Alexion Pharmaceuticals

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TABLE OF CONTENTS

Company Overview

Overview

- Founded in 1992 and currently headquartered in Boston
- Alexion Pharmaceutical is a pharmaceutical research company focusing on autoimmune and cardiovascular diseases
  - Specifically, Alexion designs therapeutic compounds that target segments of the immune system that cause disease

Operating Segments

- Soliris
  - Designed to treat inflammation associated with chronic diseases, mainly Paroxysmal Nocturnal Hemoglobinuria (PNH) and atypical Hemolytic Uremic Syndrome (aHUS)
- Strensiq
  - Targeted enzyme replacement therapy and is the only approved therapy for Hypophosphatasia (HPP)
- Kanuma
  - Only enzyme replacement therapy approved for treatment of Lysosomal acid lipase deficiency (LAL-D)

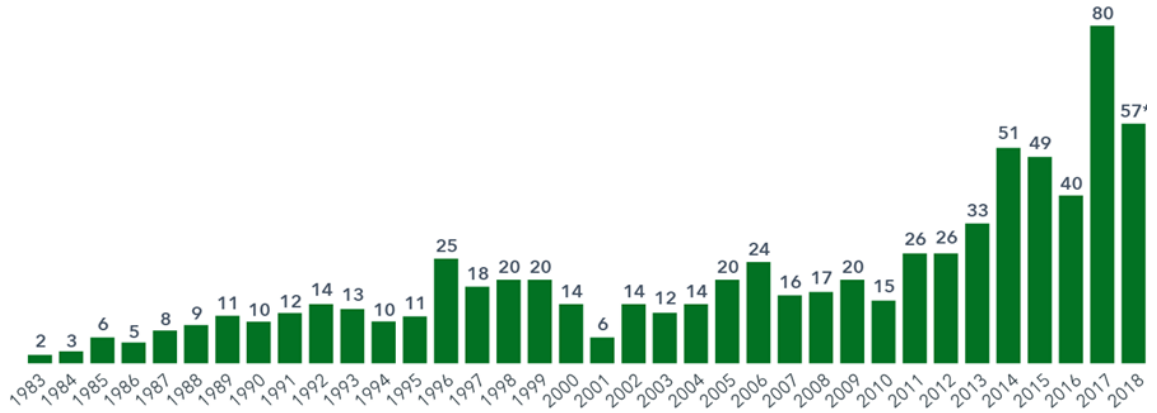
Geographic Presence

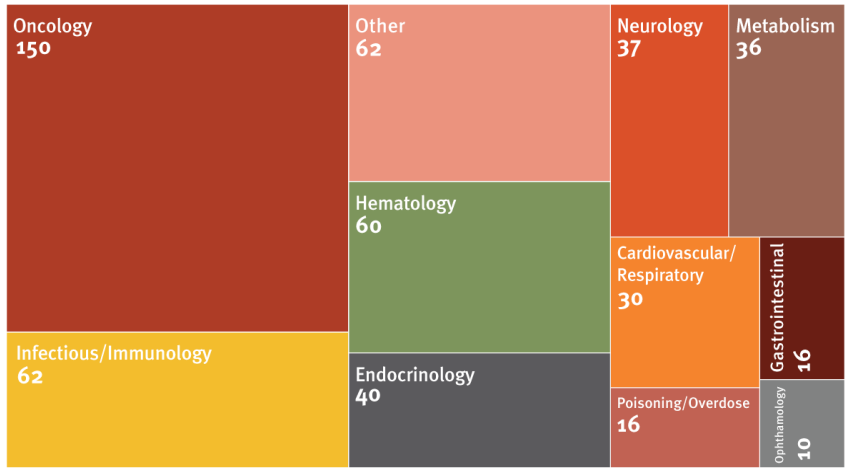
- United States
  - 48.8% of total revenue
- Europe
  - 27.1% of total revenue
- Asia Pacific
  - 10.0%

	Year Ended December 31,		
	2018	2017	2016
SOLIRIS			
United States	$ 1,588.4	$ 1,235.0	$ 1,058.5
Europe	1,036.7	985.2	939.7
Asia Pacific	382.0	328.1	303.8
Rest of World	555.9	595.8	541.2
	$ 3,563.0	$ 3,144.1	$ 2,843.2
STRENSIQ			
United States	$ 374.3	$ 280.1	$ 177.5
Europe	61.7	35.6	15.3
Asia Pacific	27.9	18.6	13.0
Rest of World	11.2	5.5	3.6
	$ 475.1	$ 339.8	$ 209.4
KANUMA			
United States	$ 51.3	$ 42.4	$ 20.4
Europe	21.6	14.6	6.3
Asia Pacific	3.7	2.7	1.3
Rest of World	15.4	5.9	1.1
	$ 92.0	$ 65.6	$ 29.1
Total Net Product Sales	4,130.1	$ 3,549.5	$ 3,081.7

End Markets

- End customer
  - Hospital
  - Private/government pharmacy
  - Health care facility
- Ultimately paid through health insurance
  - Co-payment is dependent of the drug's designation
- Increased sensitivity toward reimbursement
  - Heightened orphan drug approvals + rising prices
  - Coverage determined by a drug's value



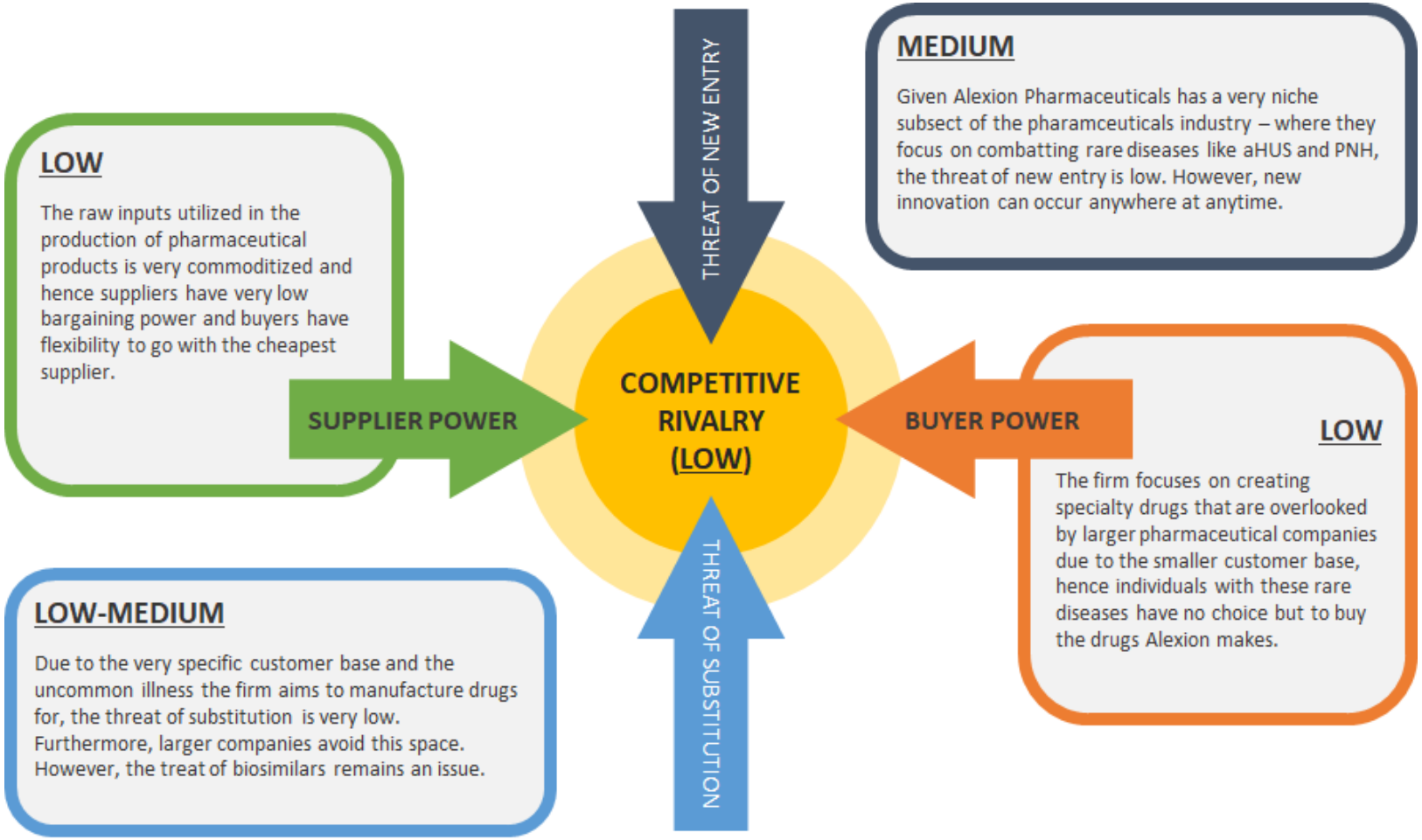


Segment Trends

- Increasingly competitive generic landscape
  - Shifting towards niche blockbusters
  - Increasing pressure on payers
- Stringent regulatory guidelines
  - Patent extensions (Ultomiris)
- Political pressure
  - Bipartisan support for drug pricing initiative

Industry Overview

Porter's 5 Forces



Key Competitors

- Soliris Biosimilars
  - Amgen/Samsung Bioepis (USA)
  - Generium (Russia)
- Non-Pharmaceutical Treatments
  - Immunosuppressives
    - Sanofi Genzyme - Thymoglobulin
    - Cyclosporine
      - Novartis – Sandimmune/Neoral
      - Abbvie – Gengraf
  - Supportive Care (Iron supplements, blood transfusions)
    - Nature's Bounty

Shorter Competitive Landscape

Company	Speciality	Product Example	Total Number of Drugs	Market Cap	EBITDA (TTM)
Amgen	Recombinant DNA Technology	Neulasta (Immunostimulatory for Cancer)	~ 20	$131.38 B	$11.96 B
Johnson & Johnson	Immunology, Neuroscience, Infectious Diseases & Oncology	Remicade (Treats Crohn's Disease & Colitis)	~ 70	$350.04 B	$28.26 B
Celgene Corp	Cancer & Inflammatory	Revlimid (Treats Multiple Myeloma)	~ 11	$77.96 B	$8.98 B
Bristol Myers Squibb	Prescription Pharmaceuticals & Biologics	Opdivo (Treats Metastatic Melanoma)	~ 16	$94.53 B	$7.77 B

Competitive Edge – Product Differentiation

- Unique, patent-protected product (Ultomiris)
  - Ultomiris vs. Soliris/Soliris biosimilars
    - One dosage every 8 weeks instead of every 2 weeks
    - Cheaper treatment
    - Potentially “more potent”
  - Patent protection and regulatory approval in US/EU/Japan

Competitive Edge – Sector Expertise

- Niche Sector – rare/ultra-rare diseases
  - Difficult to identify sufficient numbers of patients for clinical trials; often needs a large number of trial sites across multiple countries
  - Increased regulatory risks
    - usually no approved therapy for a given ultra-rare disease
    - no well-established road map for regulatory approval.
  - Increased cost and risk for manufacturing - most treatments are complex biologics
  - Requires significant physician education, patient support and post-marketing research
- Demonstrated Sector Expertise
  - Developed the only two FDA approved complement inhibitors for PNH
  - Global presence

Thesis Point 1: Orphan Drug Efficiency

Orphan Drug Sector

- Orphan drugs, though they have smaller consumer bases, carry larger price tags and numerous market exclusivity benefits
  - These protections incentivize first-movers, but disincentive competitors, as market exclusivities help strongly entrench these first-movers and create long-term revenue generators
  - Strong positioning in orphan drug segments entails long periods of marketing exclusivity and higher margins, with insurance companies willing to bear the cost of expensive treatments due to the lesser amount of patients with orphan diseases
- The orphan drug sector is projected to grow at a CAGR of 12.3% from 2019-2024 to around $242 billion in sales
  - This figure is expected to amount to account for over 20% of worldwide prescription sales, growing from just under 16% in 2019

The Financial Advantages of Orphan Drugs

Exclusivity Protections

Orphan drug exclusivity

During the period of marketing exclusivity, the regulatory bodies are barred from approving the same product for the same orphan indication. A product holding several separate orphan designations for different indications can have several separate market exclusivities, which can run concurrently.

- **US:** Seven years of marketing exclusivity from approval.
- **EU:** Ten years of marketing exclusivity from approval.
- **Japan:** Ten years registration validity period (also known as re-examination period).

Cost Reductions

Reduced R&D costs, tax credits, and fees

- **US:** 50% Tax Credit on R&D Cost (owing to new tax legislation, likely to decrease to 25%).
- **US:** R&D Grants for Phase I to Phase III Clinical Trials.
- **US:** User fees waived (FFDCA Section 526: Company WW Revenues <$50m).

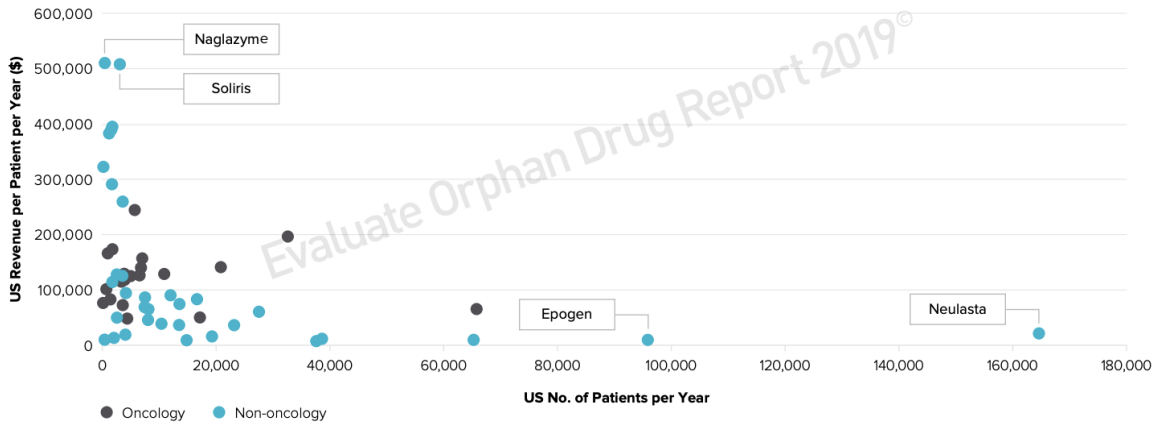
Alexion's Margins and Efficiency

- Alexion has shown an ability to maintain efficient asset utilization ratios, with a Sales to Total Assets ratio of 0.32, 54% above the industry average of 0.21
- Sales are expected to grow at a rate of 17.2% vs. an industry average of 4.9%
- This sales growth is paired with gross margins consistently around 90% and EBITDA margins between 30 – 40%
  - 2018's EBITDA margin was 16%, but only because of two drug acquisitions that accounted for $1.2 bn of incurred expenses. Without these expenses, which produced no revenue in 2018, EBITDA margin would have sat comfortably at 38.4%

The Orphan Drug Margin Advantage

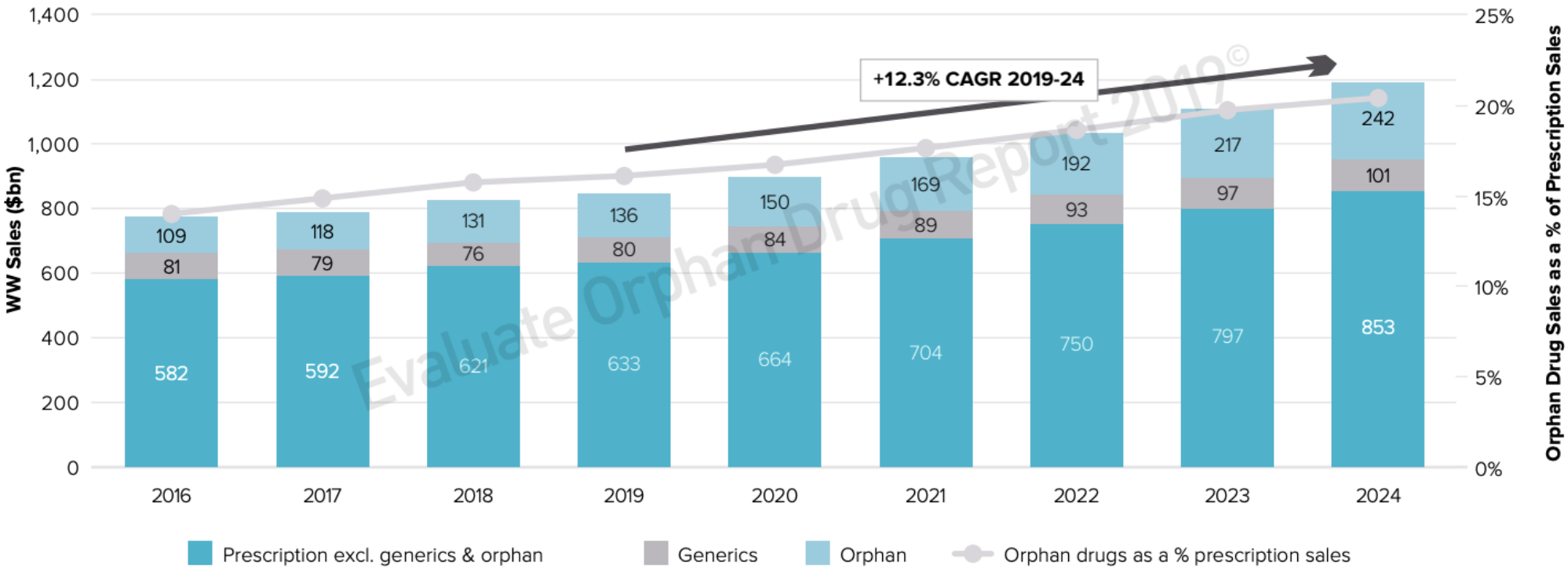
- Pricing flexibility is much higher for orphan drugs, as downward pricing pressure (from both insurance companies and regulatory bodies) is low
  - Insurance companies typically act as market-based price indicators
  - Regulatory bodies must take care not to disrupt incentives for orphan drug developers

Figure 4: 2018 US Revenue per Patient vs. Number of Patients Treated

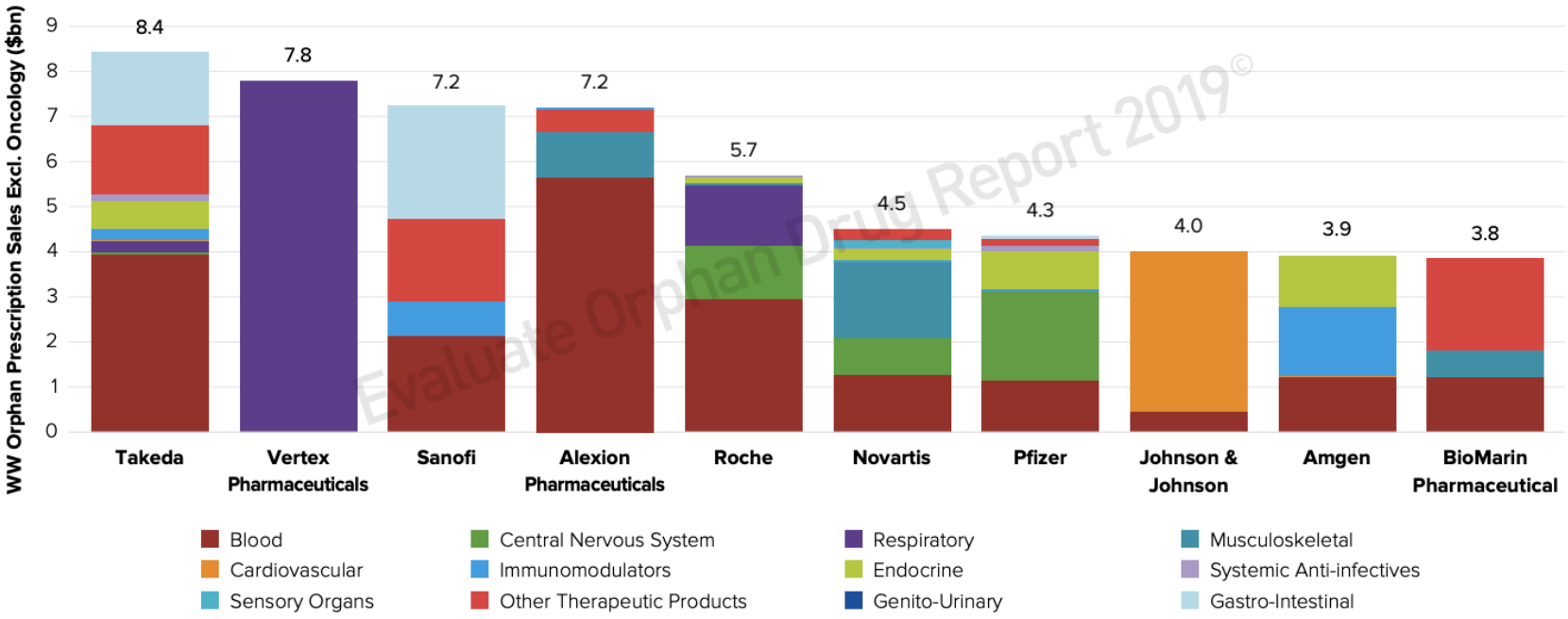


Thesis Point 2: Alexion's Pipeline Positioning

Orphan Drug Growth



Alexion's Positioning

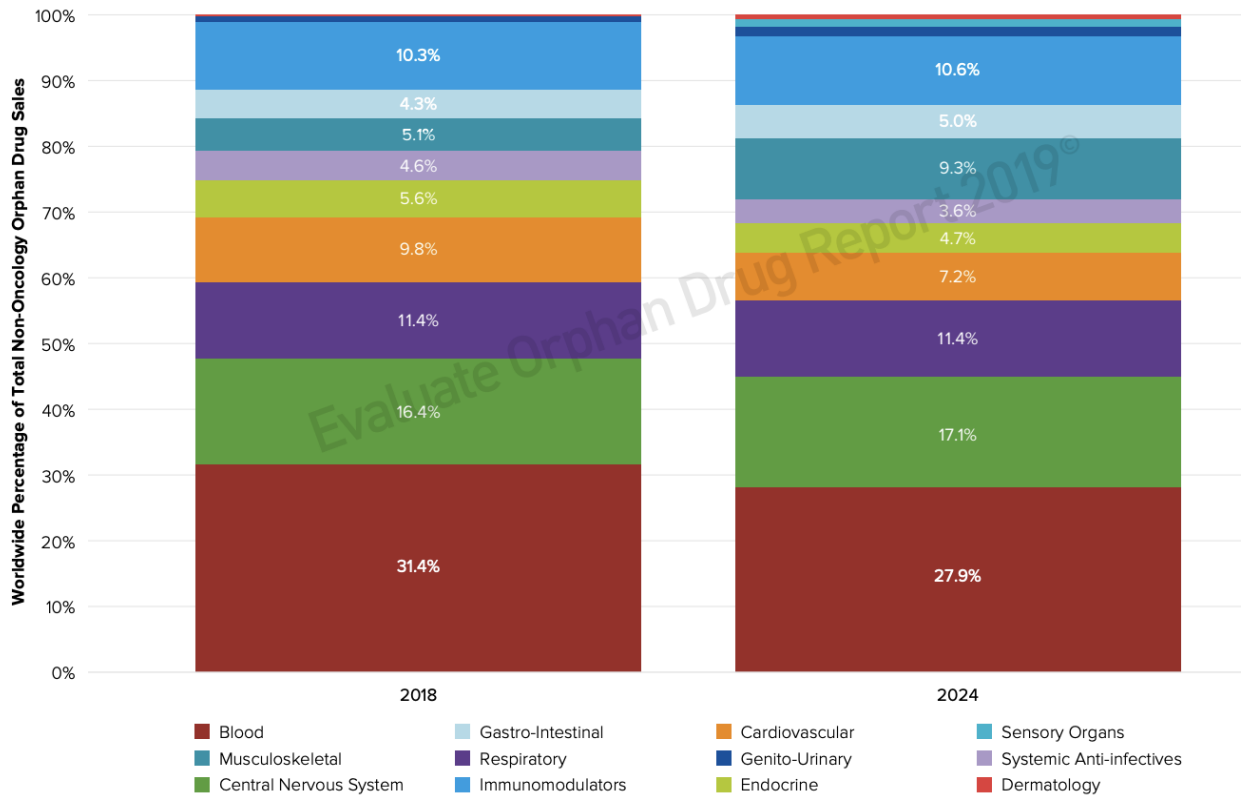


Pipeline

- Current Drugs
  - PNH (blood)
  - AHUS (blood)
  - gMG (musculoskeletal)
- New Approvals
  - NMOSD (CNS)
- Exploratory Areas
  - ALS (CNS)
  - MS (CNS)

Alexion's Positioning

Figure 7: Share of Worldwide Non-Oncology Orphan Drug Sales by Therapeutic Category (2018 & 2024)



Pipeline

- Current Indications
  - PNH (blood)
  - AHUS (blood)
  - gMG (musculoskeletal)
  - Metabolic Disorders
- New Approvals
  - NMOSD (CNS)
- Exploratory Areas
  - ALS (CNS)
  - MS (CNS)

Pipeline Construction

- Alexion's Soliris treats three indications: PNH, NMOSD, and gMG, indicating the unique versatility of a one drug-many disease approach
- Alexion has the next generation version of Soliris (Ultomiris) approved for PNH and aHUS and is in Phase 3 trials to get the drug approved for the other two indications along with HSCT-TMA
- Further treatments have massive sales potential as well:
  - Strensiq: $1.2 billion in peak sales by 2025
  - Kanuma: $1.1 billion in peak sales by 2025
  - NMOSD Treatments: $1.0 billion in peak sales by 2026
  - ALXN1830: $802 million in peak sales by 2026
  - ALXN1840: $234 million in peak sales by 2025

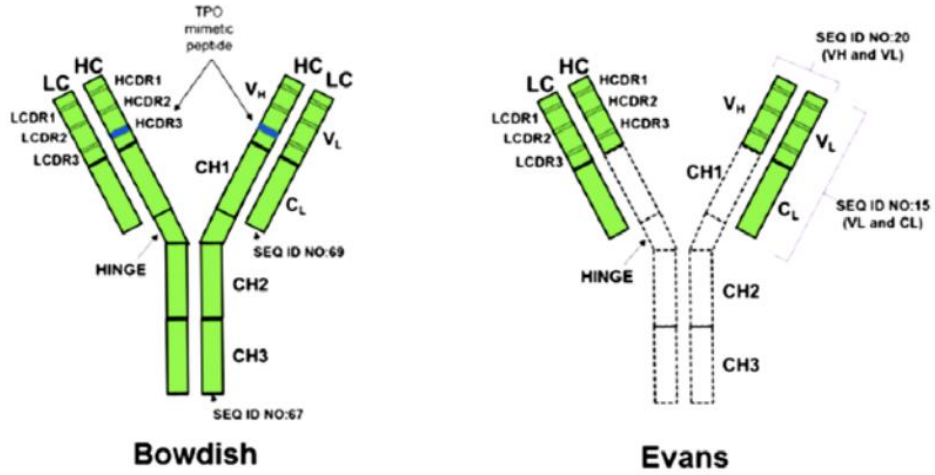
Thesis Point 3/Major Risk:
Amgen Case – The Undervaluation Story

The Risk – Inter Partes Review Case

- An Amgen case for inter partes review (IPR) has led the Patent Trials and Appeal Board to review three patents regarding Soliris – Alexion's current lead drug
  - Patents relate to protections of Soliris's structure, formulation, and application to treating PNH and the extension of these protections from 2022 to 2027
- Each review request comes under claims of "anticipation and obviousness"
  - Each review request was presented under at least 4 grounds (7, 5, and 4 grounds) and advanced under a combination of two prior Alexion patents (referred to as Bowdish and Evans)
- If the case is ruled against Alexion (i.e. if Amgen's challenge is successful) the three patents can be rendered invalid

Amgen's Argument

- Amgen is arguing that the patents related to Soliris's formulation could have been anticipated by prior "artwork" latent within old Alexion patent filings
  - The primary papers in question were filed in 2001 and 2002 under Katherine Bowdish and Mark Evans
  - Bowdish provided a primary antibody scaffold, which is revealed to have provided the encoded sequence of Soliris, with the exception of one CDR3 sequence provided by Evans



The Case at Hand

- The IPR case, which is going to trial, will depend on three events
  - Alexion's cross examination of Amgen's expert testimony
  - The ability to prove a sufficient motivation to combine the two structures without hindsight
  - A consideration of objective indications of non-obviousness
    - These come in the form of sales, industry praise, and awards/recognition
- Important Considerations
  - Soliris has won Prix Galien Awards (the equivalent of the Nobel Prize in biotechnology) in both the United States and France
  - The PTAB acknowledges both the institutional recognition of Soliris and its sales performance (each of which are considered indicators of non-obviousness)
  - Antibodies patented by structure (which Soliris is) are generally protected more so than more general functional claims

Investor Reaction

- The headline appearance of the patent case gives off a greater appearance of risk than is actually present
  - Soliris made up 88% of Alexion's revenue in 2018
- However, sell-side analysts remain level-headed and optimistic
  - Contextual factors (next-gen drugs, Amgen's biosimilar capability) mitigate much of the risk of the patent case even if lost
  - The nature of the process (and its component steps) creates event risk and the resultant arbitrage opportunity

Necessary Context - Positive Outlook

- Alexion has a wide range of legal protections and litigation options
  - Patents and market exclusivity are independent of one another
  - Alexion can bring the case to court and further litigate (or settle)
  - The case still has to undergo IPR review (analysts rate the case at 50/50)
- Switching to Ultomiris provides a massive competitive advantage and a competitive moat
  - Reduced cost relative to Soliris
  - Massive quality of life improvement
  - Extended protections (both market exclusivity and patent)
- Amgen's biosimilar is still years away from deployment
  - Analysts agree that the worst-case release date is 2022, with 8-12% projected erosion

Thesis Risk: Regulatory Pressure

Pharmaceuticals Regulation

- Greater political capital is being dedicated to lowering drug prices, but only two types of policy would significantly disrupt Alexion's operations
  - Greater involvement from courts in favoring patent challenges
  - Price ceilings that cap drug prices at certain levels
- Each of these policies would be massive shifts in how the industry is regulated, and to do so with orphan drugs would be an even larger step
  - There is a large amount of political capital that needs to be spent between the status quo and an industry where orphan drug prices are regulated
- The only foreseeable steps in reducing prices in the near future will likely **not** affect a company like Alexion with established patents in the orphan drug sector

Valuation

Key Assumptions

- Revenue projections based on linear approach to peak sales estimates
- 33% Probability Weight assigned to drugs in Phase 3 trials
- 70% conversion of PNH patients to Ultomiris by mid 2020
- Soliris/Ultomiris revenue assigned based on disease prevalence, with PNH overweighed due to prior introduction
  - 51% conversion already achieved as of Q3 earnings
- 50% probability of Amgen case loss priced in (with analyst projected earnings erosion)
  - Worst case biosimilar introduction date used
- Pre-purchased acquisition options (mainly CAEL101) excluded

Revenue Build

Revenue Build for Alexion Pharmaceuticals											
Fiscal Year Ended	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Net revenues:											
Soliris (PNH, aHUS, gmG)	$ 2,591.50	$ 2,843.00	$ 3,144.10	$ 3,563.00	$ 3,953.00	$ 2,725.35	$ 2,515.32	$ 2,476.92	$ 2,229.23	$ 2,117.77	$ 2,011.88
Ultomiris (PNH, aSUS)	$ -	$ -	$ -	$ -	$ 253.80	$ 1,878.99	$ 2,554.88	$ 3,093.91	$ 3,438.37	$ 3,821.17	$ 4,246.59
Strensiq	$ 12.00	$ 210.00	$ 339.80	$ 475.10	$ 546.37	$ 655.30	$ 764.24	$ 873.18	$ 982.12	$ 1,091.06	$ 1,200.00
Kanuma	$ -	$ 29.00	$ 65.60	$ 92.00	$ 111.32	$ 276.10	$ 440.88	$ 605.66	$ 770.44	$ 935.22	$ 1,100.00
NMOSD (Soliris and Ultomiris)	$ -	$ -	$ -	$ -	$ -	$ 142.86	$ 285.71	$ 428.57	$ 571.43	$ 714.29	$ 857.14
ALXN1830 (WAIHA, gmG)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 164.06	$ 190.57	$ 209.06
ALXN1840 (Wilson's Disease)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 78.00	$ 156.00	$ 234.00
Ultomiris (ALS, MLS)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total net revenues	**2,603.50**	**3,082.00**	**3,549.50**	**4,130.10**	**4,864.49**	**5,678.60**	**6,561.04**	**7,478.25**	**8,233.65**	**9,026.08**	**9,858.68**
Growth		18.4%	15.2%	16.4%	17.8%	16.7%	15.5%	14.0%	10.1%	9.6%	9.2%

DCF Outputs

Exit EBITDA multiple approach	
Terminal year EBITDA	4,081.6
Terminal value EBITDA multiple	*13.0x*
Terminal value	53,061.3
Present value of terminal value	26,719.4
Present value of stage 1 cash flows	7,211.8
Enterprise value	**33,931.1**

Fair value per share	
	EBITDA Exit
Enterprise value	33,931.1
Less: Net debt	1,136.2
Equity value	**32,794.9**
Diluted shares	223.5
Equity value per share	**$146.73**
Market upside (downside)	**38.4%**

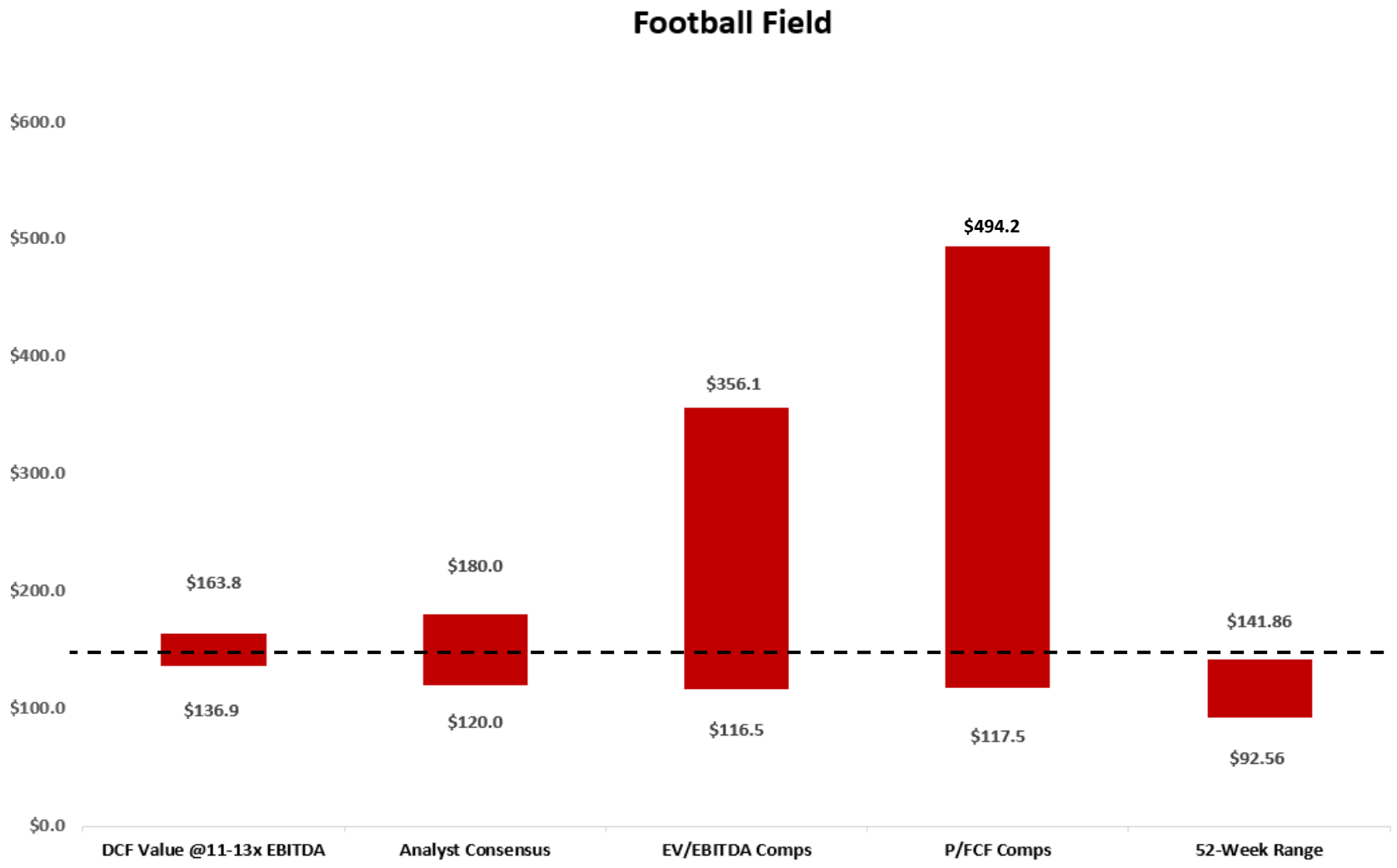
Price Target	% Change
146.73	38.43%

Sensitivity Analysis - Comparable Approach						
		EV / EBITDA Multiple				
		11.0x	12.0x	13.0x	14.0x	15.0x
WACC	12.63%	125.06	134.01	142.95	151.90	160.84
	12.38%	126.64	135.70	144.77	153.83	162.90
	12.11%	128.34	137.54	146.73	155.93	165.13
	11.86%	129.97	139.29	148.61	157.93	167.25
	11.61%	131.62	141.06	150.51	159.96	169.40

Trading Comps

Company Information				Market Valuation					Valuation Metrics						Beta Calculation		
Ticker	Country	Identifier	Firm	Share price	Shares Out	Market Cap	Net Debt	Preferred Equity & NCI	EV/ EBITDA	EV/ EBIT	EV/ Sales	P/E	P/FCF	P/B	Raw Beta	Tax rate	Unlevered Beta
ALXN	US	ALXN US EQUITY	Alexion Pharmaceuticals Inc	$106.63	223.5	$23,831.8	$1,642.7	$0.0	7.2x	7.9x	4.4x	9.6x	11.1x	#N/A N/A	1.54	21.00%	1.46
Competitors																	
VRTX	US	VRTX US EQUITY	Vertex Pharmaceuticals Inc	$195.97	255.2	$50,006.1	($3,138.8)	$0.0	21.4x	23.3x	10.2x	31.0x	46.7x	#N/A N/A	1.19	21.00%	1.25
REGN	US	REGN US EQUITY	Regeneron Pharmaceuticals Inc	$324.49	109.0	$35,371.4	($3,856.4)	$0.0	8.0x	8.8x	3.7x	12.8x	14.1x	#N/A N/A	1.08	4.27%	1.21
Top Quartile						$42,688.8			7.2x	7.9x	3.7x	9.6x	11.1x		1.36		1.36
Mean						$36,403.1			12.2x	13.3x	6.1x	17.8x	24.0x		1.27		1.31
Median						$35,371.4			8.0x	8.8x	4.4x	12.8x	14.1x		1.19		1.25
Bottom Quartile						$29,601.6			21.4x	23.3x	10.2x	31.0x	46.7x		1.13		1.23

Football Field



Conclusion

Conclusion

- Alexion is currently well positioned in orphan drug therapeutic areas with strong growth potential in the near future
- Because of its positioning in orphan drugs, Alexion is able to maintain high profitability margins and leverage assets into returns efficiently
- The Amgen case provides a situation of undervaluation that gives the fund the opportunity to buy in at a lower than normal price
  - There are strong indications that the case can be won
  - Even if Alexion is to lose, several factors are at play to severely mitigate any downside risk of a loss

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Appendix

Market Information

Trading History – 3 Year Correlation Matrix

3 Year Stock Correlation Matrix	Pfizer (PFE)	Merck (MRK)	Amgen (AMGN)	Johnson & Johnson (JNJ)	Celgene (CELG)	Bristol Myers Squibb (BMY)	VIX	SPDR S&P 500 ETF (SPY)	Healthcare Select Sector SPDR ETF (XLV)	iShares 7-10 Year Treasury Bond ETF (IEF)	Teva (TEVA)
Alexion Pharmaceuticals (ALXN)	-0.0295	-0.1413	-0.1441	-0.0245	0.3548	0.1041	-0.4180	-0.1850	0.2580	0.0170	0.2398

-Shows inherent trading pessimism as it has negative correlation with SPY

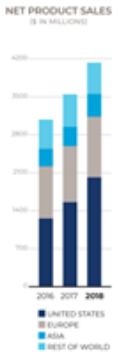
-Medium strength positive correlation with TEVA – portfolio construction issues as it amplifies our directional bet on TEVA.

-Medium strength positive correlation with Healthcare ETF, has underperformed the larger healthcare sector (the ETF itself is up 8.55% over 1 Year, market value)

Further Geographical Patterns

Region	Net Sales – 2016 (% of Total)	Net Sales – 2017 (% of Total)	Net Sales – 2018 (% of Total)	Overall Change (%) (2016 – 2018)
United States	40.770	43.879	48.764	+19.608
Europe	31.194	29.170	27.118	-13.067
Asia Pacific	10.322	9.843	10.014	-2.984
Rest of the World	17.714	17.108	14.104	-20.379

Net Sales	2016 (Millions, $)	2017 (Millions, $)	2018 (Millions, $)	Overall Change (%)
Total Net Sales	3,081.7	3,549.5	4,130.1	+34.020



Competitive Landscape

Key Competitors

- Soliris Biosimilars
  - Amgen/Samsung Bioepis (USA)
  - Generium (Russia)
- Non-Pharmaceutical Treatments
  - Immunosuppressives
    - Sanofi Genzyme - Thymoglobulin
    - Cyclosporine
      - Novartis – Sandimmune/Neoral
      - Abbvie – Gengraf
  - Supportive Care (Iron supplements, blood transfusions)
    - Nature's Bounty

Competitive Edge – Product Differentiation

- Unique, patent-protected product (Ultomiris)
  - Ultomiris vs. Soliris/Soliris biosimilars
    - One dosage every 8 weeks instead of every 2 weeks
    - Cheaper treatment
    - Potentially “more potent”
  - Patent protection and regulatory approval in US/EU/Japan

Competitive Edge – Sector Expertise

- Niche Sector – rare/ultra-rare diseases
  - Difficult to identify sufficient numbers of patients for clinical trials; often needs a large number of trial sites across multiple countries
  - Increased regulatory risks
    - usually no approved therapy for a given ultra-rare disease
    - no well-established road map for regulatory approval.
  - Increased cost and risk for manufacturing - most treatments are complex biologics
  - Requires significant physician education, patient support and post-marketing research
- Demonstrated Sector Expertise
  - Developed the only two FDA approved complement inhibitors for PNH
  - Global presence

Macro Trends

- Business Cycle
  - Drugs to treat chronic conditions are things people will spend money on independent of the business cycle
  - Uncertain how many current Soliris users will switch to Ultomiris, especially if costs of biosimilars are cheaper – management is pretty confident they'll be able to convert vast majority over
- Regulation
  - Could be exposed to increased regulation/scrutiny of drug pricing and patents, especially if Democrats gain influence in the government. Most of their revenues relies on the high margins from their one blockbuster drug (Soliris)
- Insurance Access
  - If people have more access to insurance, they could have a higher propensity to spend on switching to new drugs/paying for a name brand as opposed to a generic

Margin/Operating Efficiency

- Soliris - 5th most expensive drug in the U.S.
- Alexion GAAP Operating Margin Guidance December 31,2019
  - Low - 36%
  - High - 43%