Regeneron Pharmaceuticals

Fundamentals of Investing

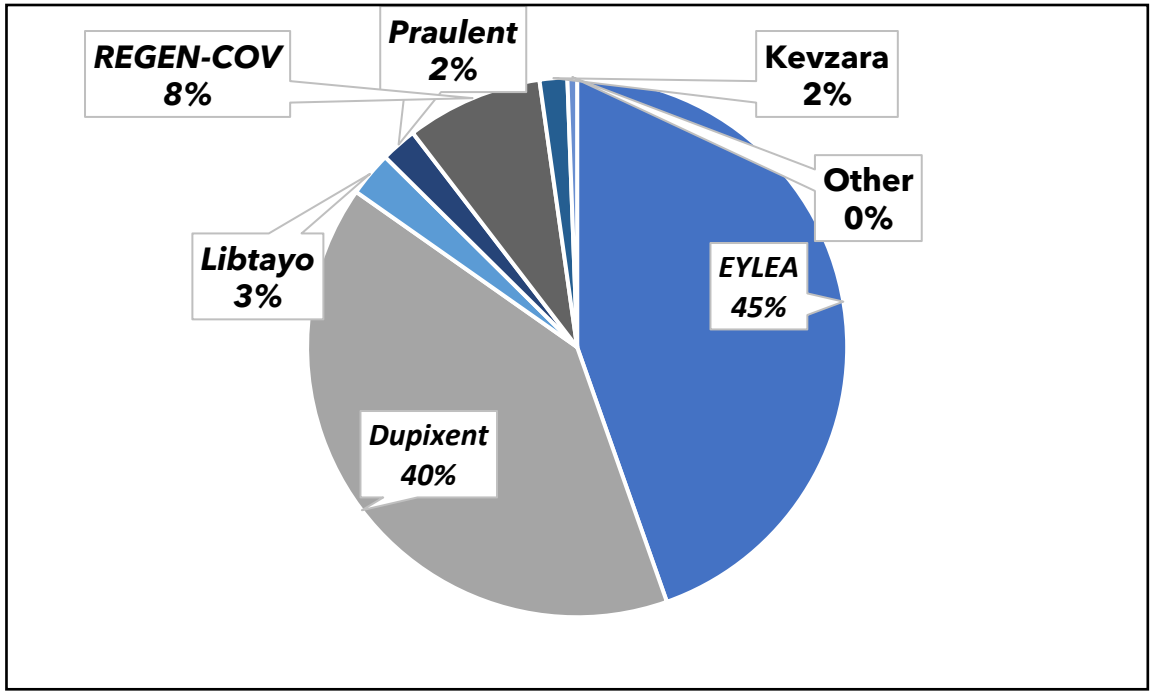
Siddharth Shrimal

Understanding the business

Regeneron pharmaceuticals is a biotechnology company that invents and commercialises medicines for diseases such as:

- Eye diseases
- Allergy and inflammation
- Cancer
- Cardiovascular
- Infectious and rare diseases

- The company is 35 years old and currently has 9 FDA approved medicines.
- REGN produces biologics- protein medicines that are made in living cells. It analyses genetic variation and relies on therapies to cure it.



Medicines	Sales in USD million
EYLEA	9647.4
Dupixent	8681.2
Libtayo	578
Praulent	467.4
REGEN-COV	1769.6
Kevzara	358
Other	125.2

What do their main medicines do?

EYLEA

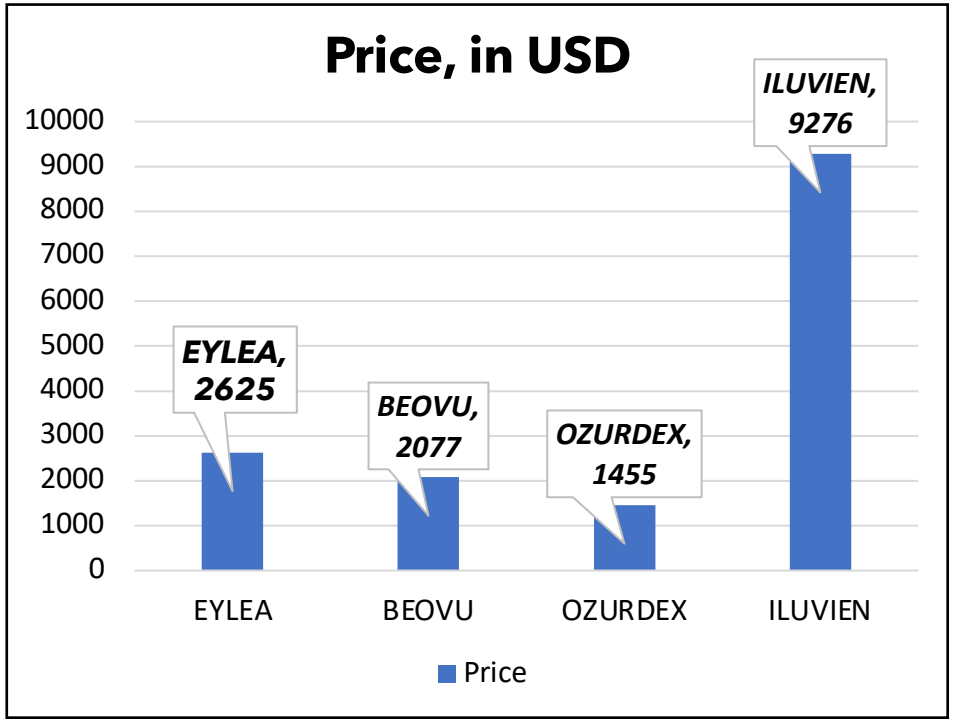
- EYLEA, is an injection composed of aflibercept. It is used to treat age related macular degeneration, which thwarts someone from seeing straight. Also used for diabetic macular edema, and diabetic retinopathy.
- It can only be injected by a doctor or a healthcare professional. Prescription only
- EYLEA HD, its successor was approved on Aug 23, 2023. The main distinction being lesser number of doses required in the long run with the same efficacy.
- Shots are required every 4-6 weeks
- Regen has patents for formulation and methods of treatment in the US
- It is also dependent on Bayer for sales outside the USA

Competitors

EYLEA

- EYLEA has 4 competitors. However, only 3 are sold in the USA.

Competitor Product	Manufacturer
Beovu® (brolucizumab) Injection	Novartis
Ozurdex® (dexamethasone intravitreal implant)	Allergan/AbbVie Inc.
Iluvien® (fluocinolone acetonide intravitreal implant)	Alimera Sciences, Inc.



What do their main medicines do?

Dupixent

- It's prescription only and has been approved since 2017
- It has patents for formulation and methods of treatment extending till 2031. However, this has been an antibody collaboration with Sanofi. They equally share profits within the US and REGN gets a scale from 35%-45% of profits outside the USA.
- Dupixent, whose generic name is dupimulab is a spontaneous injection for:
    - Moderate to severe eczema
    - Certain type of asthma(age 6+)
    - Chronic inflammation of the sinus and two other

Competitors

Dupixent

- Dupixent has several competitors in the US

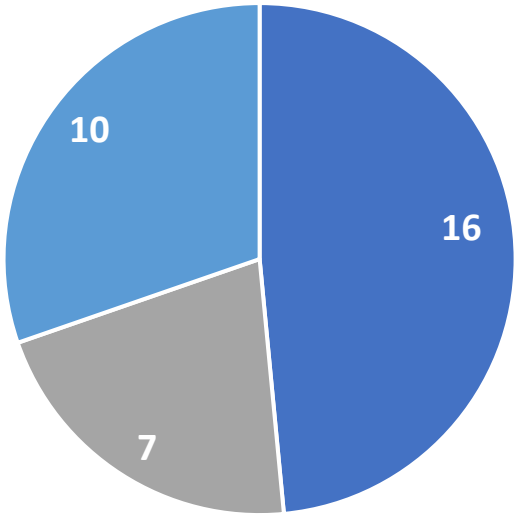
Competitor Product	Manufacturer
Eucrisa®/Staquis® (crisaborole)	Pfizer Inc.
Cibinqo® (abrocitinib)	Pfizer
Rinvoq® (upadacitinib)	AbbVie
AdbryTM/Adtralza® (tralokinumab)	LEO Pharma Inc.
Xolair® (omalizumab)	Roche/Novartis
Nucala® (mepolizumab)	GSK
Cinqair® (reslizumab)	Teva
Fasenra® (benralizumab)	AstraZeneca
TezspireTM (tezepelumab-ekko)	AstraZeneca/Amgen

Main Products

- For Libtayo, Praulent and Kevzara they have at least 4 competitors and competing products
- However, none of them produce the same chemical composition as Regeneron Pharma. All competitor products are distinct.
- One of the main risks in EYLEA is that the regulatory exclusivity period for EYLEA ends in May 2024. Biosimilar products can now appear in the market. Biocon Biological has produced a biosimilar which received approval in the EU. REGN filed a case against Amgen regarding a biosimilar for EYLEA as well
- The market for Dupixent's current and potential future indications is also increasingly competitive. In addition, several companies that may compete with Dupixent in. In asthma, competitors to Dupixent include antibodies against the IL-5 ligand or the IL-5 receptor, immunoglobulin E, or thymic stromal lymphopoietin
- **According to reports, they shall lose 1.9% of revenue per quarter when patents are lost. Over 5 years, they will lose a significant share for EYLEA and Dupixent**

The clinical pipeline

Clinical trials



Phase 1 Phase 2 Phase 3

Clinical Product Candidates

PHASE 1

ALN-APP [4]
RNAi therapeutic targeting APP
Early-onset Alzheimer's disease

ALN-HSD
RNAi therapeutic targeting HSD17B13
Nonalcoholic steatohepatitis (NASH)

ALN-PNP [4]
RNAi therapeutic targeting PNPLA3
NASH

DB-OTO
AAV-based gene therapy
Hearing loss in pediatrics (Phase 1/2)

FIANLIMAB
Antibody to LAG-3 | Solid tumors, advanced hematologic malignancies

NTLA-2001 [3]
TTR gene knockout using CRISPR/Cas9
Transthyretin (ATTR) amyloidosis

ODRONEXTAMAB [5]
Bispecific antibody targeting CD20 and CD3
Certain B-cell malignancies

REGN4336
Bispecific antibody targeting PSMA and CD3
Prostate cancer

REGN5093
Bispecific antibody targeting two distinct MET epitopes
MET-altered advanced non-small cell lung cancer (NSCLC)

REGN5093-M114
Bispecific antibody-drug conjugate targeting two distinct MET epitopes
MET overexpressing advanced cancer

REGN5381/REGN9035
Agonist Antibody to NPR1/Reversal Agent to REGN5381 | NPR1

LINVOSELTAMAB
Bispecific antibody targeting BCMA and CD3
Multiple myeloma

REGN5459
Bispecific antibody targeting BCMA and CD3
Transplant desensitization in patients with chronic kidney disease

REGN5668
Bispecific antibody targeting MUC16 and CD28
Platinum-resistant ovarian cancer

REGN5678
Bispecific antibody targeting PSMA and CD28
Prostate cancer

REGN6569
Antibody to GITR | Solid tumors

REGN7075
Bispecific antibody targeting EGFR and CD28
Solid tumors

REGN7257
Antibody to IL2Rg | Aplastic anemia

REGN7508
Antibody to Factor XI | Thrombosis

REGN7999
Antibody to TMPRSS6
Transfusion dependent iron overload

REGN5837
Bispecific antibody targeting CD22 and CD28
B-NHL

Next Generation Covid Antibody
Antibody to SARS-CoV-2 Variants
SARS-CoV-2 Variants

REGN7544
Antagonist antibody to NPR1
Healthy volunteers

PHASE 2

ALN-HSD
RNAi therapeutic targeting HSD17B13 | NASH

CEMIPLIMAB
Antibody to PD-1 | Neoadjuvant cutaneous squamous cell carcinoma (CSCC); First-line non-small cell lung cancer (NSCLC), BNT116 combination

DUPILUMAB [1]
Antibody to IL-4R alpha subunit | Ulcerative colitis; Eosinophilic gastroenteritis (Phase 2/3)

ODRONEXTAMAB [5]
Bispecific antibody targeting CD20 and CD3
B-cell non-Hodgkin lymphoma (B-NHL) (pivotal study)

FIANLIMAB
Antibody to LAG-3
First-line advanced NSCLC (Phase 2/3) (pivotal study)

MIBAVADEMAB
Agonist antibody to leptin receptor (LEPR)
Generalized lipodystrophy, partial lipodystrophy

REGN5381/REGN9035
Agonist antibody to NPR1/reversal agent to REGN5381 | Heart failure

LINVOSELTAMAB
Bispecific antibody targeting BCMA and CD3
Multiple myeloma (pivotal study)

SARILUMAB [1]
Antibody to IL-6R
Polyarticular-course juvenile idiopathic arthritis (pcJIA) (pivotal study), systemic juvenile idiopathic arthritis (sJIA) (pivotal study)

VIDUTOLIMOD
Immune activator targeting TLR9 | Solid tumors

UBAMATAMAB
Bispecific antibody targeting MUC16 and CD3
Platinum-resistant ovarian cancer

REGN9933
Antibody to Factor XI
Thrombosis

PHASE 3

AFLIBERCEPT 8 MG
VEGF | Reinal vein occlusion (RVO)

ALIROCUMAB
Antibody to PCSK9 | HeFH in pediatrics and adolescents

CEMIPLIMAB
Antibody to PD-1 | Adjuvant CSCC

DUPILUMAB [1]
IL-4R Alpha Subunit Antibody
EoE in pediatrics; chronic obstructive pulmonary disease (COPD); bullous pemphigoid; chronic spontaneous urticaria (CSU); chronic pruritis of unknown origin

FIANLIMAB
Antibody to LAG-3
First-line metastatic melanoma; First-line adjuvant melanoma

ITEPEKIMAB [1]
IL-33 Antibody | COPD

POZELIMAB
C5 | Myasthenia gravis, cemdisiran combination; paroxysmal nocturnal hemoglobinuria (PNH), cemdisiran combination

REGN5713-5714-5715
Multi-antibody therapy to Bet v 1
Birch allergy

GARETOSMAB
Antibody to Activin A
Fibrodysplasia ossificans progressiva (FOP)

LINVOSELTAMAB
BCMA and CD3 | Multiple myeloma

ODRONEXTAMAB [5]
CD20 and CD3 | Follicular lymphoma (FL); Diffuse large B-cell lymphoma (DLBCL)

In collaboration with: [1] Sanofi | [2] Bayer | [3] Intellia | [4] Alnylam | [5] Zai Lab

Ophthalmology | Infectious Diseases | Immunology & Inflammatory Diseases | Oncology | Cardiovascular/Metabolic Diseases | Hematology | General Medicine | Rare Diseases | Neurology

This graphic displays pipeline drug candidates currently undergoing clinical testing in a variety of diseases.
The safety and efficacy of these drug candidates have not been fully evaluated by any regulatory authorities for the indications described in this section.

Phase 1 trials

Product	Indication	Market Size
ALN-APP	Early-onset Alzheimer's disease	$15.9 billion (Alzheimer's market)
ALN-PNP	Metabolic associated steatohepatitis (MASH)	$25.7 billion (NASH market)
DB-OTO	Hearing loss in pediatrics	Limited data (Hearing loss market)
FIANLIMAB	Solid tumors, hematologic malignancies	Depends on specific indications
LINVOSELTAMAB	Multiple myeloma	$40 billion (Multiple myeloma market)
"Next Generation" COVID Antibody	Healthy volunteers (COVID-19 variants)	Limited data (COVID-19 therapeutics market)
NTLA-2001	Transthyretin (ATTR) amyloidosis	$2.8 billion (ATTR amyloidosis market)
ODRONEXTAMAB	Certain B-cell malignancies	$15 billion (B-cell malignancies market)
REGN13335	Healthy volunteers (cardiovascular/metabolic)	Depends on specific indication
REGN4336	Prostate cancer	$10.7 billion (Prostate cancer market)
REGN5093	MET-altered advanced NSCLC	$25.9 billion (NSCLC market)
REGN5093-M114	MET overexpressing advanced cancer	Depends on specific cancer types
REGN5381/REGN9035	Heart failure	$14.5 billion (Heart failure market)
REGN5459	Transplant desensitization in chronic kidney disease	Potential niche market (transplantation)
REGN5668	Platinum-resistant ovarian cancer	$7 billion (Ovarian cancer market)
REGN5678	Prostate cancer	$10.7 billion (Prostate cancer market)
REGN5837	B-NHL	$15 billion (B-NHL market)
REGN6569	Solid tumors	Depends on specific tumor types
REGN7075	Solid tumors	Depends on specific tumor types
REGN7257	Aplastic anemia	$1.1 billion (Aplastic anemia market)
REGN7508	Thrombosis	Limited data (Thrombosis market)
REGN7544	Healthy volunteers (cardiovascular/metabolic)	Depends on specific indication
REGN7999	Transfusion dependent iron overload	Limited data (Iron overload market)

Total market size of all diseases they have addressed is around 160 billion of those that can be calculated

Phase 2 trials

Program	Indication	Potential Market Size
ALN-HSD	Metabolic associated steatohepatitis (MASH)	$13.32 billion by 2030 (NASH)
CEMIPLIMAB	Neoadjuvant cutaneous squamous cell carcinoma (CSCC); First-line non-small cell lung cancer (NSCLC)	$47.9 billion for NSCLC by 2028 (NSCLC)
DUPILUMAB	Ulcerative colitis; Eosinophilic gastroenteritis	$9.6 billion for ulcerative colitis by 2028 (Ulcerative Colitis)
FIANLIMAB	First-line advanced non-small cell lung cancer (NSCLC)	$47.9 billion for NSCLC by 2028 (NSCLC)
LINVOSELTAMAB	Multiple myeloma	$34.8 billion by 2028 (Multiple Myeloma)
MIBAVADEMAB	Generalized lipodystrophy	Small due to rarity (Lipodystrophy)
ODRONEXTAMAB	B-cell non-Hodgkin lymphoma (B-NHL)	$16.4 billion by 2028 (Non-Hodgkin Lymphoma)
REGN5381/ REGN9035	Heart failure	$13.2 billion by 2030 (Heart Failure)
REGN9933	Thrombosis	$49.8 billion for anticoagulants by 2030 (Anticoagulants)
SARILUMAB	Polyarticular-course juvenile idiopathic arthritis (pcJIA); systemic juvenile idiopathic arthritis (sJIA)	$2.1 billion for juvenile idiopathic arthritis by 2028 (Juvenile Idiopathic Arthritis)
UBAMATAMAB (REGN4018)	Platinum-resistant ovarian cancer	$4.1 billion for ovarian cancer by 2030 (Ovarian Cancer)
VIDUTOLIMOD	Solid tumors	$349.8 billion for cancer immunotherapy by 2030 (Cancer Immunotherapy)

Total market size of all diseases they have addressed is around 600 billion of those that can be calculated

Phase 3 trials

Program	Indication	Potential Market Size
AFLIBERCEPT 8MG	Retinal vein occlusion (RVO)	$1.8 billion for RVO by 2027 (Retinal Vein Occlusion)
ALIROCUMAB	Hypercholesterolemia (HeFH) in pediatrics and adolescents	$19 billion for hypercholesterolemia by 2026 (Hypercholesterolemia)
CEMIPLIMAB	Adjuvant cutaneous squamous cell carcinoma (CSCC)	Included in earlier NSCLC market (NSCLC)
DUPILUMAB	Chronic obstructive pulmonary disease (COPD); bullous pemphigoid; chronic spontaneous urticaria (CSU); chronic pruritis of unknown origin	$14.1 billion for COPD by 2026 (COPD)
FIANLIMAB	First-line metastatic melanoma; First-line adjuvant melanoma	$9.6 billion for melanoma by 2026 (Melanoma)
GARETOSMAB	Fibrodysplasia ossificans progressiva (FOP)	Small due to rarity (Fibrodysplasia Ossificans Progressiva)
ITEPEKIMAB	COPD	Included in DUPILUMAB's COPD market
LINVOSELTAMAB	Multiple myeloma	$34.8 billion by 2028 (Multiple Myeloma)
NTLA-2001	ATTR amyloidosis with cardiomyopathy (ATTR-CM)	$3.2 billion for ATTR amyloidosis by 2026 (ATTR Amyloidosis)
ODRONEXTAMAB	Follicular lymphoma (FL); Diffuse large B-cell lymphoma (DLBCL)	$11.7 billion for non-Hodgkin lymphoma by 2026 (Non-Hodgkin Lymphoma)
POZELIMAB	Myasthenia gravis, paroxysmal nocturnal hemoglobinuria (PNH)	$1.2 billion for myasthenia gravis by 2027, $3.8 billion for PNH by 2027 (Myasthenia Gravis, Paroxysmal Nocturnal Hemoglobinuria)
REGN5713-5714-5715	Birch allergy	Included in broader allergic rhinitis market of $24.7 billion by 2026 (Allergic Rhinitis)

Total market size of all diseases they have addressed is around 123 billion of those that can be calculated

Product Chain

- Regeneron currently has 35 programmes in trial. The company follows the below procedure leading to drug discovery:
  - Target identification: analyzing the variation in gene
  - Target validation
  - Therapeutic development: how can this variation be cured
  - Pre-clinical testing
  - Clinical trials
  - Manufacturing post approval
- About 8% go from candidate selection to approved candidates.
- This process takes a minimum of 12 years, and costs at least 2 billion USD

Company	Trials	Success rate	Expected successful trails	Productions
Regeneron	35	8%	2.8	Biologics
Pfizer	112	21%	23.5	Biologics
Amgen	55	10.8%	6.05	Drugs and Biologics
Merck and Co	120	10.8%	13.2	Biologics, meds and vaccines

Predicting Revenue

- One might be tempted to think that the market they are addressing is large but there are several concerns with this:
    1. Will their solution get approved?
    2. If approved, how much of the market share will it capture? Since most of it medicines are *not* OTC, distribution lies within doctor preferences.
    3. And, what about competitors? Will they produce similar products and how do they compare
- This results in ambiguity in deciding future revenue and success. Here are the following information we'd need to get:
    - How many other companies are working on a similar product?
    - How are their approaches better? Or cheaper
    - How fast can REGN get there, relative to peers?
- Unfortunately, we cannot decide the relative success of any clinical trial- i) we are not adept to do so ii) information is highly limited for peers in first phase of trials
- We might be tempted after knowing that the market they're addressing is very valuable, but we cannot predict further.
- We'll now look at their financials compared with peers

Checklist	Comments
Promoter Stake	1.3%
Promoter Stake Trend over the last 5 FYs	Large insider buying (from 0.01% to 1.3%)
Does the promoter have other material businesses?	No
Time devoted by the promoter towards this business	100%
Length of top management team in the company over the total duration of the company's business*	36/36 years
Any unrelated diversifications in the past?	No
Financial leverage	Debt undertaken (leverage ratio of 1.27 as of Dec 31, 2023)
What management says vs Actual Financials	Very little deviation
Pending court cases	Yes

*only founders applicable, remaining core team onboarded recently (<10 years)

Porter's 5 forces

Supplier's Power – High

- Certain raw materials are from single-source unaffiliated third-party suppliers.
- Certain bulk drug materials and products are manufactured by collaborators.
- Reliance on collaborators or third parties to perform packaging, filling, finishing, labelling, distribution, laboratory testing, and other services related to the manufacture
- Rely on collaborators and third-party contract manufacturers
- We cannot assess manufacturing capacity; management has expressed little confidence in their capacity to handle future needs)

Buyer's Power – Moderate

- Regeneron's customers cannot switch if they are not satisfied with Regeneron's pro duct.
- Sales to two customers account for more than 20% of their total gross product revenue.
- Who are the buyers: mainly wholesalers and speciality healthcare distributors. 73% of revenue was via "distributor customers"

Threats by New Entrants – Low

- High costs of R&D and capital infrastructure, and complex regulatory framework to enter the industry.

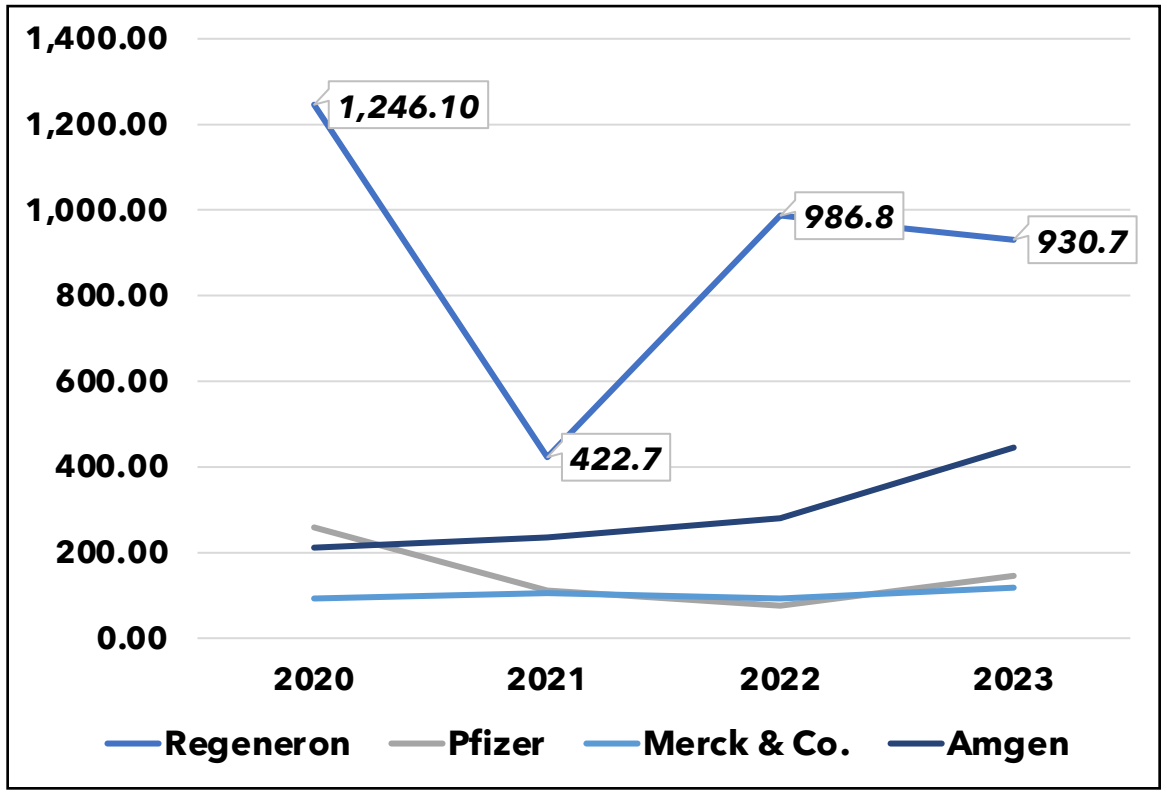
Existing Competition – Low

- Very few competitors for EYLEA and Dupixent.
- Competitors are active in numerous projects within more accessible fields, while Regeneron focuses its research efforts on unique and less explored areas.

Threat of Substitutes – Moderate

- While there aren't other biologics, there are alternative methods and drugs for treating the diseases targeted by Regeneron's products.

Cash Cycles



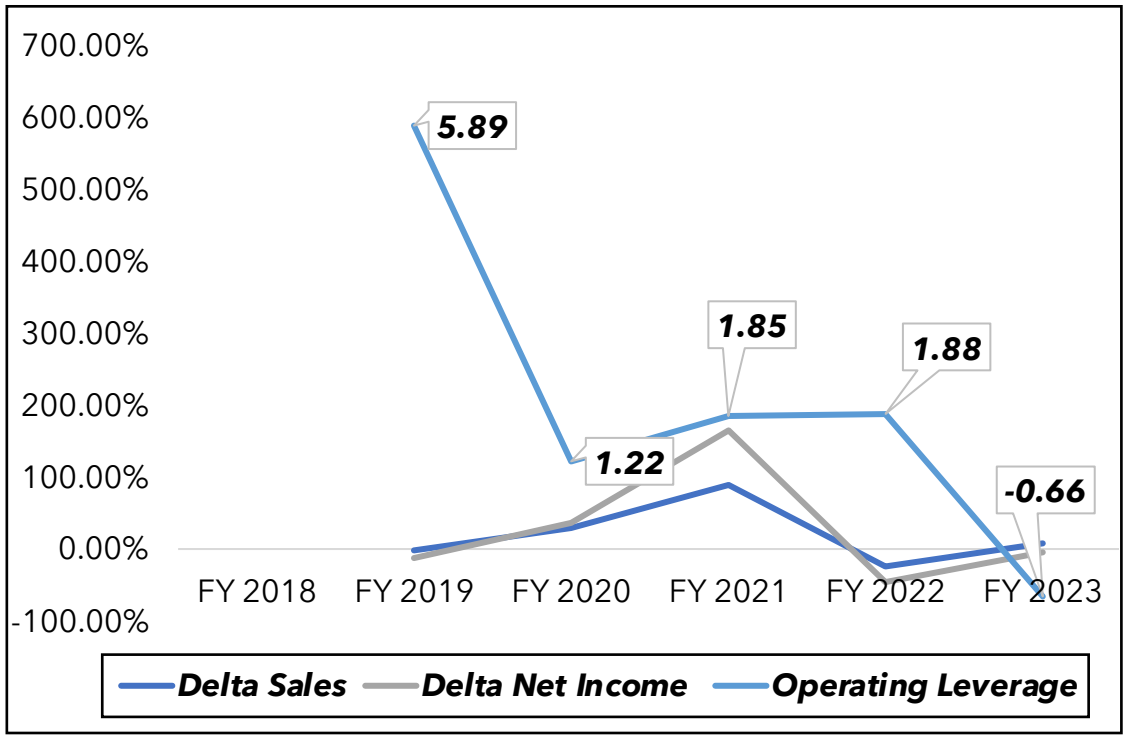
Particulars	2021	2022	2023
Receivable days	137.09	159.77	157.69
Inventory days	401.68	1095.86	1010.49
Payable days	116.10	268.82	237.53
Cash Cycle	422.7	986.8	930.7

Key Takeaways

- Regeneron's cash cycles are the highest among peers
- Main reason is their incredibly high inventory days.
- Their high inventory days could be high since they have collaborated with many companies and have deferred costs (the peers have no deferred costs)
- COGS doubled in 2021 because of i) recognition of manufacturing costs of Regen-COV, ii) writing off Regen COV inventory as it was ineffective against the omicron variant. This led to a decrease in inventory days iii) A Roche connection required them to make payments
- COGS decreased in 2022 because they did not have to incur the Roche collab cost again and they were no longer required to pay Sanofi for *Libtayo* profits

Operating Leverage

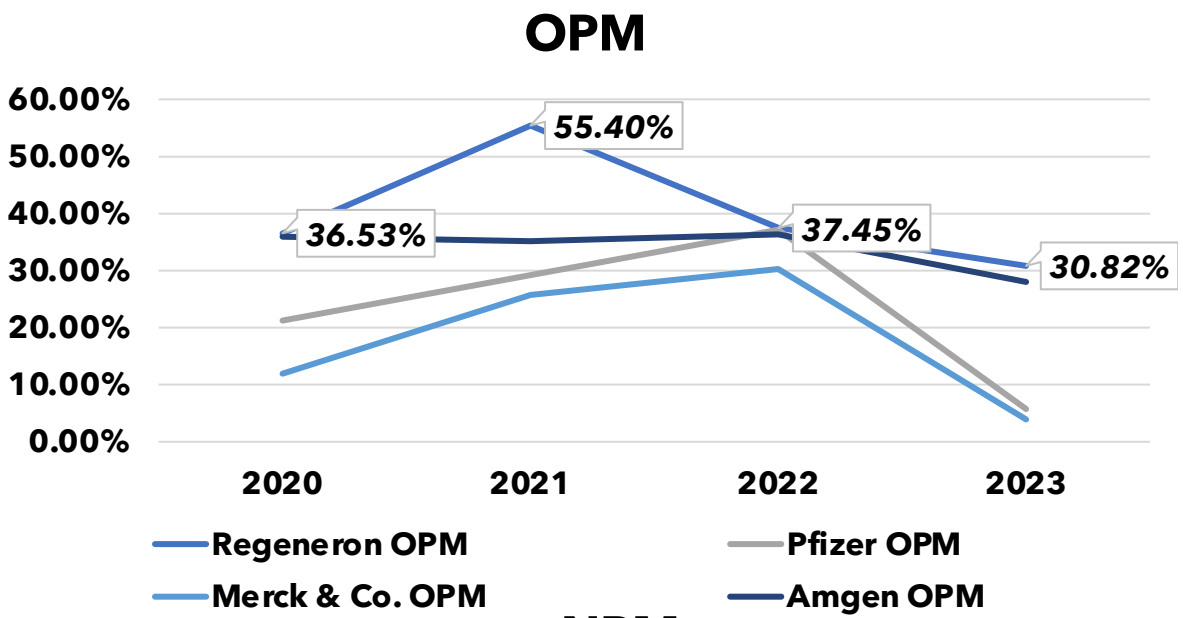
Particulars	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Net Sales	6,710.80	6,557.60	8,497.10	16,071.70	12,172.90	13,117.20
Net Income	2,444.40	2,115.80	2,881.60	7,646.30	4,161.30	3,949.20
Sales		-2.28%	29.58%	89.14%	-24.26%	7.76%
Net Income		-13%	36%	165%	-46%	-5%
Operating Leverage		5.89	1.22	1.85	1.88	-0.66

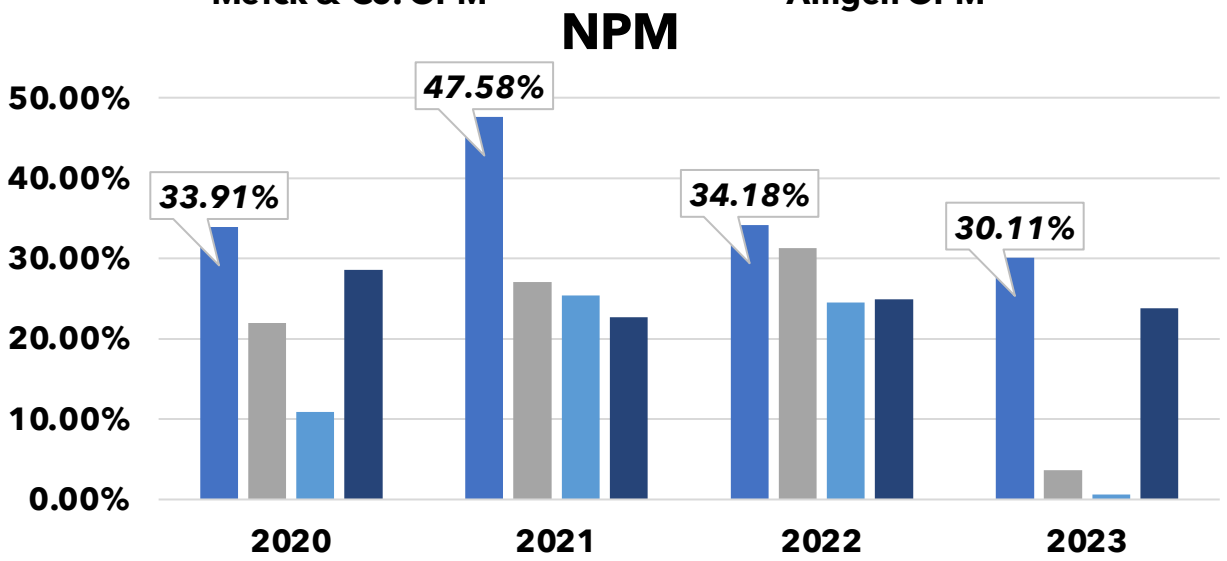


Key Takeaways

- Consider 2019, the change in sales is negative, so the change in net income is also negative. We shall not heed this year
- We see a significant change from FY22 to FY23: operating leverage dropped and became negative.
- Even though sales increased marginally in 2023, net income fell because of the following reason:
  - Their collaboration with Sanofi for Dupixent: Sanofi collaborates with REGN for Dupixent, and they are no longer reimbursing the R&D expenditure, the contract specified reimbursement of 50%.
  - This 50% was now recognized, leading to much higher R&D reducing net income.

Profit Margins

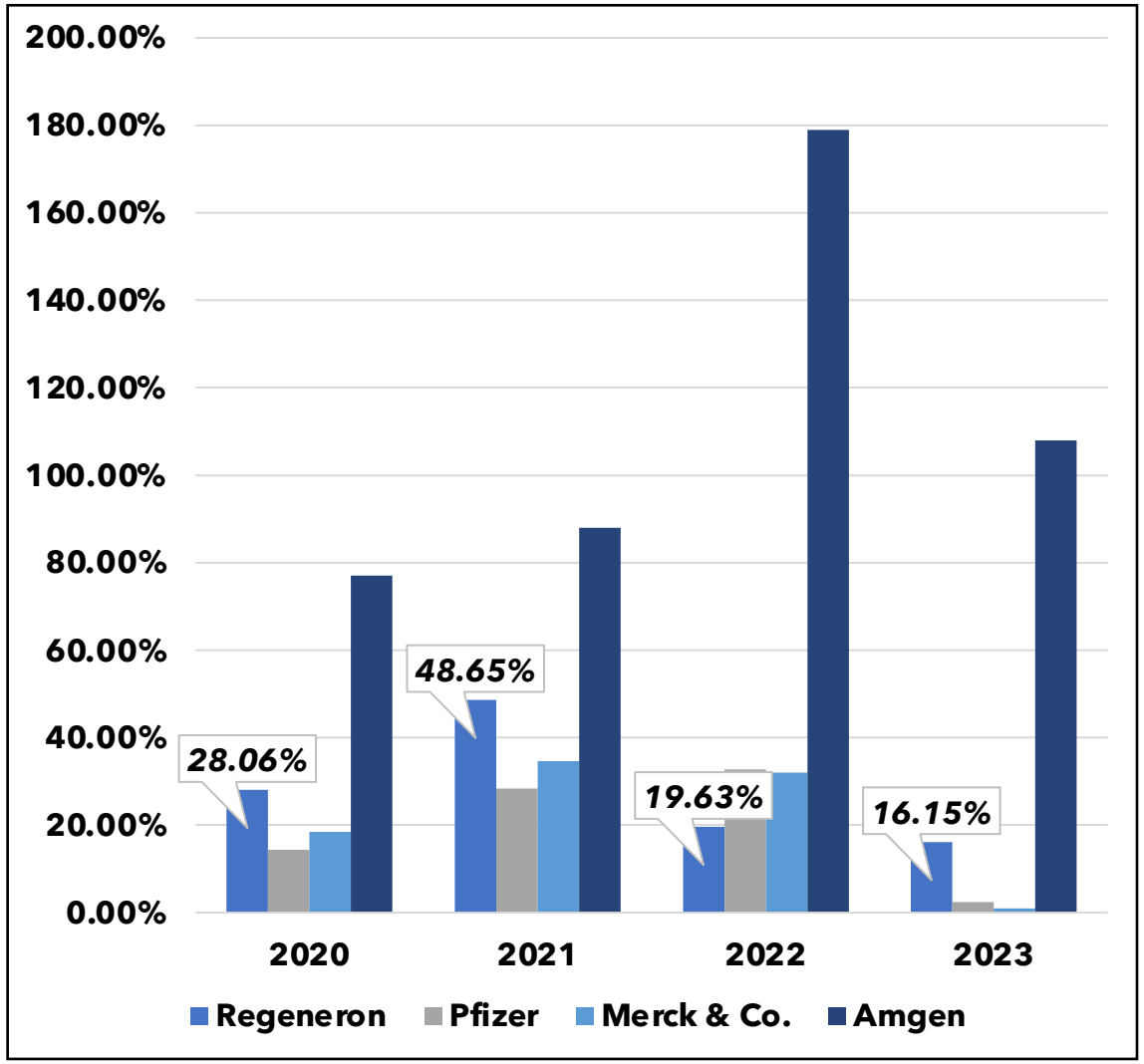




Key Takeaways

- Regeneron's both Net and Operating profit margins have been among the highest among peers.
- Pfizer's margins dropped in 2023 because a tornado hit one of their manufacturing facility in North Carolina which produced almost 25% of their sterile injectables.
- Merck & Co.'s margins dropped because they increased their R&D expenses by almost 2.5 times in 2023.
- Regeneron maintained higher margins because i) they were remunerated by the government for development of COVID vaccine, and because in their collaborative efforts, a part of Cost of Sales is passed on to the other party involved in collaboration.

ROE: Dupont Analysis & Peer Comparison

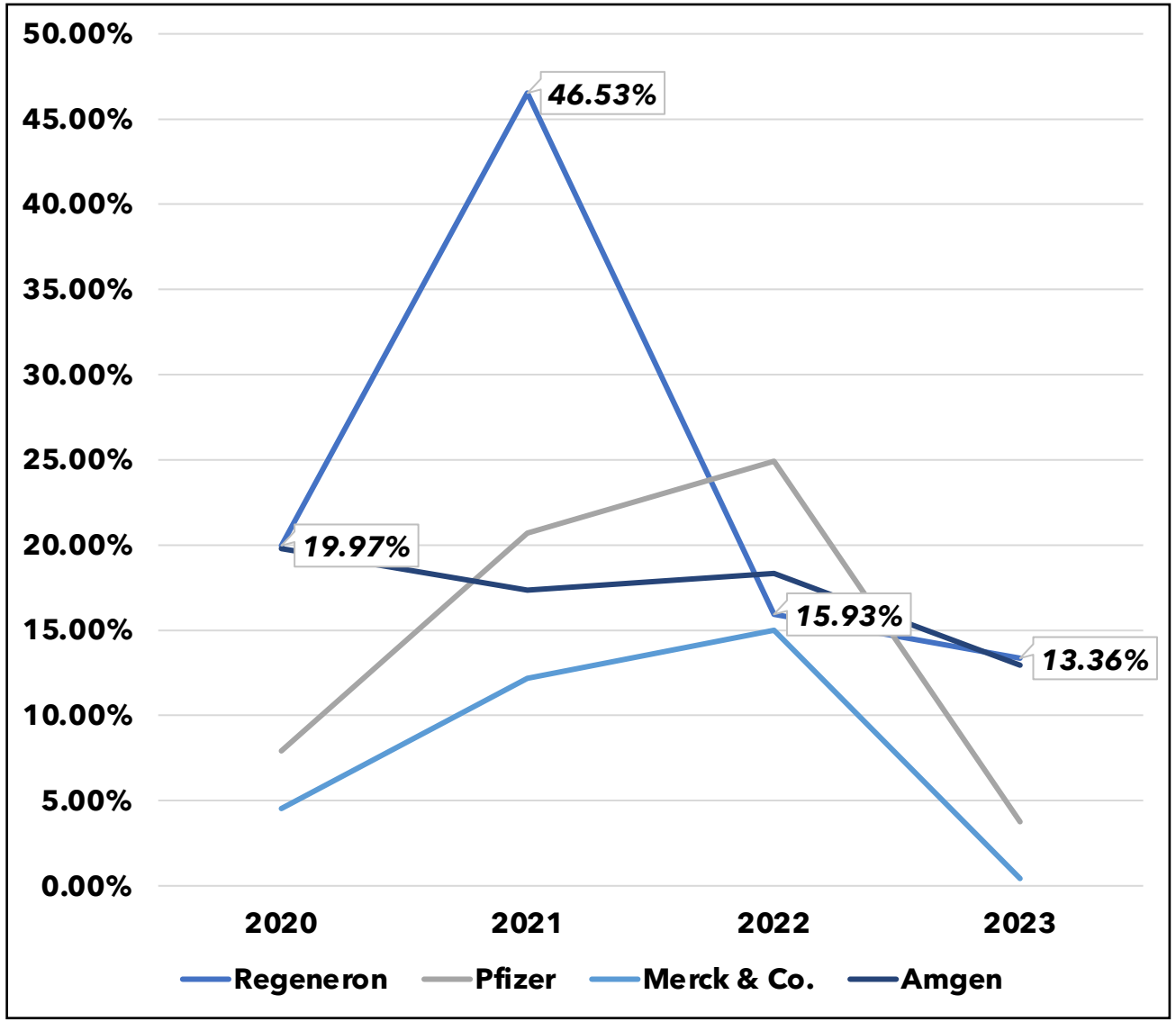


FY	NPM	Asset Turnover	Financial leverage	ROE
FY20	33.91%	53.16%	1.56	28.06%
FY21	47.58%	75.46%	1.36	48.65%
FY22	34.18%	44.55%	1.29	19.63%
FY23	30.11%	42.11%	1.27	16.15%

Key Takeaways

- Decreasing trend in ROE from FY21 to FY23.
- Asset Turnover - Company's ability to generate revenue from its assets may be declining.
- Reduction in the company's reliance on debt financing over the years.
- Amgen has a very high ROE because of their equity multiplier of around 15.58, the asset turnover is lesser than REGN with comparable NPM

ROIC: Peers and Dupont



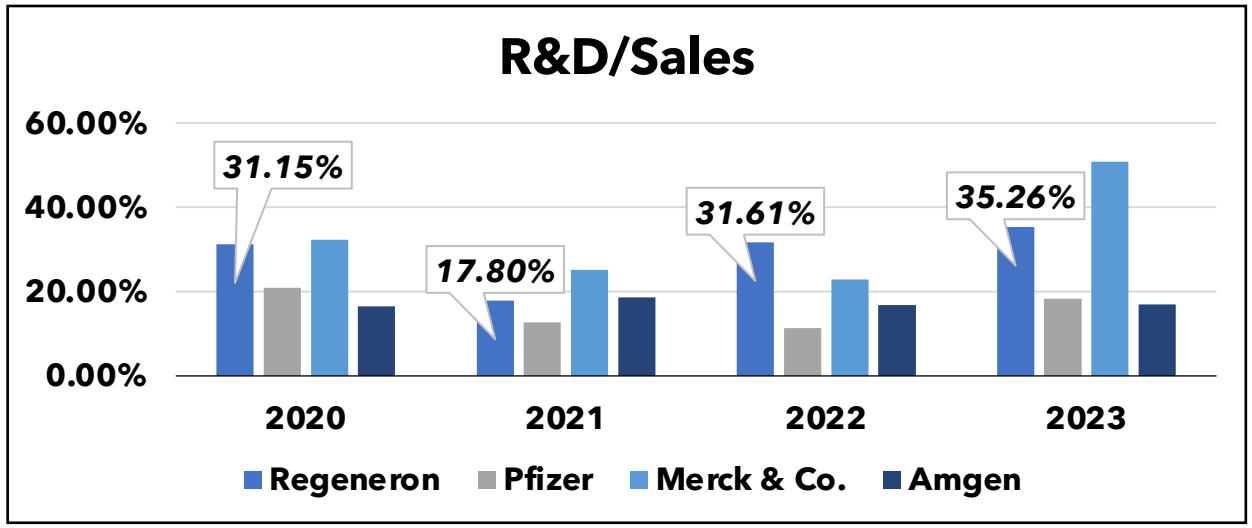
Dupont Analysis

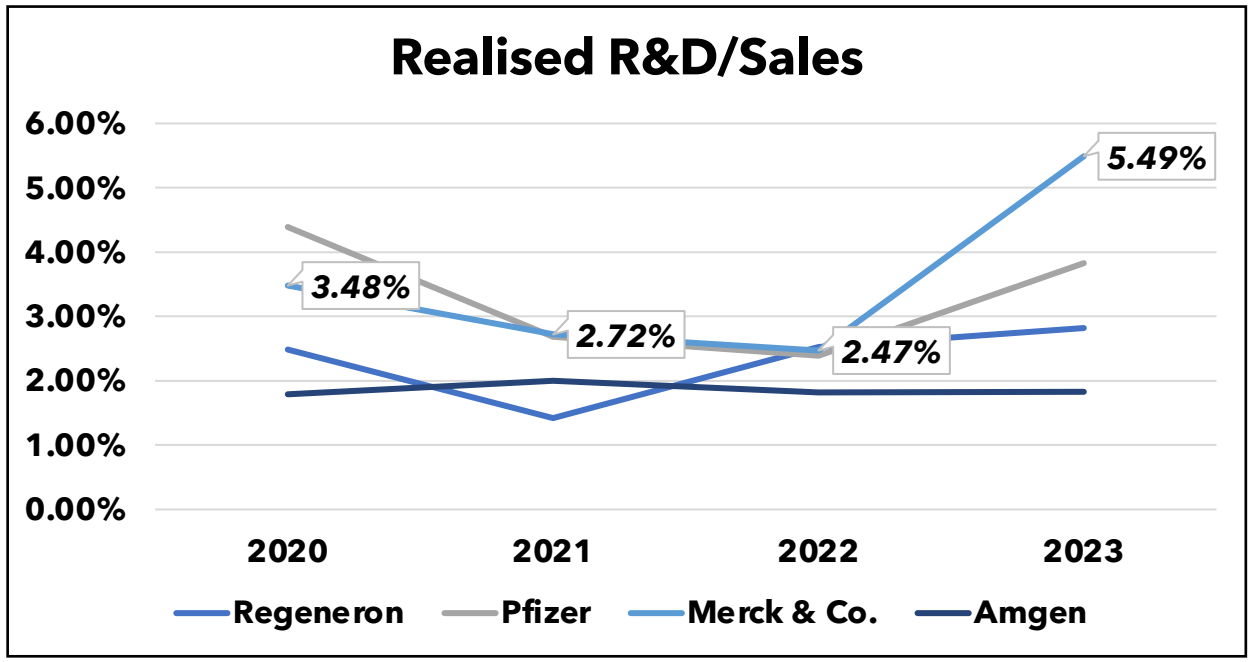
FY	NOPAT/ Sales	Sales/IC	ROIC
FY20	33.11%	60.30%	19.97%
FY21	47.61%	97.72%	46.53%
FY22	33.29%	47.86%	15.93%
FY23	29.02%	46.03%	13.36%

Key Takeaways

- The spike in 2021 is because of Regeneron's agreement with the US Gov for REGEN-COV. The sales increased and IC is of last year.
- Eylea's sales have dropped 11% year on year because of increased competition which negatively impacted efficiency.
- All companies took a hit in 2023 because of decrease in demand for COVID drugs

R&D/Sales and Realized R&D/Sales

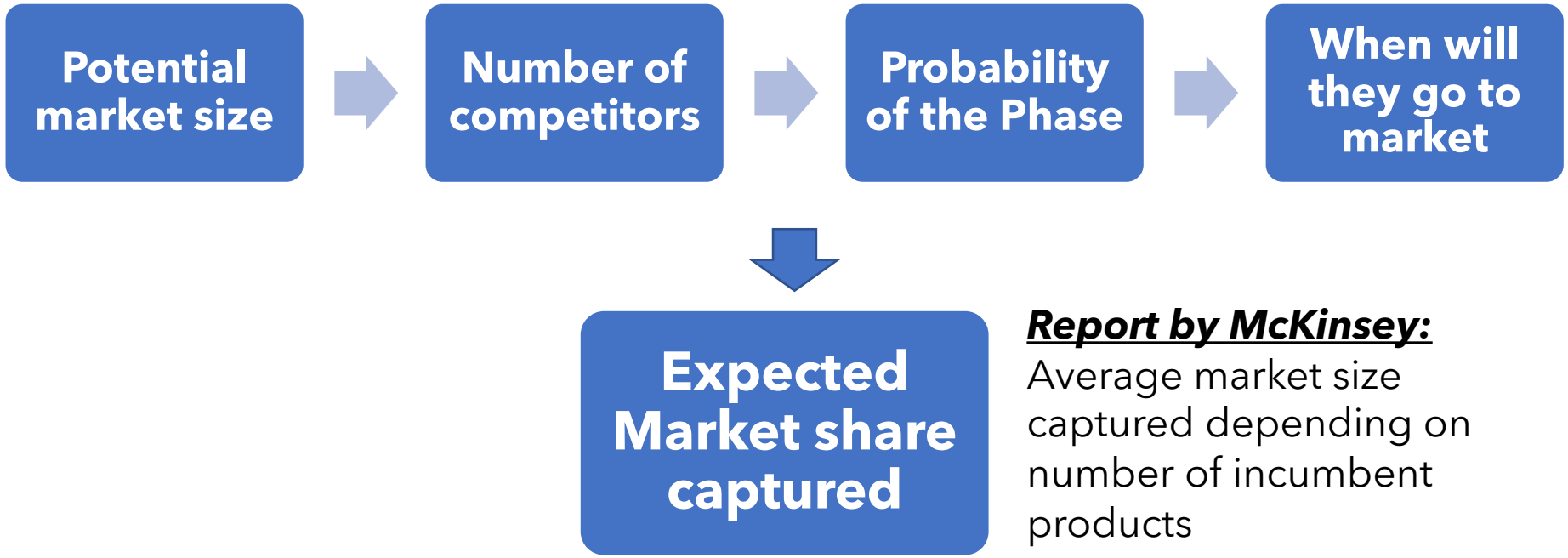




Key Takeaways

- The difference between the two metrics in the success rate of their clinical trials. Success rate is given by probability of a drug passing each clinical trial multiplied.
- We found the success rates, as shown in the slides earlier.
- Simply looking at R&D/Sales shows that Pfizer and Amgen are behind competitors. But due to variation in success rates Pfizer makes up for it.
- Regeneron is not outstanding compared to peers and Merck and Co has increased R&D by two-fold.
- In fact, it has the worst success rate and least number of trials.
- Leads to inefficient R&D spends

Potential Market Sizes



Report by US Lib. Of Medicine
Probability of a trial succeeding in that phase, and average time it takes to succeed

Report by McKinsey:
Average market size captured depending on number of incumbent products

Using these metrics, we calculated the expected market share to be captured in USD million. The drawbacks are:

- We are not exact of the market share it shall capture.
- The market size only represents of the trials *main* market, although it may have more use cases
- To address this, we made sensitivity tables depending on probability of entering and market share it shall capture

Example of Market Value- Sensitivity

REGN5381/ REGN9035

- Phase 2 trial
- Addresses Heart Failure
- Expected to launch in 8-10 years
- Market size of approximately 10,100 million by 2028
- Number of competing products: 4
- Expected market share- around 15%

AFLIBERCEPT 8MG

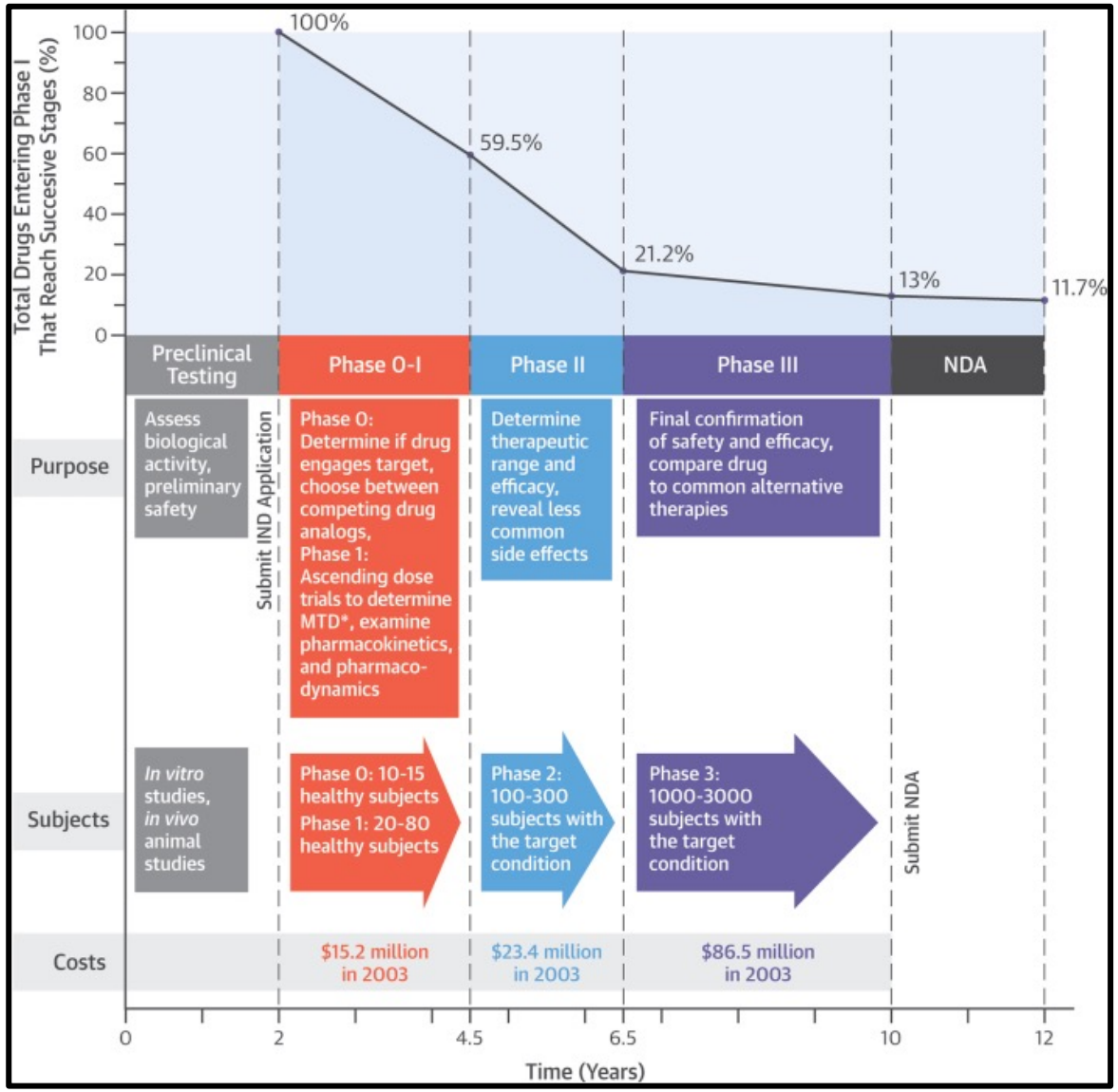
- Phase 3
- Retinal Vein Occlusion
- Expected to launch in 3-5 years
- Market size of approximately 1.5 billion by 2028
- Number of competing products: 6
- Expected market share- around 15%

		Expected Market Share				
	263.61	13%	14%	15%	16%	17%
Prob. Of success	15.4%	202.202	217.756	233.31	248.864	264.418
	17.4%	228.462	246.036	263.61	281.184	298.758
	19.4%	254.722	274.316	293.91	313.504	333.098
	21.4%	280.982	302.596	324.21	345.824	367.438
	23.4%	307.242	330.876	354.51	378.144	401.778

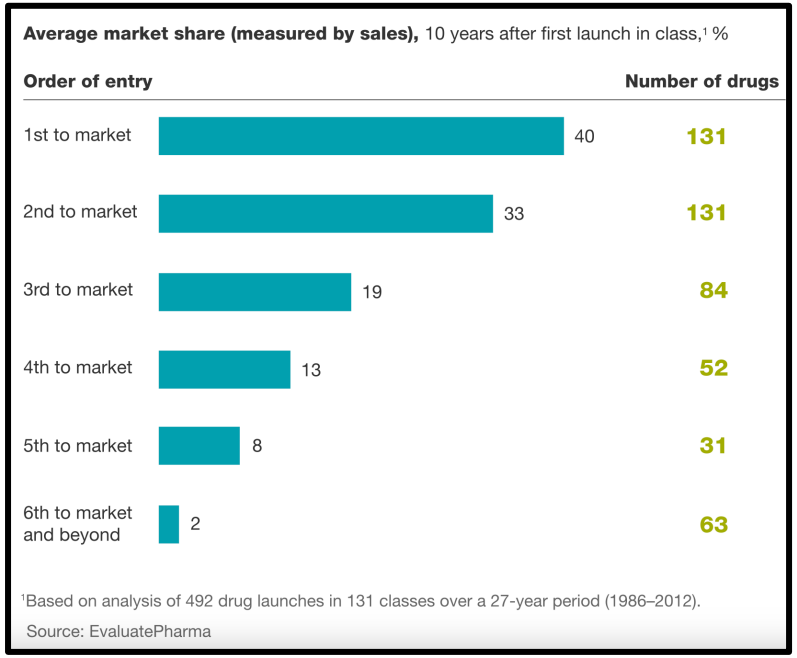
		Expected Market Share				
	114.75	13%	14%	15%	16%	17%
Prob. of Success	41%	79.95	86.1	92.25	98.4	104.55
	46%	89.7	96.6	103.5	110.4	117.3
	51%	99.45	107.1	114.75	122.4	130.05
	56%	109.2	117.6	126	134.4	142.8
	66%	128.7	138.6	148.5	158.4	168.3

We summed the expected value of market share captured, and for phase II it comes to be around 8.5 billion USD, and 3.5 billion USD in phase III

Resources



Phase	Expected go to market Year	Probability of Success
Phase 1	N/A	11.5%
Phase 2	8-12 years	17.4%
Phase 3	3-5 years	50.6%



DCF - our main assumptions

- Our main assumptions were around sales growth and their cost components
- Our sales growth continues the trend of last year to increase by 7%, dialing down to 3% in 5 years. **We estimated this from expected revenue of trials minus loss in revenue due to patents expiry.**
- This would be consistent with them growing at inflation level. This is only plausible with the pessimistic view of them not increasing medical capacity.
- This DCF is highly pessimistic and cannot predict success of R&D
- Growth was elevated in 2020 because of COVID vaccine sales. However, we expect sales growth to be like the last year level of 7%: inflation growth + growth driven by EYLEA HD. Sales growth is capped at upper limit of last year's growth because they also face capacity bottlenecking issues, hence very limited volume growth
- The reason it falls to inflation is because we expect close competitors of EYLEA come soon as it loses patent rights. However, since the decision of prescribing EYLEA is doctor driven, revenues will not fall so steeply.
- Cost assumptions were representative of long-term collaboration levels. They have realized most as of last year and are not anymore passing it on.

Discounted Cash Flow- Financials

Particulars(in USD millions)	31-Dec-21	31-Dec-22	31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26	31-Dec-27	31-Dec-28
Sales	16,071.70	12,172.90	13,117.20	14,035.40	14,877.53	15,621.40	16,246.26	16,733.65
EBIT	8,855.60	4,559.20	4,042.90	4,325.90	4,585.46	4,814.73	5,007.32	5,157.54
NOPAT	7,604.40	4,052.15	3,806.10	3,850.05	4,081.06	4,285.11	4,456.51	4,590.21
Depreciation				556.09	584.64	615.54	647.76	680.25
(Inc)/dec in OWC				(396.19)	(364.01)	(321.54)	(270.09)	(210.67)
Inc/(dec) in long term operating liabilities				909.20	252.19	102.15	139.40	114.68
(Inc)/dec in long term assets				163.39	(16.84)	(14.88)	(12.50)	(9.75)
Capex				(768.90)	(815.04)	(855.79)	(890.02)	(916.72)
Purchase of new intangibles				-	-	-	-	-
FCFF				**4,313.65**	**3,721.99**	**3,810.59**	**4,071.06**	**4,248.00**

Discounted Cash Flow- WACC

Particulars	Value
Risk free rate	4.3%
Equity Risk Premium	4.6%
Beta	0.71
Cost of equity (Ke)	7.6%
Spread over risk free rate	3.2%
Kd	7.5%
Marginal Tax Rate	21.1%
Post tax cost of debt	5.9%
Total Debt	1,980.0
Share Price (USD)	893.00
Diluted number of shares	109.4
Market Capitalization	1,05,750.0
Total Capital	1,07,790.0
% of Debt	0.019%
% of Equity	99.98%
WACC	7.52%

Assumptions

- Risk free rate is 10-year US Treasury bond yield
- ERP taken from Damodaran
- Spread over risk free rate taken as per credit rating of BBB+
- We get a WACC of 7.5%

Discounted Cash Flow- Final

Calculating EV and Equity Value	Growing Perpetuity Method
Sum of PV of forecasted cash flows	16,299.4
PV of terminal value	67,360.6
Enterprise Value	**83,660.0**
Add cash	10,844.8
Add Investments	5,396.5
Less Debt	2,702.9
Equity value	**97198.41**
Share price USD	**820.631**

WACC	*LT growth rate*		
820.6	2.5%	3.0%	3.5%
6.5%	922.4	1,020.8	1,151.8
7.0%	833.0	908.2	1,004.8
7.5%	761.5	**820.6**	894.4
8.0%	702.9	750.4	808.4
8.5%	654.0	692.9	739.6

Our Final Result

- Even the best case of growth rate and WACC in sensitivity will lead to a very low margin of safety.
- As per this DCF it is slightly overvalued by 8%
- The CMP is 893 dollars

Further Valuation

- Our theoretical P/E = 1/(k.e-g) = 16.7 x and the market P/E is 27.6 signaling overvaluation

Investment Thesis - Don't Buy

More honestly, we do not know enough

Clinical Pipeline

- Least number of clinical trials with respect to peers
- Stage 3 consists of already developed products
- Low success rate

R&D Efficiency

- Realized R&D sales is lower than peers
- Expected number of successful trials is least amongst the peers

Ratios and Financials

- Very high cash cycles, negative operating leverage and reducing efficiency of assets and Invested Capital

Cash Flow predictions

- Cash flows cannot be predicted to a reasonable degree of accuracy as successful trial takes into account many variables that we cannot find

Valuation

- Current P/E exceeds 1/(k.e-g), signaling overvaluation
- DCF showed an implied share price of 820 USD, which is lower than CMP

Summarizing

Tenet	Assessment
Simplicity of the business model	
Management Rationality	
Consistent Operating history	
Long term Favorable prospects	
Management candor	
ROE	
Profit Margins	
Valuation	
For Every Dollar Retained, Make Sure the Company Has Created at Least One Dollar of Market Value	
Can the Business Be Purchased at a Significant Discount to Its Value?	

Resources

- https://www.drugs.com/new-drug-applications.html
- https://medlineplus.gov/druginfo/meds/a612004.html#:~:text=Aflibercept%20injection%20(Eylea%2C%20Eylea%20HD,an%20eye%20disease%20caused%20by
- https://www.ncbi.nlm.nih.gov/books/NBK582136/#:~:text=Aflibercept%20is%20a%20medication%20used,vein%20occlusion%2C%20and%20diabetic%20retinopathy.
- https://investor.regeneron.com/news-releases/news-release-details/aflibercept-8-mg-bla-treatment-wet-age-related-macular
- https://www.drugs.com/condition/macular-degeneration.html#medication-table-activity
- https://www.drugs.com/new-drug-applications.html
- https://investors.amgen.com/stock/fundamentals/ratios
- https://www.merck.com/investor-relations/financial-information/
- https://s21.q4cdn.com/488056881/files/doc_financials/2023/q4/4abbf601-f36f-4016-ae6f-a07650f3b571.pdf
- https://www.sec.gov/ix?doc=/Archives/edgar/data/872589/000180422024000009/regn-20231231.htm
- https://www.sec.gov/ix?doc=/Archives/edgar/data/872589/000180422024000009/regn-20231231.htm
- https://www.pfizerclinicaltrials.com/our-research
- https://investor.regeneron.com/pdf/2022AR
- https://yearinreview.regeneron.com/early-research-and-technology
- https://investor.regeneron.com/static-files/77c0ae46-80c4-4be2-b868-f1f17fb75793
- https://www.regeneron.com/pipeline-medicines/investigational-pipeline
- https://yearinreview.regeneron.com/advancing-our-pipeline
- https://www.drugs.com/dupixent.html
- https://www.sanofi.com/en/investors/reports-and-publications
- https://www.sec.gov/Archives/edgar/data/1121404/000104746914001951/a2217900z20-f.htm#RFa
- https://s28.q4cdn.com/781576035/files/doc_financials/2023/ar/2023-10k.pdf
- Great report: https://www.iqvia.com/-/media/iqvia/pdfs/institute-reports/biosimilars-in-the-united-states-2023-2027/iqvia-institute-biosimilars-in-the-united-states-2023-usl-orb3393.pdf
- Very cool: https://www.sciencedirect.com/science/article/pii/S1359644621005444
- https://www.iqvia.com/insights/the-iqvia-institute/reports-and-publications/reports/global-trends-in-r-and-d-2024-activity-productivity-and-enablers#:~:text=The%20composite%20success%20rate%20for,level%20last%20seen%20in%202019.
- https://www.merckgroup.com/en/annualreport/2022//management-report/fundamental-information-about-the-group/research-and-development.html
- https://www.merck.com/research/product-pipeline/
- https://www.merck.com/wp-content/uploads/sites/124/2024/02/Public_Pipeline-1Q2024.pdf
- Pharma's first-to-market advantage | McKinsey