other vaccine makers including Pfizer Inc. and Moderna Inc.



01 Increasing Demand of Pharmaceuticals

- According to estimates from ReportLinker, the global pharmaceutical industry will be worth \$1.57 trillion by 2023, primarily driven by the growing and ageing population in key markets like North America and Asia Pacific. As per World Population Prospects by United Nations, the global population is likely to cross 9.3 billion by 2050 and around 21% of this population will be aged 60 and above. Furthermore, improvements in purchasing power and a wider access to quality healthcare to households worldwide is driving the growth of global pharma industry.
- With the demand for medicines and healthcare tools increasing, the COVID-19 pandemic has also increased the reliance on healthcare industry and created new opportunities for large pharmaceutical companies, in terms of vaccine development. Companies like Gilead and Eli Lilly, who have been in the frontline for covid-19 vaccine development, saw positive growth on the stock market (as of 2020). With fourth quarter sales rising by 12%, AstraZeneca also reported an overall product sales growth of 10% in 2020, as the Company gathered attention for its work developing a coronavirus vaccine.

02 Acquisition of Alexion

- In December 2020, AstraZeneca announced its plans to acquire rare diseases drug development company Alexion, for \$39 billion, making it the largest biopharma acquisition of 2020. Under the partnership, AstraZeneca will work with Alexion's R&D team, to build on Alexion's pipeline of 11 molecules across more than 20 clinical-development programmes across the spectrum of indications, in rare diseases and beyond.
- Rare diseases present a promising area for big pharma companies owing to a couple of reasons. Firstly, pricing is usually very high for these drugs (for example Soliris costs roughly \$600k per year) and insurers typically bear these expenses. Secondly, the marketing costs related to these drugs are also low given their highly specialized nature and limited competition, allowing for better margins. AstraZeneca's acquisition of one of the top players in the rare diseases drug market is expected to help the Company capitalize on its strong commercial portfolio and gain a firm foothold in this market.

03 Advancements in Technology

- Advancement in technologies is helping drug manufacturers go further and faster in monitoring patient safety. They are also helping reduce costs and promote efficiencies by reducing manual input. Technologies such as Artificial Intelligence, Natural language processing, and tailored algorithms can help filter through masses of data to find relevant information, saving time for human workers.
- AstraZeneca is one of the early movers among the Big Pharma companies in implementing AI and data analytics in the drug R&D processes. The Company acknowledges that the utilization of AI in drug R&D provides opportunities for faster molecule discovery at a lesser cost than the competition, thus capturing healthy profit margins. For instance, in December 2020, the Group partnered with Qure.ai to integrate AI for the early detection of lung cancer in patients across the Emerging Markets, covering Latin America, Asia, and the Middle East & Africa.



Source: Company Website, Annual Report, ReportLinker, Fitch Ratings, Moody's



01 Competitive Intensity

- Patent protection for pharmaceutical products is finite. After a patent expires, there is market access for generic alternatives in many important drug classes. The generic alternatives are lower priced because generic manufacturers are largely spared the costs of R&D and market development. For prescriptions dispensed in the US as of 2020, generics constituted 85.3% of the market by volume.
- The sales of many of the popular products of AstraZeneca, including Faslodex and Pulmicort, were also adversely hit in 2020 due to the competition offered by the generic versions of these products in the US and Japan, respectively.

02 Regulatory oversight

- The manufacturing of pharmaceutical and vaccine products and their constituent materials requires compliance with good manufacturing practice regulations. The group's manufacturing sites are subject to review and approval by the FDA and other regulatory agencies.
- Compliance failure by the group's manufacturing facilities or suppliers of critical services and materials could lead to product recalls and seizures, interruption of production, delays in the approval of new products, and revoking of license to operate pending resolution of manufacturing issues. For example, non-compliance with cGMP requirements for US supply could ultimately result in fines and disgorgement of profits in the most severe circumstances. Recently, the European Union filed a lawsuit against AstraZeneca over the supply of Covid-19 vaccines to the bloc. The group had committed to do its best to deliver 300 million doses by the end of June this year, but production delays led it to revise this to 100 million vaccines. The EU has also asked for a penalty of €10 per dose per day for missing the deadline. Such supply interruptions or the incurring of fines or disgorgement could adversely affect the group's business performance.

03 Securing Adequate Pricing and Reimbursement

- Pharmaceutical and vaccine products are subject to price controls or pressures and other restrictions in many markets, around the world. Some governments intervene directly in price determination. Further, in some markets, major purchasers of pharmaceutical or vaccine products (whether governmental agencies or private health care providers) have the economic power to exert substantial pressure on prices or the terms of contracts.
- In the USA, where 33% of the Group's total product sales is made, there are no direct government price controls over private sector purchases, but federal law requires pharmaceutical manufacturers to pay prescribed rebates on certain drugs to be eligible for reimbursement under several state and federal healthcare programs, primarily Medicare and Medicaid. Pricing pressures are likely to increase as the US government's share of national health spending continues to increase.

Management Team (1/4)

Pascal Soriot



**Executive Director and
Chief Executive Officer**

- Dr. Soriot was appointed to the Board as Chief Executive Officer in October 2012.
- Prior to becoming Chief Executive Officer, he served as Chief Operating Officer of Roche's pharmaceuticals division from 2010 to September 2012. He also served as Chief Executive Officer of Genentech, where he led its successful merger with Roche. He has also worked as the General Manager at Hoechst for 24 years in Australia.
- Dr. Soriot holds an MBA from HEC Paris. He is also a Doctor Of Veterinary Medicine.

Aradhana Sarin



**Executive Director and
Chief Financial Officer**

- Ms. Sarin was appointed as an Executive Director and Chief financial Officer of AstraZeneca in August 2021.
- Prior to this appointment, she served as Executive Vice-President, Chief Financial Officer of Alexion, where she joined in 2017. Before joining Alexion, Ms. Sarin was Managing Director of Healthcare Corporate and Investment Banking at Citi Global Banking, focusing on clients in the life sciences and biopharmaceutical sectors. Previously, she served as Managing Director of Healthcare Investment Banking at UBS and worked at JP Morgan in the M&A Advisory and Healthcare groups.
- Ms. Sarin completed her medical training at the University of Delhi and received her MBA from Stanford Business School.

Katarina Ageborg



**EVP, Sustainability and Chief Compliance
Officer; President, AstraZeneca AB, Sweden**

- Ms. Ageborg was appointed Executive Vice-President, Sustainability in 2017 and has been a member of SET since 2011. She leads the Global Sustainability function, including teams focusing on Compliance, and Safety, Health and Environment. She was also appointed President of AstraZeneca AB (Sweden) in 2018.
- Prior to her current roles, Ms. Ageborg led the Global IP function from 2008 to 2011 and she ran her own law firm before joining AstraZeneca in 1998.
- Ms. Ageborg holds a Master of Law Degree from Uppsala University School of Law in Sweden.

Management Team (2/4)

Susan Galbraith



Executive Vice-President, Oncology R&D

- Ms. Galbraith was appointed as EVP, Oncology and R&D in June 2021 and is responsible for the Group's Oncology portfolio from discovery through to late-stage development.
- Ms. Galbraith joined AstraZeneca from Bristol-Myers Squibb in 2010. She is a member of the Cambridge Cancer Centre Executive Committee. She is also on the Scientific Advisory Board of the Institute of Cancer Research. In 2021, she was elected to the American Association for Cancer Research Board of Directors and served on the European Association of Cancer Research Advisory Council.
- Ms. Galbraith studied medicine at Manchester and Cambridge Universities and has a Ph.D. from the University of London.

Pam Cheng



Executive Vice-President, Operations and Information Technology

- Ms. Cheng joined AstraZeneca in June 2015 as Executive Vice President - Global Operations & IT.
- Prior to joining the Group, she had 18 years of experience with Merck/MSD in Global Manufacturing and Supply Chain and Commercial roles. Before joining Merck, Ms. Cheng held various engineering and project management positions at Universal Oil Products, Union Carbide Corporation and GAF Chemicals.
- Ms. Cheng holds a Bachelor's and a Master's degrees in Chemical Engineering from Stevens Institute of Technology in New Jersey and an MBA in Marketing from Pace University in New York.

Ruud Dobber



EVP and President, BioPharmaceuticals Business Unit

- Mr. Dobber was appointed Executive Vice-President, BioPharmaceuticals Business Unit, in January 2019 and is responsible for product strategy and commercial delivery for CVRM, Respiratory and Immunology, Neuroscience and Infection.
- He joined AstraZeneca in 1997 and has held various senior commercial and leadership roles, including Executive Vice-President, Europe. Mr. Dobber was also responsible for developing the Group's late-stage, small molecule antibiotic pipeline and its global commercialization. He was Regional Vice-President for the EMEA region, Regional Vice-President for the Asia Pacific region and Interim Executive Vice-President, GPPS.
- Mr. Dobber holds a doctorate in immunology from the University of Leiden, Netherlands.

Management Team (3/4)

David Fredrickson



Executive Vice-President, Oncology Business Unit

- Mr. Fredrickson was appointed Executive Vice-President, Oncology Business Unit, in October 2017 and has global accountability for marketing, sales, medical affairs and market access in Oncology.
- Previously, he served as President of AstraZeneca K.K. in Japan, and Vice-President, Specialty Care in the US. Before joining AstraZeneca, he worked at Roche/Genentech, where he served in several functions and leadership positions, including Oncology Business Unit Manager in Spain, and strategy, marketing and sales roles in the US.
- Mr. Fredrickson is a graduate of Georgetown University in Washington, DC.

Menelas (Mene)
Pangalos



Executive Vice-President, BioPharmaceuticals R&D

- Mr. Pangalos was appointed as Executive Vice-President, BioPharmaceuticals R&D in January 2019 and is responsible for R&D from discovery through to late-stage development across CVRM, Respiratory and Immunology, Neuroscience and Infection.
- Prior to this, he served as Executive Vice-President of AstraZeneca's IMED Biotech Unit and Global Business Development. Before joining AstraZeneca, Mr. Pangalos held various senior R&D roles at Pfizer, Wyeth and GSK.
- Mr. Pangalos is a Fellow of the Academy of Medical Sciences, the Royal Society of Biology and Clare Hall, University of Cambridge. He is also on the Boards of the Francis Crick Institute, the Judge Business School and Dizal Pharma.

Iskra Reic



Executive Vice-President, Europe and Canada

- Ms. Reic was appointed Executive Vice-President (EVP), Europe & Canada, in February 2019 and is responsible for sales, marketing and commercial operations across the Group's businesses in 30 European countries and Canada.
- Ms. Reic joined AstraZeneca in 2001 and has held a variety of in-market, regional sales and marketing and general management roles, including in Europe as Head of Specialty Care, Central & Eastern Europe, Middle East and Africa. In 2012 she joined AstraZeneca Russia as Marketing Director and in 2016, she was made Area Vice-President for Russia and Eurasia.
- Ms. Reic has an International Executive MBA in Business and Leadership from the IEDC-Bled School of Management, Slovenia.

Management Team (4/4)

Leon Wang



**Executive Vice-President,
International**

- Mr. Wang joined AstraZeneca China in 2013 as a Vice-President and became President in 2014.
- Prior to this, Mr. Wang had 20 years of experience in the pharmaceutical industry and served in a series of positions in Marketing And Business Leadership at Roche. He served as Business Unit Director at Roche from 2010 to 2013.
- Mr. Wang holds a Bachelor of Arts from Shanghai International Studies University and an EMBA from China Europe International Business School.

Jeff Pott



**Executive Vice-President,
Human Resources and General Counsel**

- Mr. Pott was appointed General Counsel in January 2009 and has overall responsibility for all aspects of AstraZeneca's Legal and IP function. In addition to his role as General Counsel, he was appointed Chief Human Resources Officer in January 2021, assuming additional responsibilities for the AstraZeneca Human Resources function.
- Before joining AstraZeneca, he spent five years at the US legal firm Drinker Biddle and Reath LLP. During his tenure at the firm, he specialized in pharmaceutical product liability litigation and anti-trust advice and litigation.
- He received his Bachelor's degree in Political Science from Wheaton College and his Juris Doctor Degree from Villanova University School of Law.

Marc Dunoyer



**Chief Executive Officer,
Alexion**

- Mr. Dunoyer became the Chief Executive Officer of Alexion, AstraZeneca's Rare Disease group, in August 2021, following its acquisition in July.
- Prior to this, he served as an Executive Director and AstraZeneca's Chief Financial Officer from November 2013. He joined AstraZeneca in 2013, serving as Executive Vice-President, Global Product and Portfolio Strategy, from June to October 2013. Prior to that, he served as Global Head of Rare Diseases at GSK and Chairman, GSK Japan.
- Mr. Dunoyer holds an MBA from HEC Paris and a Bachelor of Law degree from Paris University.



Alchemy Research and Analytics

Web: www.alchemy-research.com

Email: info@alchemy-research.com



Presented by:
Alchemy Research and Analytics
N.N. Bose Road, Durgapur
West Bengal – 703211
India