



EvaluatePharma®

World Preview 2017, Outlook to 2022

10th Edition – June 2017

 Evaluate®

Welcome to the EvaluatePharma® World Preview 2017, Outlook to 2022

The tenth edition of EvaluatePharma's World Preview brings together many of our analyses to provide a top level insight, from the world's financial markets, into the expected performance of the industry between now and 2022. Based on EvaluatePharma's coverage of the world's leading 6,500 pharmaceutical and biotech companies, the World Preview highlights trends in prescription drug sales, patent risk, R&D spend, global brand sales and market performance by therapy area. Also included this year are analysis on Worldwide Pharma Innovation 2008-2022 with insights into pipeline value creation through 2022, fastest growing companies and the top performers in terms of RoI. Complimentary copies of the full report can be downloaded at:

www.evaluate.com/PharmaWorldPreview2017

Foreword

The uncertainty that hit the wider pharma world last year with the US presidential elections, weak economic growth, Brexit and ever-increasing pressure on drug prices has continued into 2017. Despite all this, the long-term outlook for the industry remains broadly positive.

This year, Evaluate's World Preview 2017 shows that prescription drug sales are forecast to grow at an impressive annual compound rate of 6.5%, eventually hitting \$1.06trn worldwide in 2022. Much of this growth is set to come from some of the industry's hottest therapy areas including new cancer immunotherapies like Opdivo and Keytruda, as well as much higher-risk assets like Biogen's Alzheimer's project aducanumab.

It is notable that orphan drugs are expected to be responsible for a third of this uplift in sales – an uptick that is forecast to come even as these niche medicines are coming under increasing scrutiny over pricing.

In fact this pressure is likely to be largely responsible for the first downgrade to our long term sales projection for the first time in ten years of Evaluate's World Preview. Last year, our consensus forecasts showed that worldwide drug sales would reach \$1.12trn in 2022.

This slight retraction is likely due to a number of factors, but the continuing squeeze on pricing is almost certainly a major one. Although Donald Trump has yet to directly intervene on US drug costs, the threat remains ever present and some pharma companies have announced their own pre-emptive strikes, by publicly announcing caps to price hikes.

Other potential brakes on the industry's upward trajectory are the forecast \$194bn worth of sales at risk, as products come to the end of their patent life. The rate and level of erosion of sales of some of the industry's biggest biologics, many of which are facing multiple incursions on their revenues from biosimilars, have yet to be determined. This could create what some believe will be the industry's second patent cliff.

Foreword

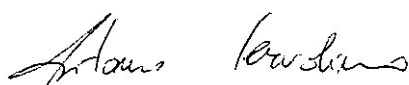
The desire to restock pipelines to mitigate against the loss of big franchises will continue to drive deal making. A big drop in the number of drug approvals in the US last year from 56 in 2015 to 27 in 2016 serves to highlight the scarcity value of novel medicines. While the dip in the FDA's activity probably reflects a return to more sustainable approval rates following the glut in 2015, however, if the decline continues then large scale mergers might come back on the table

Many believe that US tax reform plans need to emerge before really big deals materialise, however there is already pressure on the likes of Sanofi, Pfizer and Gilead to shore up their pipelines. Finding the right targets at the right price will be crucial, and if deals do happen at the level some are predicting it could shift the balance of power at the top of pharma.

At the moment no one pharma company is forecast to stand head and shoulders above its peers. Only the slenderest of margins will exist between the top three companies in 2022, current forecasts suggest. Novartis is predicted to return to the top spot with expected sales of \$49.8bn in 2022, compared with \$49.7bn for Pfizer and \$49.6bn for Roche. It would take only one high profile failure to change these rankings.

Alongside clinical failure, other industry headwinds that could affect the predictions laid out in this report include the rising cost of R&D, with the report finding the average spend per NME was \$4bn over the last 10 years. Also the demand for evidence of long-term value by payers is prompting pharma players to shift from volume to value driven strategies, in the hope of gaining market access - a big step change.

The future role of technology, which appears to be outpacing pharma innovation, is also another unknown. Remote monitoring and care, artificial intelligence and machine learning could all have huge impacts on pharma companies. It should be hoped that these changes, rather than being overlooked by the industry, will be embraced and ultimately help it achieve the growth forecast in this report.



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Analysis Highlights

Worldwide Prescription Drug Sales 2017-22 in figures

+6.5% CAGR*
2017-22

Drivers		Brakes	
\$95 bn	Additional sales in 2022 from Orphan drugs (32% of total growth)	Increase of the pharmaceutical bill. Can the system pay for innovation?	+6.5% CAGR 2017-22
27	New FDA approvals in 2016, down 50% vs 2015, but pace picking up again in 2017	Sales at risk during 2017-22 period due to patent expiry. Increasing risk from biosimilars	\$194 bn
522 m	Average value of new approvals in 2016*. Above 2010-15 average *USA sales 5 yrs post launch	Biosimilar erosion expected for top selling biologics. More aggressive estimates vs. 2016	-54% Sales Erosion
+13%	2016-22 CAGR for Oncology therapies to reach \$192bn in 2022. PD-1/PD-L1 close to \$30bn	Average R&D spend per NME since 2006. Increasing pressure on pharma productivity	\$4 bn

* Compound Annual Growth Rate.

- Worldwide prescription drug sales forecasted to grow at a robust 6.5% (CAGR) through 2022 to reach \$1.06trn
- 32% of the 2022 increase in sales to come from orphan drugs (+\$95bn)
- Sales at risk worth \$194bn potentially signal a second patent cliff era with the advent of biosimilars
- Novartis, Pfizer and Roche to compete head to head for the crown of worldwide Prescription sales in 2022, but Novartis seems to have a slight edge
- Celgene (+15%) and Shire (+10%) expected to record the fastest sales growth (CAGR) by 2022 although growth estimates have been revised downward in the last 12 months

Analysis Highlights

- Biologics to contribute 52% of the Top 100 product sales by 2022; Roche leads market
- Roche gains the top spot of the pipeline value creation ranking proving its leadership ambitions beyond oncology. AstraZeneca and AbbVie complete the podium
- Novo Nordisk's portfolio expected to yield the highest return on investment in the future
- Biogen's aducanumab and J&J's apalutamide projected to be the most valuable R&D projects
- Worldwide pharmaceutical R&D spend expected to grow by 2.4% (CAGR) to \$181bn in 2022
- Average R&D spend per NME at \$4bn over the last 10 years
- Roche forecast to be the biggest spender on pharmaceutical R&D in 2022.
- New drug approvals in 2016 drop to 27 NMEs down 50% vs. the record high of 56 in 2015. Positive trend in the first 5 months of 2017 with 21 NMEs already approved
- Oncology is still the largest therapy area in sales (+12.7% CAGR) 2016-22
- Roche remains atop the oncology field but its leadership is challenged by Celgene. Novartis to drop out of the top 3
- Novo Nordisk is expected to remain the major player in the anti-diabetics market in 2022, but Lilly is gaining ground behind driven by Trulicity
- AbbVie still dominates anti-rheumatics market in 2022; ABT-494 (upadacitinib) set to be the most promising R&D asset in development
- GSK leads in the vaccine market ahead of Merck and Pfizer
- Pfizer's pneumococcal vaccine Prevnar 13 remains the top selling vaccine product
- Gilead lead continues in anti-viral market in 2022 largely due to its HIV portfolio
- Opdivo and Revlimid to compete for the top selling products in the world in 2022
- Humira still expected to be the top selling drug in 2022 at \$15.9bn ahead of Revlimid and Opdivo
- Keytruda (\$9.5bn in 2022) nearly closed the gap with Opdivo (\$9.9bn) in terms of consensus forecast
- Eliquis took over Xarelto as the leading anti-coagulant in 2022 at \$8.5bn
- AbbVie's Humira will continue to be the leading product in the USA in 2022, with sales of \$12.0bn. Keytruda knocks off Opdivo as the top-selling PD-1/PD-L1 product in 2022

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Worldwide Prescription Drug Sales (2008-2022)



Worldwide prescription drug sales forecasted to grow at 6.5% (CAGR) through to 2022.

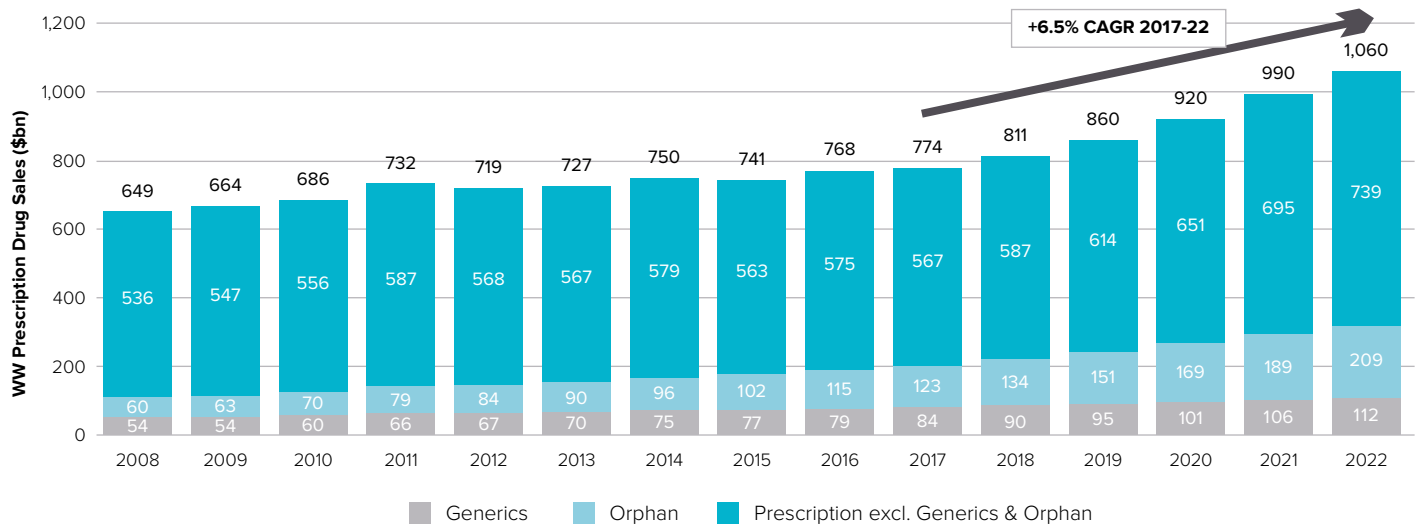
According to Evaluate consensus forecast, the pharmaceutical industry is set to grow at 6.5% per year (CAGR) to reach \$1.06trn by 2022. This growth can be largely attributed to the expansion of existing therapies such as the PD-1/PD-L1 inhibitors Opdivo and Keytruda and J&J's Darzalex, as well as the launch of novel therapies, such as Sanofi/Regeron's Dupixent in atopic dermatitis and Roche's Ocrevus in multiple sclerosis. CAR-T therapies continue to generate interest in oncology although the recent safety issues have partially dampened any short term excitement.

The orphan drug market is expected to almost double during the 2016-22 period, peaking at \$209bn in 2022 and further demonstrating that R&D programmes are increasingly oriented towards more narrow patient populations characterised by larger unmet need, a faster route to market and a more compelling market

access value proposition. Although this all points to a rather optimistic future for the industry, since June 2016 the industry's CAGR has only just revived itself from a prediction of a 5.4% CAGR over the same period, demonstrating uncertainty surrounding pharma. As with all changes within the industry, many variables have contributed to this uncertain environment, but some main factors can be identified. Firstly, the \$194bn of sales at risk between 2017 and 2022 signals that the pharma industry has just entered a second patent cliff era where top biologic blockbusters will be challenged by biosimilars. The investment of large biotech companies in this space, such as Biogen and Amgen, is likely to fast track the commercial impact of these therapies. Secondly, the US market access landscape continues to rapidly transform forcing pharmaceutical companies to adjust their access strategies, either through pay for performance deals or more payer-friendly prices at launch.

Worldwide Total Prescription Drug Sales (2008-2022)

Source: Evaluate, May 2017





Worldwide Prescription Drug Sales (2008-2022)

Source: Evaluate, May 2017

Year	WW Prescription Sales (\$bn)														
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Prescription	649	664	686	732	719	727	750	741	768	774	811	860	920	990	1,060
Growth per Year		+2.2%	+3.3%	+6.8%	-1.8%	+1.1%	+3.2%	-1.1%	+3.6%	+0.8%	+4.7%	+6.1%	+7.0%	+7.6%	+7.0%
Change vs. June 2016 (\$bn)										-48	-63	-71	-76	-71	-61
Generics	54	54	60	66	67	70	75	77	79	84	90	95	101	106	112
Generics as % of Prescription	8.3%	8.1%	8.7%	9.0%	9.3%	9.6%	10.0%	10.4%	10.2%	10.9%	11.1%	11.0%	10.9%	10.7%	10.6%
Prescription excl. Generics	596	610	626	666	652	657	675	665	689	690	721	765	820	884	948
Growth per Year		+2.4%	+2.6%	+6.4%	-2.1%	+0.7%	+2.7%	-1.5%	+3.7%	+0.2%	+4.4%	+6.1%	+7.1%	+7.8%	+7.3%
Orphan	60	63	70	79	84	90	96	102	115	123	134	151	169	189	209
Prescription excl. Generics & Orphan	536	547	556	587	568	567	579	563	575	567	587	614	651	695	739

Prescription incl. Generics CAGR 17-22 +6.5%

Note: Sales to 2016 based on company reported sales data. Sales forecasts to 2022 based on a consensus of leading equity analysts' estimates for company product sales and segmental sales.

Worldwide Sales At Risk from Patent Expiration (2008-2022)

Source: Evaluate, May 2017



Patent Analysis: 'Total Sales at Risk' represents the worldwide product sales in the year prior to patent expiry but allocated to the year of expiry. E.g. Plavix had sales of \$7.1bn in 2011, this is shown above as 'At Risk' in 2012.

Worldwide Sales At Risk from Patent Expiration (2008-2022)

Source: Evaluate, May 2017

Year	WW Prescription Sales (\$bn)														
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Sales at Risk	18	24	29	34	52	31	31	48	52	33	31	41	17	21	49
Expected Sales Lost	12	12	13	20	37	24	20	15	14	23	19	19	17	14	13
% Market at risk	+3%	+4%	+4%	+5%	+7%	+4%	+4%	+6%	+7%	+4%	+4%	+5%	+2%	+2%	+5%

Worldwide Prescription Drug Sales in 2022: Top 20 Companies

part 1 of 2



Novartis forecast to lead pharma ranking in 2022, but Pfizer and Roche will challenge its leadership.

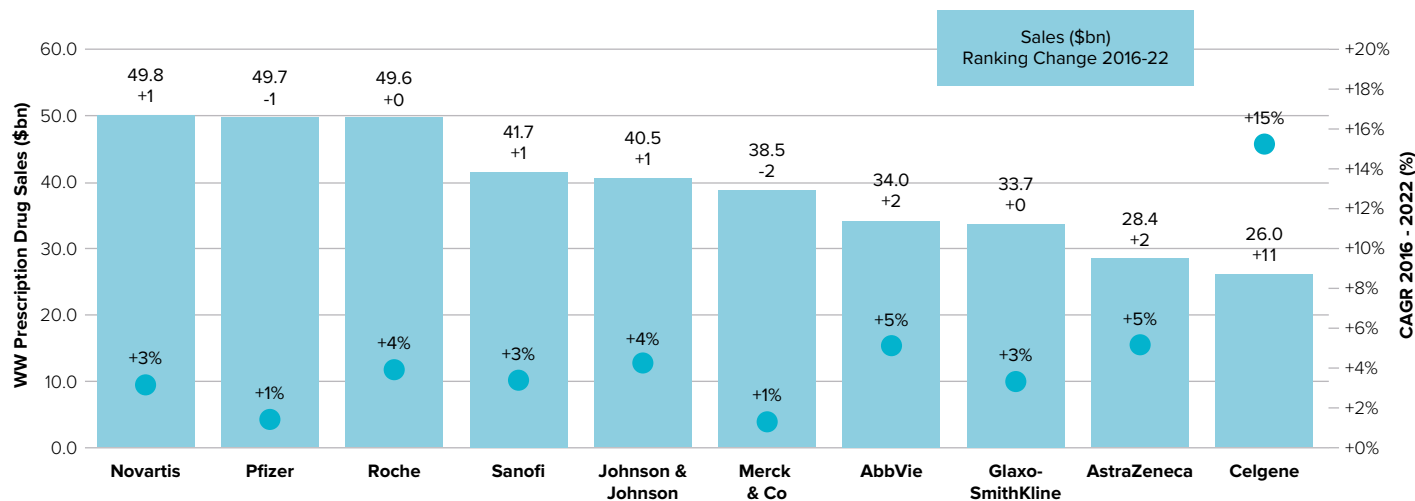
Evaluate finds that three companies will be closely competing for the top spot. According to the latest sell side consensus forecast, Novartis seems to have a slight edge over Pfizer and Roche, but several themes overlap among the three contenders. The impact of biosimilars will be a decisive factor for the future of Roche and Pfizer, with the former having a significant share of its portfolio at risk and the latter playing on both sides of the fence where the losses from Enbrel could be offset by the upside coming from the biosimilar franchise acquired through Hospira. Pfizer and Roche will be also crossing paths in the PD-1/PD-L1 space where

their assets, Bavencio and Tecentriq respectively, are late joiners while Novartis's Kisqali will be challenging Pfizer's Ibrance for the leadership in the CDK 4&6 space.

Behind the top three, Celgene exhibits the largest jump and is forecast to enter the top 10 driven by its anti-cancer therapeutic Revlimid and its immunosuppressant Otezla adding a combined \$17.1 bn to its 2022 prescription drug sales. Gilead moves in the opposite direction leaving the top ten ranking due to the projected erosion of its HCV franchise while the market is still awaiting for an in-organic play to boost its revenue projections and longer term outlook. Shire is anticipated to enter the top 20 following the acquisition of Baxalta.

Worldwide Prescription Drug Sales in 2022: Top 10 Companies

Source: Evaluate, May 2017



Worldwide Prescription Drug Sales (2016-2022): Top 20 Companies & Total Market

Source: Evaluate, May 2017

Rank	Company	WW Prescription Sales (\$bn)			Rank Chg. (+/-)	WW Market Share			Rank Chg. (+/-)
		2016	2022	CAGR		2016	2022	Chg. (+/-)	
1.	Novartis	41.6	49.8	+3%	-2.6	5.4%	4.7%	-0.7pp	+1
2.	Pfizer	45.9	49.7	+1%	+0.6	6.0%	4.7%	-1.3pp	-1
3.	Roche	39.6	49.6	+4%	-3.0	5.2%	4.7%	-0.5pp	+0
4.	Sanofi	34.2	41.7	+3%	-3.7	4.4%	3.9%	-0.5pp	+1
5.	Johnson & Johnson	31.7	40.5	+4%	+0.6	4.1%	3.8%	-0.3pp	+1
6.	Merck & Co	35.7	38.5	+1%	-0.6	4.6%	3.6%	-1.0pp	-2
7.	AbbVie	25.3	34.0	+5%	+3.0	3.3%	3.2%	-0.1pp	+2
8.	GlaxoSmithKline	27.8	33.7	+3%	+1.2	3.6%	3.2%	-0.4pp	+0
9.	AstraZeneca	21.0	28.4	+5%	-1.8	2.7%	2.7%	-0.1pp	+2
10.	Celgene	11.1	26.0	+15%	+0.4	1.4%	2.5%	+1.0pp	+11

Top 11-20 continued over...

Worldwide Prescription Drug Sales in 2022: Top 20 Companies

part 2 of 2



Source: Evaluate, May 2017

Rank	Company	WW Prescription Sales (\$bn)			Rank Chg. (+/-)	WW Market Share			Rank Chg. (+/-)
		2016	2022	CAGR		2016	2022	Chg. (+/-)	
11.	Bristol-Myers Squibb	17.7	25.6	+6%	-2.0	2.3%	2.4%	+0.1pp	+3
12.	Amgen	21.9	24.1	+2%	-2.9	2.9%	2.3%	-0.6pp	-2
13.	Teva Pharmaceutical Industries	18.5	22.3	+3%	+4.8	2.4%	2.1%	-0.3pp	+0
14.	Novo Nordisk	16.6	21.7	+5%	-5.6	2.2%	2.1%	-0.1pp	+3
15.	Bayer	16.9	21.2	+4%	+1.6	2.2%	2.0%	-0.2pp	+1
16.	Gilead Sciences	30.0	20.8	-6%	-8.3	3.9%	2.0%	-1.9pp	-9
17.	Eli Lilly	17.2	20.7	+3%	-1.3	2.2%	2.0%	-0.3pp	-2
18.	Allergan	18.6	19.2	+1%	-11.5	2.4%	1.8%	-0.6pp	-6
19.	Shire	10.9	19.0	+10%	-1.5	1.4%	1.8%	+0.4pp	+3
20.	Boehringer Ingelheim	13.3	18.5	+6%	+0.2	1.7%	1.7%	+0.0pp	-2
	Total Top 20	495.2	605.0	+3%		64.5%	57.1%	-7.4pp	
	Other	272.8	454.7	+9%		35.5%	42.9%		
	Total	768.0	1,059.7	+6%		100.0%	100.0%		

Note: Prescription drug sales include generic drug sales. Excludes alliance revenue and royalties where possible.
2016 Teva Pharmaceutical Industries sales reflect Actavis Generics business.

Worldwide Prescription Drug & OTC Sales by Technology (2008-2022)



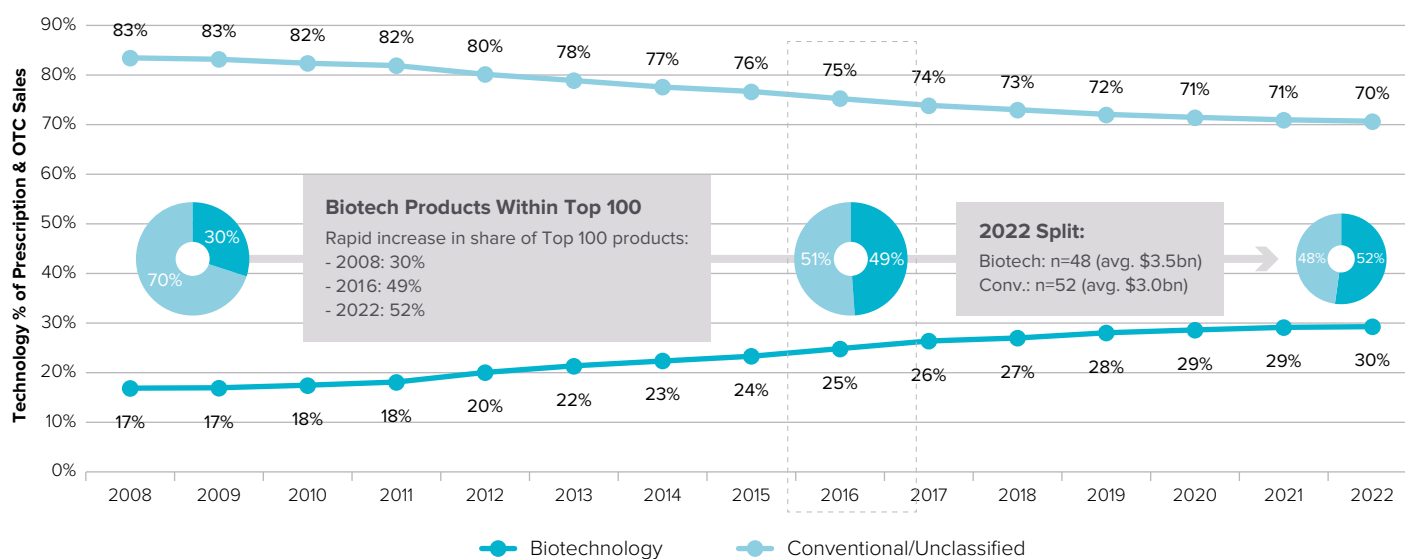
Use of biotech technology continues to rise, contributing to 52% of the Top 100 product sales by 2022, overtaking small molecule drugs. Roche still market leader.

The uptake of biologics is expected to continue as novel biologic blockbusters keep entering the pharmaceutical market. The penetration of biotech products is set to increase from a 25% market share in 2016 to 30% in 2022. According to the latest Evaluate consensus forecast, in 2022 52% of the value of the top 100 products will come from biologics as established chemical

products drop off the patent cliff and new breakthrough biologics get approved. Within this outlook, Roche will continue to be the undisputed market leader although with a \$5bn reduction in 2022 forecast sales since last year the gap is narrowing. Bristol-Myers Squibb retains a CAGR (+12%) among the highest in the top 10, but with recent setbacks to Opdivo, it has dropped 4 places compared to our consensus forecasts from last year and is perilously close to falling out of the top 10.

Worldwide Prescription Drug & OTC Pharmaceutical Sales: Biotech vs. Conventional Technology

Source: Evaluate, May 2017



Worldwide Prescription Drug & OTC Sales by Technology (2008-2022)

Source: Evaluate, May 2017

Technology	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Biotechnology	17%	17%	18%	18%	20%	22%	23%	24%	25%	26%	27%	28%	29%	29%	30%
Conventional/Unclassified	83%	83%	82%	82%	80%	78%	77%	76%	75%	74%	73%	72%	71%	71%	70%
Total Prescription & OTC Sales	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Technology	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Biotechnology	118	120	129	141	152	165	178	183	202	214	231	253	276	302	326
Conventional	422	433	440	461	439	430	440	435	436	423	435	455	483	517	550
Other Unclassified Sales	150	145	151	167	165	170	171	159	165	173	181	190	200	211	225
Total Prescription & OTC Sales	690	698	719	769	756	765	789	776	803	809	847	897	959	1030	1101



Worldwide Prescription Drug Sales from Biotechnology in 2022: Top 10 Companies

Source: Evaluate, May 2017

Rank	Company	WW Sales (\$bn)			WW Market Share			Rank Chg.
		2016	2022	% CAGR 16-22	2016	2022	Chg. (+/-)	
1.	Roche	31.9	38.7	+3%	15.8%	11.9%	-3.9pp	+0
2.	Sanofi	15.5	24.2	+8%	7.7%	7.4%	-0.3pp	+3
3.	Amgen	19.4	21.7	+2%	9.6%	6.7%	-3.0pp	-1
4.	Johnson & Johnson	13.0	19.1	+7%	6.5%	5.9%	-0.6pp	+2
5.	AbbVie	16.8	19.1	+2%	8.3%	5.8%	-2.5pp	-2
6.	Novo Nordisk	15.8	18.4	+3%	7.8%	5.7%	-2.2pp	-2
7.	Merck & Co	8.6	17.7	+13%	4.3%	5.4%	+1.2pp	+1
8.	Eli Lilly	8.4	14.7	+10%	4.1%	4.5%	+0.3pp	+1
9.	Bristol-Myers Squibb	7.3	14.4	+12%	3.6%	4.4%	+0.8pp	+1
10.	Pfizer	11.4	14.0	+4%	5.6%	4.3%	-1.3pp	-3

Note: Company drug sales from undisclosed products are presumed to be from conventional (small molecule) technology.



Roche gains the top spot of the pipeline value creation ranking proving its leadership ambitions beyond oncology.

Despite the declining growth of its HCV franchise, Gilead still tops the value creation ranking when considering both recently launched products (approved from 2014 onward) as well as assets currently in development. Merck & Co is expected to capitalise on the ongoing label expansion of Keytruda which recently scored a potentially game-changing milestone with the first tumour-agnostic approval by the FDA. The podium is completed by GlaxoSmithKline where Triumeq and Nucala are forecast to drive the company's value creation through 2022 along with the new addition to the

vaccine portfolio, Shingrix. While it does not surprise to see Roche's pipeline at the top of the ranking given its historical track record, the fact that the two major novel therapies - lampalizumab and emicizumab - are not part of the oncology franchise does represent a step-change in the company's portfolio strategy. AstraZeneca's R&D assets also look particularly promising after struggling for so many years, in particular in oncology where Imfinzi, tremelimumab and acalabrutinib will reinforce the existing franchise (Tagrisso, Lynparza). Life after Humira is slightly less worrying for AbbVie where a promising pipeline will help balance the decline of its major blockbuster when the first biosimilar adalimumab will hit the market.

Value creation from recently launched* and pipeline products (\$bn)

Rank	Company	Cumulative Sales 2017-22	Lead product/s
1.	Gilead Sciences	98.2	Descovy, Genvoya
2.	Merck & Co	69.5	Keytruda
3.	GlaxoSmithKline	54.8	Triumeq, Nucala
4.	Novartis	52.0	Cosentyx, Entresto
5.	Pfizer	51.4	Ibrance
6.	Eli Lilly	50.1	Trulicity, Abemaciclib
7.	Roche	50.0	Tecentriq, Ocrevus
8.	Sanofi	44.4	Dupixent, Kevzara
9.	Bristol-Myers Squibb	43.6	Opdivo
10.	AstraZeneca	41.4	Imfinzi

*Products launched from 2014 onward.

Value creation from pipeline products (\$bn)

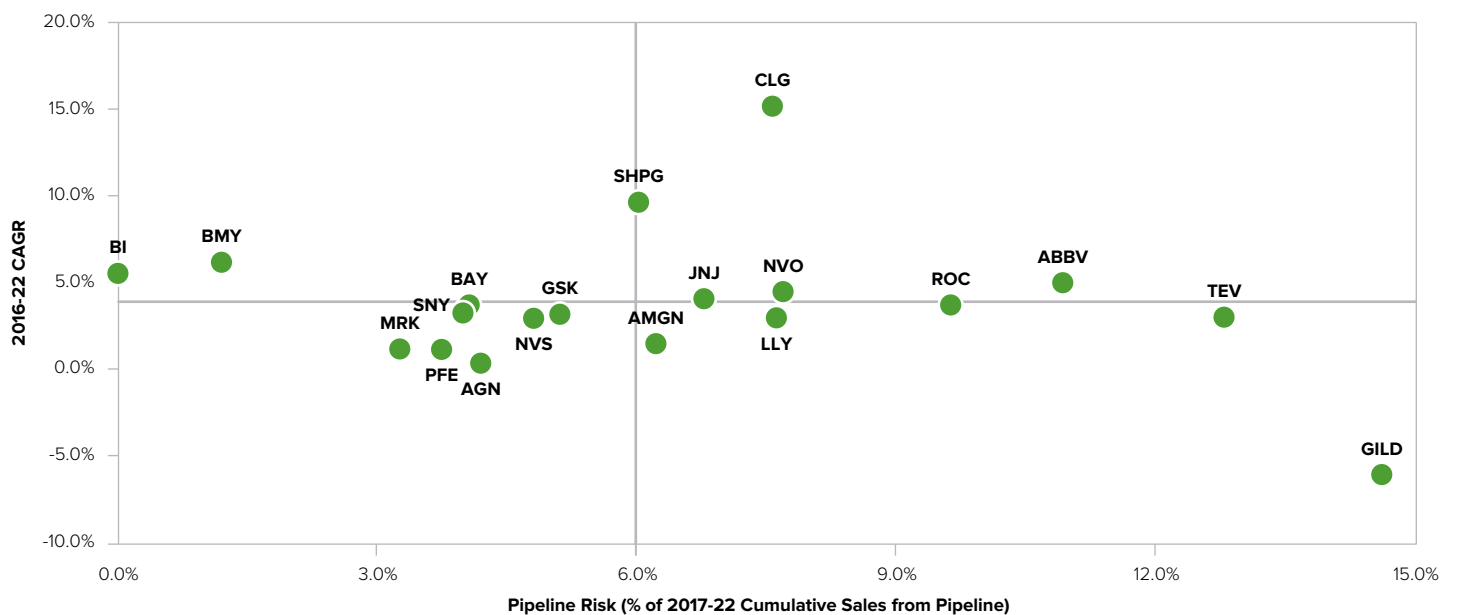
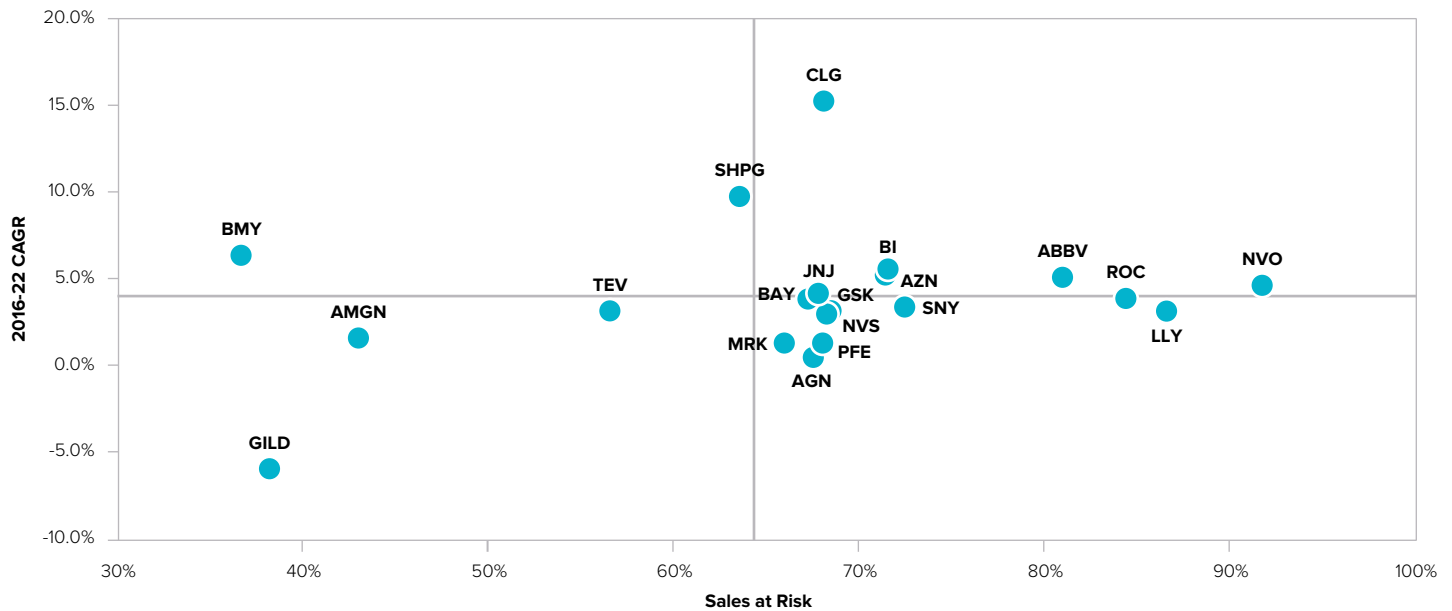
Rank	Company	Cumulative Sales 2017-22	Lead product/s
1.	Roche	24.5	Emicizumab, Lampalizumab
2.	AstraZeneca	21.0	Imfinzi, Tremelimumab
3.	AbbVie	20.4	Elagolix, Rova-T, ABT-494
4.	Gilead Sciences	19.1	Bictegravir/F/TAF
5.	Johnson & Johnson	14.9	Guselkumab, Apalutamide
6.	Novartis	10.3	Tisagenlecleucel-T, Siponimod
7.	Pfizer	9.6	Talazoparib, Ertugliflozin
8.	GlaxoSmithKline	9.4	Shingrix
9.	Celgene	8.8	Ozanimod, Mongersen
10.	Novo Nordisk	8.7	Semaglutide



Celgene and Shire emerge as the fastest growing companies through 2022.

Celgene and Shire stand out as the fastest growing companies through 2022, with double-digit CAGR. Such a growth seems also balanced in terms of relative portfolio risk (both pipeline setbacks and generic impact) although it is worth noticing that Celgene's high dependence on Revlimid does raise the risk profile of the company. While Bristol-Myers Squibb had a difficult 12 months in the stock market due to lowered expectations on Opdivo, its portfolio exhibits

a limited exposure to generic risk and it is reasonably diversified. The main question mark remains the value of its pipeline where there are no assets that seem to trigger the enthusiasm of sell-side analysts. AbbVie and Roche share a similar position with a significant portion of their top-selling franchises exposed to biosimilar risk and with promising pipelines which also contribute to overall risk of their portfolios. Gilead still acts as the main outlier as its declining revenues are also combined with the largest pipeline risk (Bictegravir/F/TAF) among the top 20.



ABBV = AbbVie, AGN = Allergan, AMGN - Amgen, AZN = AstraZeneca, BAY = Bayer, BI = Boehringer Ingelheim, BMJ = Bristol-Myers Squibb, CLG = Celgene, LLY = Eli Lilly, GILD = Gilead Sciences, GSK = GlaxoSmithKline, JNJ = Johnson & Johnson, MRK = Merck & Co, NVS = Novartis, NVO = Novo Nordisk, PFE = Pfizer, ROC = Roche, SNY = Sanofi, SHPG = Shire, TEV = Teva



Novo Nordisk’s portfolio expected to yield the highest return on investment in the future based on historical investment. Organic strategies linked to higher Rol.

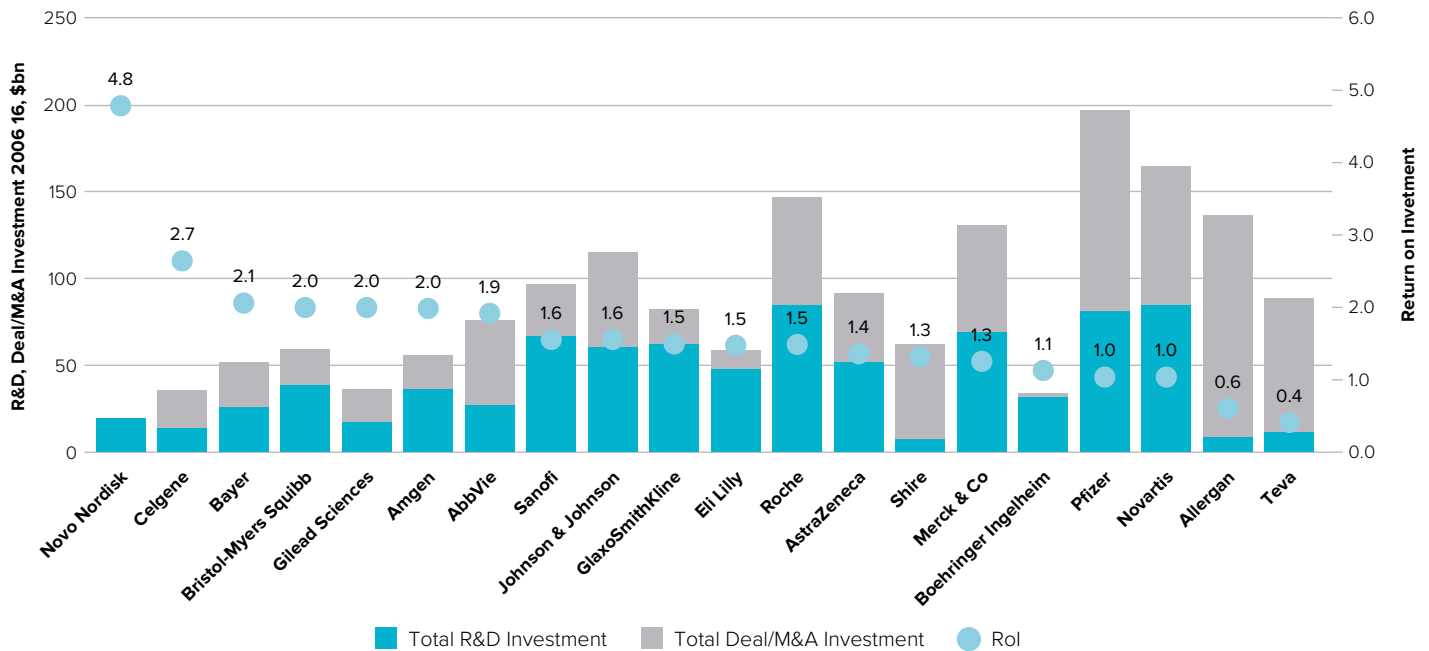
If it was still necessary to prove it, a focused-play strategy appears to be more productive in terms of return on investment according to an analysis of Evaluate data where the investment in R&D and M&A over a 10-year timeframe has been assessed against the expected return proxied by Evaluate’s NPV Analyzer. Novo Nordisk and Celgene exhibit the largest return on investment, 4.8 and 2.7

respectively, with Bayer completing the podium. Among the top 3 pharma companies, Roche is the only one with a Rol higher than 1, while Pfizer and Novartis seem to struggle to capitalise on the large M&A spend.

The top 10 companies in terms of Rol exhibit a share of R&D vs. total spend of 60% vs. 47% of the bottom 10 which seems to suggest that an organic play, mixed with a few selected bolt-on acquisitions could potentially pave the way to higher returns. Companies such as BMS and Celgene are good examples.

Pharma Top 20 Prescription Sales, Rol Analysis¹
(Rol = Return on Investment²)

Source: Evaluate, May 2017



¹ Return on investment based on Evaluate’s NPV Analyzer and disclosed investment in R&D and deal/M&A during the 2006-16 period (deals data until May 2017). Deals data only include pharma-related deals (e.g. deals in Medtech and Agrochemicals not included). The NPV value only takes into consideration products where a consensus forecast value exists. R&D spend for AbbVie also includes Abbott’s R&D budget during the 2006-10 period.

² The Rol in this analysis should be interpreted as a prospective Rol based on future projections as it does not take into account the earnings gained in the past as the result of historical acquisitions (e.g. Enbrel contribution to Pfizer’s bottom line following Wyeth’s acquisition).

Top 20 Most Valuable R&D Projects (Ranked by Net Present Value)

part 1 of 2



Aducanumab emerging as the most valuable pipeline product. AbbVie exhibits the largest amount of assets in the top 20.

Good news for Biogen, as their Alzheimer's drug Aducanumab tops the list of most valuable projects in the pharmaceutical pipeline, but is this drug destined to go the way of most of the other Alzheimer's drugs before it? The further down the list we go, the more apparent it becomes that oncology is the therapy area of choice when it comes to R&D value. Kite Pharma's Axicabtagene Ciloleucel and Novartis's CTL019 CAR-T cell therapies are featured in the top twenty, despite patient deaths in Juno's JCAR015 clinical trials, showing that there is still faith in the success of these products. Although oncology's dominance on the list is very apparent, Gilead may have finally found a much needed blockbuster in the form of Bictegravir/F/TAF, an HIV drug with predicted 2022 sales of over

4 billion. It's no Harvoni, but it has the potential to pick up the slack after declining sales for their HCV line of therapies.

Room for new entries on the list has also been made easier by the approval of 5 drugs including last year's top 2, Roche's Ocrevus and Sanofi's Dupixent, but not all projects were able to exit the list on such good terms. Lilly's Alzheimer's drug Solanezumab failed to meet the primary endpoints of its Phase III trials and was abandoned, putting an end to Lilly's dreams of a first to market Alzheimer's drug and the related commercial potential. Although this was the only drug to be abandoned this year, many drugs have suffered large setbacks, including Ophotech's Fovista. The highly anticipated drug lost 97% of its NPV since August 2016 and AbbVie's Veliparib also lost 82% over the same period. Among companies, AbbVie and J&J showcase the largest number of assets in the top 20.

Top 20 Most Valuable R&D Projects (Ranked by Net Present Value)

Source: Evaluate, May 2017

Rank	Product	Company	Phase (current)	Pharmacological Class	WW Product Sales (\$m) 2022		Today's NPV (\$m)
1.	Aducanumab	Biogen	Phase III	Anti-beta-amyloid (Abeta) MAb	1,536		10,199
2.	Apalutamide	Johnson & Johnson	Phase III	Anti-androgen	1,629		9,839
3.	Abemaciclib	Eli Lilly	Phase III	Cyclin-dependent kinase (CDK) 4 & 6 inhibitor	1,792		8,840
4.	Rova-T	AbbVie	Phase II	Anti-delta-like ligand (DLL) 3 MAb-cytotoxic drug conjugate	1,476	New Entry	8,486
5.	Ozanimod	Celgene	Phase III	Sphingosine-1-phosphate (S1P) 1 & 5 modulator	1,779		8,174
6.	Axicabtagene Ciloleucel	Kite Pharma	Filed	Anti-CD19 chimeric antigen receptor (CAR) T cell therapy	1,713	New Entry	7,427
7.	Bictegravir/F/TAF	Gilead Sciences	Phase III	Nucleoside reverse transcriptase inhibitor (NRTI) & HIV integrase inhibitor	4,378		7,178
8.	Semaglutide	Novo Nordisk	Filed	Glucagon-like peptide (GLP) 1 agonist	2,243		6,943
9.	Guselkumab	Johnson & Johnson	Filed	Anti-IL-23 MAb	1,559	New Entry	6,392
10.	ABT-494	AbbVie	Phase III	Janus kinase (JAK) 1 inhibitor	1,214	New Entry	6,285
11.	Emicizumab	Roche	Phase III	Anti-factor IXa/X bispecific MAb	1,635		6,129
12.	Epacadostat	Incyte	Phase III	Indoleamine 2,3-dioxygenase (IDO) 1 inhibitor	1,728	New Entry	5,866
13.	Sirukumab	Johnson & Johnson	Filed	Anti-IL-6 MAb	1,162		5,423
14.	SHP643	Shire	Phase III	Anti-plasma kallikrein MAb	921		5,327
15.	Elagolix	AbbVie	Phase III	Gonadotrophin releasing hormone (GnRH) antagonist	1,488	New Entry	4,956
16.	CTL019	Novartis	Filed	Anti-CD19 chimeric antigen receptor (CAR) T cell therapy	917	New Entry	4,794
17.	Shingrix	GlaxoSmithKline	Filed	Herpes zoster vaccine	1,126	New Entry	4,321
18.	Tremelimumab	AstraZeneca	Phase III	Anti-cytotoxic T lymphocyte associated protein (CTLA) 4 MAb	992	New Entry	4,302
19.	Glecaprevir & pibrentasvir	AbbVie	Filed	Hepatitis C NS3/4A protease & hepatitis C NS5A inhibitor	1,254	New Entry	4,066
20.	Lampalizumab	Roche	Phase III	Anti-complement factor D MAb	924	New Entry	4,063
Top 20					31,466		129,008
Other					115,455		380,089
Total					146,921		509,097 -5%

NPV of R&D Pipeline AUG 2016: 537,873

Note: *In regards to Kite Pharma's Axicabtagene Ciloleucel, Evaluate has judged Investment Bank Analyst product forecasts for this company to be on 'best case' and are not fully adjusted for development risk associated with R&D projects.



**Most Valuable R&D Projects (Ranked by NPV) in August 2016
Which Have Since Been Approved or Suffered Setbacks**

Source: Evaluate, May 2017

Change vs. Aug 2016	Product	Company	Status (Aug 2016)	Status Change Since Aug 2016	Aug 2016 NPV (\$m)	Today's NPV (\$m)	Change vs. Aug 2016 (%)
Approved	Imfinzi	AstraZeneca	Phase III	Marketed	8,276	13,069	58%
	Kisqali	Novartis	Phase III	Marketed	6,370	6,921	9%
	Amjevita	Amgen	Filed	Marketed	6,273	2,549	-59%
	Ocrevus	Roche	Filed	Marketed	16,965	18,242	8%
	Dupixent	Sanofi	Phase III	Marketed	12,884	18,775	46%
				Sub-Total	50,768	59,556	17%
Setback	Solanezumab	Eli Lilly	Phase III	Abandoned, Phase III	5,577	0	-100%
	Fovista	Ophthotech	Phase III	Clinical trial setback	5,514	164	-97%
	Verubecestat	Merck & Co	Phase III	PI/III trial discontinuation	5,219	1,748	-67%
	JCAR017	Juno Therapeutics	Phase II	CAR-T class effect concerns	4,836	3,676	-24%
	Veliparib	AbbVie	Phase III	Missed PIII trial endpoints	7,502	1,321	-82%
	Mongersen	Celgene	Phase III	Disappointing trial results	4,719	3,335	-29%
				Sub-Total	28,648	6,908	-76%
Total					79,416	66,465	-16%

Worldwide R&D Spend by Pharma & Biotech Companies (2008-2022)



Worldwide pharmaceutical R&D spend to grow by 2.4% (CAGR) to \$181bn in 2022.

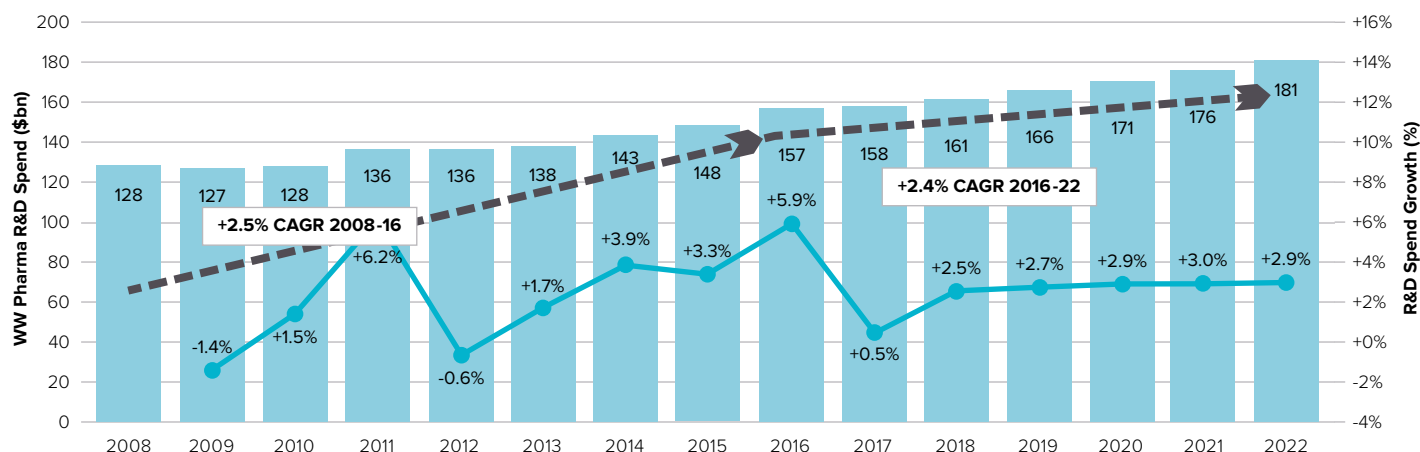
Evaluate finds that worldwide pharmaceutical R&D totalled \$156.7bn in 2016 representing an increase of 5.9% on the previous year.

Looking forward, R&D spend is forecast to grow at a rate of 2.4% per year, compared with the compound annual growth rate of 2.5%

between 2008 and 2016. The spend per NME, based on a three-year lag period between R&D expenditure and NME approval*, was \$5.1bn per NME, showing a sharp increase on the previous few years. The forecasted R&D spend has decreased compared with the 2016 World Preview suggesting a slow down in R&D investment.

Worldwide Total Pharmaceutical R&D Spend in 2008-2022

Source: Evaluate, May 2017



Worldwide R&D Spend by Pharma & Biotech Companies (2008-2022)

Source: Evaluate, May 2017

Year	WW Prescription Sales (\$bn)														
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Pharma R&D Spend	128.3	126.5	128.4	136.3	135.5	137.8	143.2	148.0	156.7	157.5	161.4	165.8	170.7	175.8	180.9
Growth per Year		-1.4%	+1.5%	+6.2%	-0.6%	+1.7%	+3.9%	+3.3%	+5.9%	+0.5%	+2.5%	+2.7%	+2.9%	+3.0%	+2.9%
WW Prescription Sales	649	664	686	732	719	727	750	741	768	774	811	860	920	990	1,060
R&D as % of WW Prescription Sales	19.8%	19.1%	18.7%	18.6%	18.8%	19.0%	19.1%	20.0%	20.4%	20.3%	19.9%	19.3%	18.5%	17.8%	17.1%
Generics	54	54	60	66	67	70	75	77	79	84	90	95	101	106	112
Prescription excl. Generics	596	610	626	666	652	657	675	665	689	690	721	765	820	884	948
R&D as % of Prescription excl. Generics	21.5%	20.8%	20.5%	20.5%	20.8%	21.0%	21.2%	22.3%	22.7%	22.8%	22.4%	21.7%	20.8%	19.9%	19.1%

CAGR 16-22 on Pharma R&D Spend +2.4%. Cumulative 10 year R&D Spend (2007-16) \$1,360bn.

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Number of NMEs	38	28	29	25	31	35	26	35	44	35	51	56	27
Spend per NME (\$bn)	2.3	3.4	3.7	4.8	4.1	3.6	4.9	3.9	3.1	3.9	2.8	2.6	5.8
Spend per NME (\$bn) (3 year lag)*				3.5	3.1	3.1	4.6	3.7	2.9	3.7	2.7	2.4	5.1

Note: Forecast pharmaceutical research and development spend based on a consensus of leading equity analysts' estimates for company level R&D spend, extrapolated to pharmaceutical R&D when a company has non-pharmaceutical R&D activity.

*Spend per NME (\$bn) (3 year lag) uses the R&D expense for 3 years prior to the NME approval instead of the same year. e.g. the 2016 figure of \$5.1bn is the R&D expense in 2013 divided by the number of NMEs in 2016.

Pharmaceutical R&D Spend in 2022: Top 20 Companies



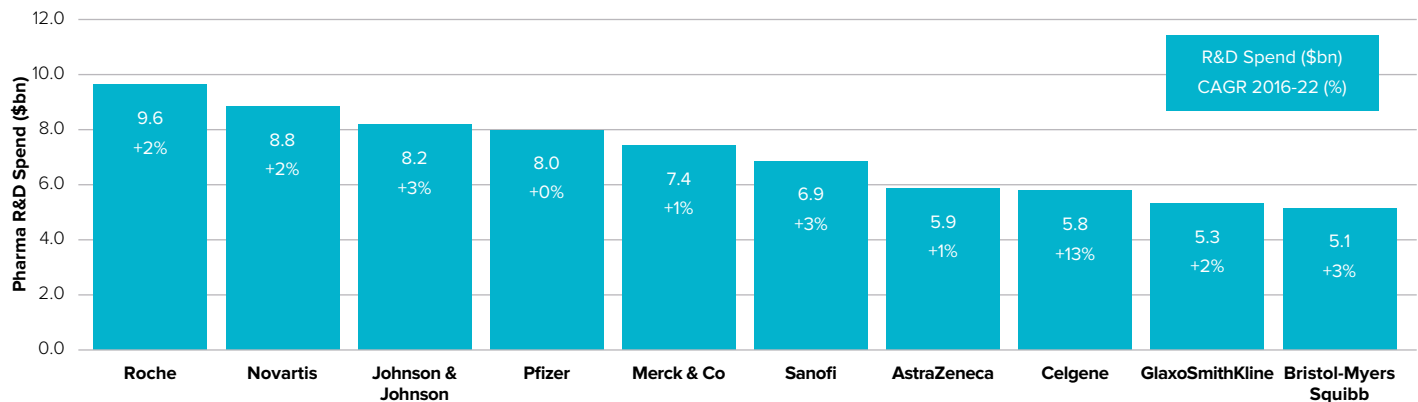
Roche overtakes Novartis as the biggest spender on pharmaceutical R&D in 2022.

Evaluate finds that Roche is forecast to spend the most on research and development in 2022, with a spend of \$9.6bn. Of the top 20, Celgene and Boehringer Ingelheim are forecast to grow their R&D

expenses most rapidly, with R&D spending forecast to increase 13% and 6% per year until 2022 respectively. Overall, total R&D spend is expected to increase by 2.4% each year, reaching \$180.9bn in 2022.

Pharmaceutical R&D in 2022: Top 10 Companies

Source: Evaluate, May 2017



Pharmaceutical R&D Spend (2016 & 2022): Top 20 Companies & Total Market

Source: Evaluate, May 2017

Rank	Company	Pharma R&D (\$bn)		Change 2016-22	Change Since August 2016	R&D As a % of Prescription Sales		Chg. (+/-)
		2016	2022			2016	2022	
1.	Roche	8.7	9.6	+2%	-0.3	22.0%	19.4%	-2.6pp
2.	Novartis	7.9	8.8	+2%	-0.3	19.1%	17.7%	-1.3pp
3.	Johnson & Johnson	7.0	8.2	+3%	+0.2	22.0%	20.2%	-1.8pp
4.	Pfizer	7.8	8.0	+0%	+0.2	17.1%	16.0%	-1.0pp
5.	Merck & Co	6.8	7.4	+1%	+0.2	19.2%	19.3%	+0.1pp
6.	Sanofi	5.7	6.9	+3%	-0.4	16.7%	16.5%	-0.3pp
7.	AstraZeneca	5.6	5.9	+1%	+0.1	26.9%	20.7%	-6.2pp
8.	Celgene	2.8	5.8	+13%	+0.9	24.8%	22.2%	-2.6pp
9.	GlaxoSmithKline	4.7	5.3	+2%	-0.5	16.9%	15.7%	-1.2pp
10.	Bristol-Myers Squibb	4.4	5.1	+3%	+0.1	24.9%	20.1%	-4.8pp
11.	Eli Lilly	4.9	4.9	-0%	-0.1	28.7%	23.8%	-4.9pp
12.	AbbVie	4.2	4.8	+2%	+0.4	16.4%	14.1%	-2.3pp
13.	Boehringer Ingelheim	3.2	4.6	+6%	+0.1	23.8%	24.9%	+1.0pp
14.	Gilead Sciences	3.9	3.9	-0%	-0.4	13.1%	18.6%	+5.5pp
15.	Amgen	3.8	3.8	+0%	-0.6	17.2%	15.9%	-1.2pp
16.	Bayer	3.1	3.5	+2%	+0.4	18.3%	16.6%	-1.7pp
17.	Takeda	2.9	3.3	+2%	+0.0	22.7%	21.2%	-1.5pp
18.	Novo Nordisk	2.2	2.8	+4%	-0.7	13.0%	12.9%	-0.1pp
19.	Biogen	2.0	2.5	+4%	-0.2	20.1%	20.7%	+0.6pp
20.	Regeneron Pharmaceuticals	2.1	2.5	+4%	-0.9	61.5%	57.5%	-3.9pp
Total Top 20		93.6	107.7	+2.4%		19.8%	18.7%	-1.1pp
Other		63.1	73.2	+2.5%				
Total		156.7	180.9	+2.4%		20.4%	17.1%	-3.3pp

Note: Forecast pharmaceutical R&D spend based on a consensus of leading equity analysts' estimates for company-level R&D spend.

FDA New Drug Approval Analysis NMEs & Biologicals: (2001-2016)

part 1 of 2



After the record high of 56 approvals exhibited in 2015, the number of NME approvals has dropped by around 50%.

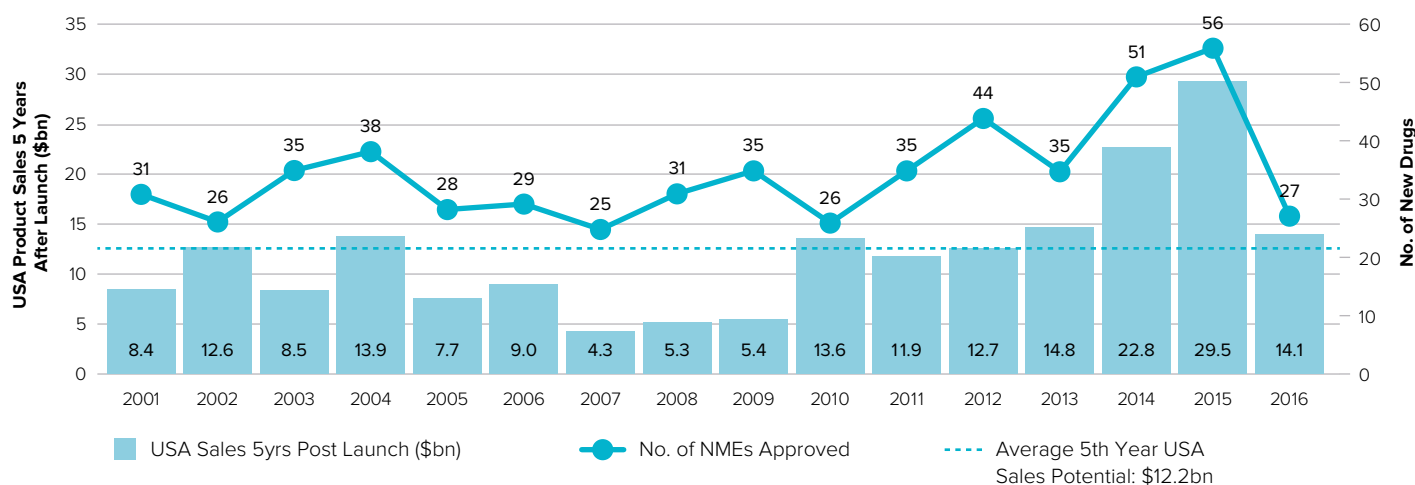
While the figure may signal a decrease in R&D productivity, the positive trend observed in the first months of 2017 with 21 novel drugs already approved by CDER in 2017 compared to 15 up to May 2016, seems to suggest that the drop was mostly due to timing of approval rather than more structural dynamics.

The average value of US sales after 5 years per single approval – \$522m – comes very close to the record established last year

and primarily driven by potential blockbusters such as Tecentriq (Roche), Venclexta (Roche/AbbVie) and Taltz (Lilly). The 2017 outlook looks promising based on the trend observed in the first 5 months with the approval of many potential big sellers, such as Dupixent in atopic dermatitis, Ocrevus in multiple sclerosis and several oncology compounds (Imfinzi, Kisqali and Bavencio). Highly anticipated is also the upcoming launch of the first CAR-T therapies which could materialize towards the end of the year.

FDA Approval Count vs. Total USA Product Sales 5 Years After Launch

Source: Evaluate, May 2017



Key Approvals in Top 6 Years

2002 – Neulasta (AMGN), Abilify (Otsuka/BMY), Zetia (MRK/SGP), Humira (ABT)
2004 – Avastin (RHHBY), Cymbalta (LLY), Spiriva (BI/PFE), Lyrica (PFE)
2013 – Tecfidera (BIIB), Imbruvica (ABBV), Invokana (JNJ), Tivicay (GSK)

2014 – Keytruda (MRK), Opdivo (BMY), Otezla (CELG), Trulicity (LLY)
2015 – Ibrance (PFE), Darzalex (JNJ), Genyova (GILD), Cosentyx (NVS)
2016 – Tecentriq (RHHBY), Venclexta (ABBV/Roche), Taltz (LLY), Xiidra (Shire)

FDA Approval Count (NMEs & Biologicals) vs. 5th Year after Launch USA Product Sales

Source: Evaluate, May 2017

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
No. of NMEs Approved	24	17	21	31	18	18	16	21	20	15	24	34	25	30	32	13
No. of Biologicals Approved	7	9	14	7	10	11	9	10	15	11	11	10	10	21	24	14
Total NMEs + Biologicals	31	26	35	38	28	29	25	31	35	26	35	44	35	51	56	27
% Chg.		-16%	+35%	+9%	-26%	+4%	-14%	+24%	+13%	-26%	+35%	+26%	-20%	+46%	+10%	-52%
USA Sales 5yrs Post Launch \$bn	8.4	12.6	8.5	13.9	7.7	9.0	4.3	5.3	5.4	13.6	11.9	12.7	14.8	22.8	29.5	14.1
% Chg.		+50%	-33%	+63%	-44%	+17%	-52%	+21%	+3%	+150%	-12%	+7%	+16%	+55%	+29%	-52%
5yr USA Sales per Approval \$m	271	485	242	365	275	311	174	170	155	522	339	290	422	448	526	522
% Chg.		+79%	-50%	+50%	-25%	+13%	-44%	-2%	-9%	+236%	-35%	-15%	+46%	+6%	+17%	-1%

Note: The number of biologicals approved include biologicals from both CDER and CBER. In 2016 there were 9 CDER biologicals approved and Evaluate estimates that there were 5 novel CBER biologicals approved: Afstyla, Idelvion, Kovaltry, MACI and Vaxchora.

5th year USA sales for products approved up to the end of 2010 are based on actual company reported sales.



Top 10 New Molecular Entities in 2016: Ranked on USA Consensus Sales in 2021

Source: Evaluate, May 2017

Rank	Product	Company	Approved	Review Status	USA Sales (\$m)	
					2016	2021
1.	Tecentriq	Roche	May 2016	Priority review	156	2,323
2.	Venclexta	AbbVie/Roche	Apr 2016	Priority review	13	1,500
3.	Taltz	Eli Lilly	Mar 2016	Standard	111	1,384
4.	Xiidra	Shire	Jul 2016	Priority review	54	1,035
5.	Spinraza	Biogen	Dec 2016	Priority review	5	936
6.	Nuplazid	ACADIA Pharmaceuticals	Apr 2016	Priority review	17	868
7.	Afstyla	CSL	May 2016	Standard	147	865
8.	Ocaliva	Intercept Pharmaceuticals	May 2016	Priority review	18	735
9.	Epclusa	Gilead Sciences	Jun 2016	Priority review	1,591	728
10.	Zepatier	Merck & Co	Jan 2016	Priority review	488	718
	Other				67	3,012
	Total				2,667	14,105

Note: Sales forecasts based on a consensus of leading equity analysts' estimates.
 Afstyla and Venclexta USA sales figures for 2016 are estimated.

Worldwide Prescription Drug & OTC Sales by Therapy Area in 2022



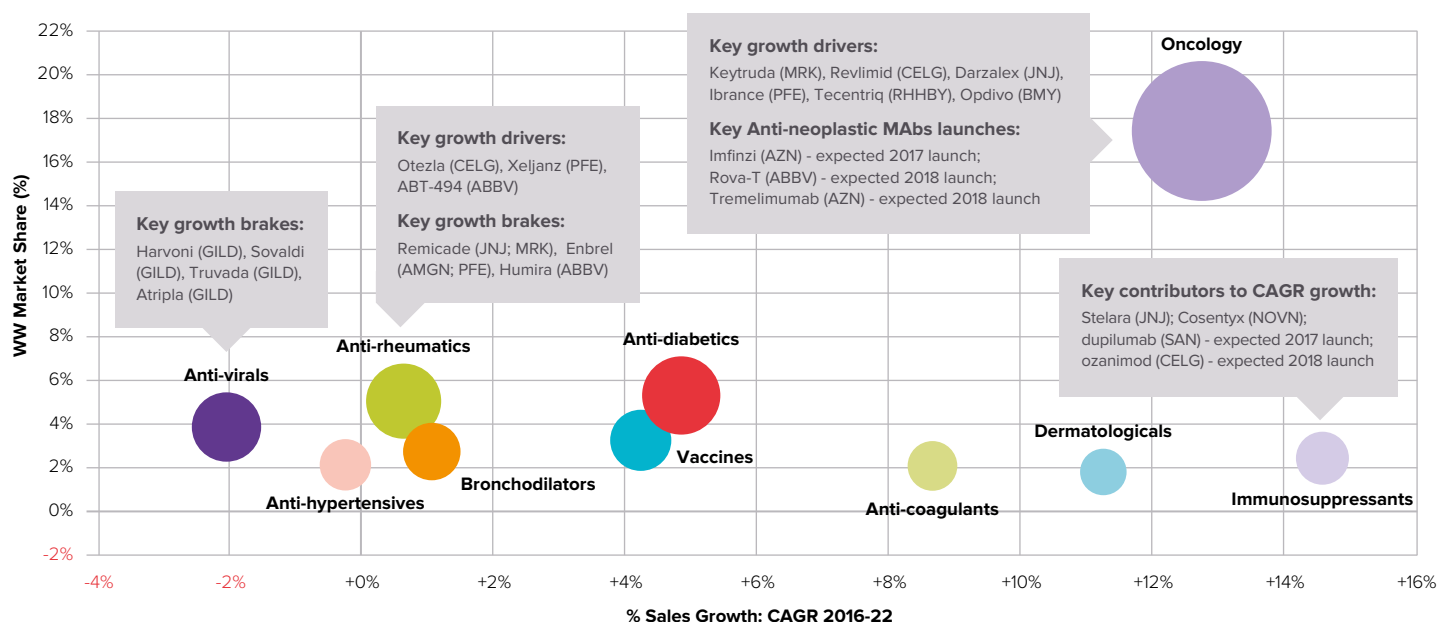
Oncology still the fastest growing therapy area with a +12.7% CAGR during the 2016-22 period.

Evaluate finds that oncology will remain the most dominant therapy segment in 2022 with an expected annual growth of 12.7% per year and sales reaching \$192.2bn in 2022. Growth in oncology through to 2022 is driven by Keytruda, Revlimid and Opdivo with contributions from the expected launches of AstraZeneca's Imfinzi and Incyte's epacadostat to compensate for the impact of biosimilars on key brands such as Roche's Herceptin and Rituxan.

Biosimilars are expected to have a larger impact in the anti-rheumatics segment which is forecast to grow at a modest 0.6% CAGR through 2022 despite the sustained growth of Otezla and Xeljanz and the launch of many promising therapies such as Lilly's Olumiant, AbbVie's ABT-494 and Sanofi/Regeneron's Kevzara. Anti-diabetics is forecast to be the second biggest therapy area with sales of \$57.9bn in 2022, fuelled by the continuous uptake of Trulicity and the upcoming launch of Novo Nordisk's semaglutide.

Top 10 Therapy Areas in 2022, Market Share & Sales Growth

Source: Evaluate, May 2017



Worldwide Prescription Drug & OTC Sales by Evaluate Therapy Area (2016 & 2022): Top 15 Categories & Total Market

Source: Evaluate, May 2017

Rank	Therapy Area	WW Sales (\$bn)		CAGR % Growth	2022 Change vs. Aug 16	WW Market Share			Rank Chg. (+/-)
		2016	2022			2016	2022	Chg. (+/-)	
1.	Oncology	93.7	192.2	+12.7%	+2.2	11.7%	17.5%	+5.8pp	+0
2.	Anti-diabetics	43.6	57.9	+4.8%	-8.2	5.4%	5.3%	-0.2pp	+2
3.	Anti-rheumatics	53.3	55.4	+0.6%	+0.8	6.6%	5.0%	-1.6pp	-1
4.	Anti-virals	48.5	42.8	-2.1%	-8.0	6.0%	3.9%	-2.2pp	-1
5.	Vaccines	27.5	35.3	+4.2%	-3.7	3.4%	3.2%	-0.2pp	+1
6.	Bronchodilators	28.3	30.1	+1.0%	-4.6	3.5%	2.7%	-0.8pp	-1
7.	Sensory Organs	20.2	28.3	+5.8%	-4.9	2.5%	2.6%	+0.1pp	+2
8.	Immunosuppressants	11.6	26.3	+14.6%	+4.2	1.4%	2.4%	+0.9pp	+5
9.	Anti-hypertensives	24.8	24.4	-0.2%	-2.0	3.1%	2.2%	-0.9pp	-2
10.	Anti-coagulants	14.1	23.2	+8.6%	+2.9	1.8%	2.1%	+0.3pp	+0

Top 11-15 continued over...



Source: Evaluate, May 2017

Rank	Therapy Area	WW Sales (\$bn)		CAGR % Growth	2022 Change vs. Aug 16	WW Market Share		Chg. (+/-)	Rank Chg. (+/-)
		2016	2022			2016	2022		
11.	MS therapies	21.6	21.7	+0.1%	-1.5	2.7%	2.0%	-0.7pp	-3
12.	Dermatologicals	10.5	19.9	+11.2%	-4.4	1.3%	1.8%	+0.5pp	+3
13.	Anti-fibrinolytics	11.6	17.1	+6.6%	+1.3	1.5%	1.6%	+0.1pp	-1
14.	Anti-hyperlipidaemics	13.8	13.4	-0.6%	-4.8	1.7%	1.2%	-0.5pp	-3
15.	Anti-bacterials	10.5	12.8	+3.4%	-4.0	1.3%	1.2%	-0.1pp	+1
	Top 15	434	601	+5.6%		54.0%	54.6%	+0.5pp	
	Other	369	500	+5.2%		46.0%	45.4%	-0.5pp	
	Total WW Prescription & OTC Sales	803	1,101	+5.4%		100.0%	100.0%		
	Total 'Prescription & OTC Sales' includes:								
	WW Generic Sales	78.7	111.8	+6.0%		9.8%	10.2%	+0.4%	
	OTC Pharmaceuticals	35.1	41.5	+2.8%		4.4%	3.8%	-0.6%	

Note: Sales in 2016 based on company reported data. Sales forecasts to 2022 based on a consensus of leading equity analysts' estimates for product sales and segmental sales.



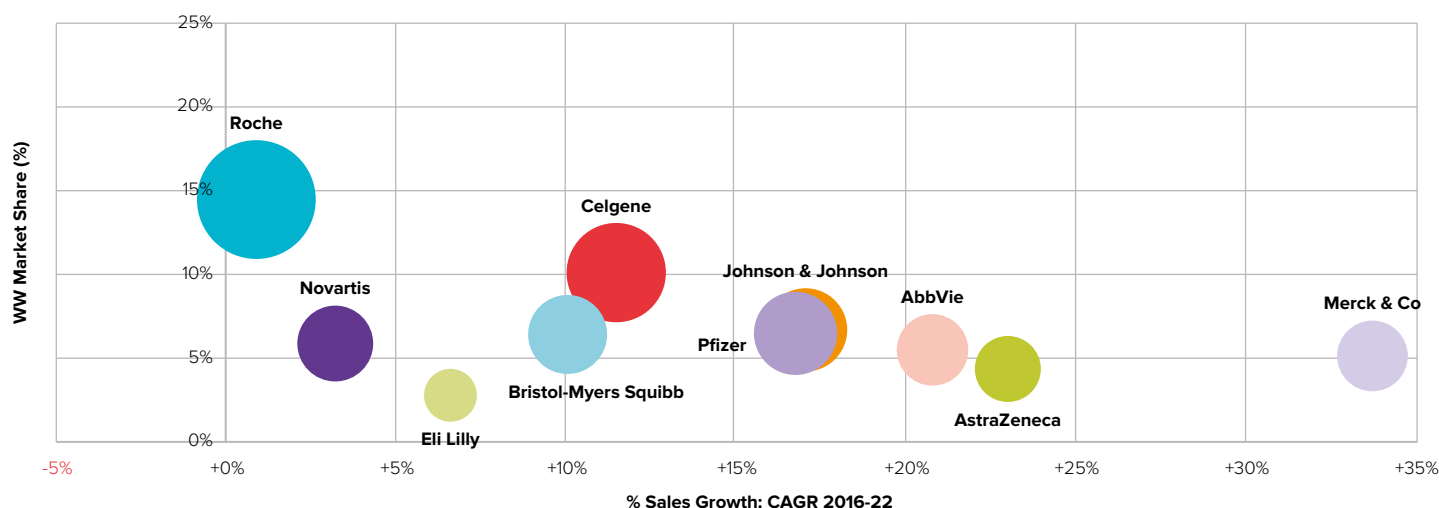
Roche still on top, but is losing its grip.

Roche's firm position as the oncology market leader looks to be at risk with an estimated 14% fall in market share through to 2022. Roche has a CAGR of 1% as opposed to an average of 16% amongst the rest of its peers in the top ten. Such a low growth rate is likely due to the impact of biosimilars eroding sales of its core products, such as Avastin, Herceptin and Rituxan. Forecasts are continuing to show that anti-PD-1 drug, Keytruda, will cement Merck & Co in the top 10 with worldwide sales forecasted to reach approximately \$9.8bn in 2022, exhibiting the largest growth in the segment with

a 34% CAGR. Opdivo's recent setbacks have negatively affected the outlook of Bristol-Myers Squibb which is forecast to lose one position in favour of Johnson & Johnson (Darzalex, Imbruvica) and Pfizer (Ibrance). Overall, the size of the oncology market is expected to increase by an estimated 13% (CAGR) to \$192bn. While this trend is fuelled by the promising clinical profile of many of the new compounds, payers are likely to introduce stricter utilization management and price control mechanisms to secure a more rational access to these therapies.

Worldwide Sales, Market Share & Sales Growth (2016-2022)

Source: Evaluate, May 2017



Note: Bubble = WW Sales in 2022

Top 10 Companies & Total Worldwide Oncology Sales (2016-2022)

Source: Evaluate, May 2017

Rank	Company	WW Sales (\$m)		CAGR 2016-22	WW Market Share		Rank Chg. 2016-22
		2016	2022		2016	2022	
1.	Roche	26,411	27,822	+1%	28.2%	14.5%	-
2.	Celgene	10,097	19,368	+11%	10.8%	10.1%	-
3.	Johnson & Johnson	4,963	12,784	+17%	5.3%	6.7%	+2
4.	Pfizer	4,924	12,462	+17%	5.3%	6.5%	+2
5.	Bristol-Myers Squibb	6,907	12,293	+10%	7.4%	6.4%	-1
6.	Novartis	9,330	11,270	+3%	10.0%	5.9%	-3
7.	AstraZeneca	3,383	10,490	+21%	3.6%	5.5%	+1
8.	Merck & Co	1,716	9,807	+34%	1.8%	5.1%	+4
9.	AbbVie	2,409	8,344	+23%	2.6%	4.3%	+1
10.	Eli Lilly	3,616	5,308	+7%	3.9%	2.8%	-3
Top 10		73,757	129,949	10%	78.7%	67.6%	
Other		19,991	62,281	21%	21.3%	32.4%	
Total Industry		93,747	192,230	13%	100.0%	100.0%	



Top 5 Oncology Products Worldwide in 2022

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharma Class	WW Sales (\$m)		CAGR 2016-22	WW Market Share		Current Status
					2016	2022		2016	2022	
1.	Revlimid	lenalidomide	Celgene	Immunomodulator	6,974	14,197	13%	7%	7%	Marketed
2.	Opdivo	nivolumab	Bristol-Myers Squibb + Ono Pharmaceutical	Anti-programmed cell death-1 (PD-1) MAb	4,735	9,912	13%	5%	5%	Marketed
3.	Keytruda	pembrolizumab	Merck & Co + Otsuka Holdings	Anti-programmed cell death-1 (PD-1) MAb	1,402	9,509	38%	1%	5%	Marketed
4.	Imbruvica	ibrutinib	AbbVie + Johnson & Johnson	Bruton's tyrosine kinase (BTK) inhibitor	2,218	7,499	23%	2%	4%	Marketed
5.	Ibrance	palbociclib	Pfizer	Cyclin-dependent kinase (CDK) 4 & 6 inhibitor	2,135	7,074	22%	2%	4%	Marketed

Oncology includes: Alkaloids, Alkylating agents, Anti-metabolites, Anti-neoplastic MABs, Cytotoxic antibiotics, Hormone therapies, Platinum compounds and other anti-cancer. Excludes anti-emetics and anti-anaemics used in chemotherapy-induced anaemia. Also excludes: Interferons, Immunostimulants & Immunosuppressants.

Top 5 Oncology R&D Products Worldwide in 2022

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharma Class	WW Sales (\$m) 2022	WW Market Share 2022	Current Status
1.	Abemaciclib	abemaciclib	Eli Lilly	Cyclin-dependent kinase (CDK) 4 & 6 inhibitor	1,792	0.9%	Phase III
2.	Epacadostat	epacadostat	Incyte	Indoleamine 2,3-dioxygenase (IDO) 1 inhibitor	1,728	0.9%	Phase III
3.	Apalutamide	apalutamide	Johnson & Johnson	Anti-androgen	1,629	0.8%	Phase III
4.	Tremelimumab	tremelimumab	AstraZeneca	Anti-cytotoxic T lymphocyte associated protein (CTLA) 4 MAb	992	0.5%	Phase III
5.	Selinexor	selinexor	Karyopharm Therapeutics	Exportin (XPO)/chromosome region maintenance protein (CRM) 1 inhibitor	920	0.5%	Phase III

Product Segment Contribution to Sales in 2022

Source: Evaluate, May 2017



Note: Established: launched prior to 2014 | Recently launched: 2014 to 2016 inclusive | New launches: launch expected after 2016 | 2016 and 2022 sales reflect the sum of these categories.



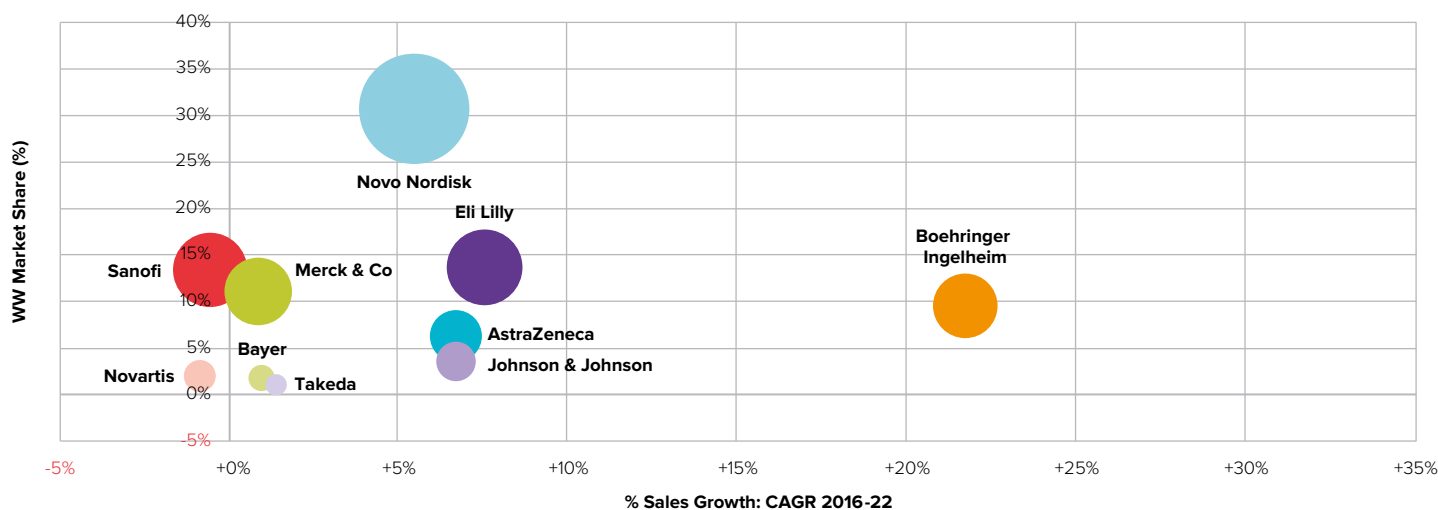
Novo Nordisk expected to remain the major player in 2022; Merck set to lose market share; Boehringer Ingelheim still climbing.

Evaluate finds that Novo Nordisk is expected to maintain its dominance in the anti-diabetic market through 2022. Novo's sales are forecast to grow by 5% per annum to \$17.8bn in 2022, representing a 30.7% share of the market. Sanofi, with anti-diabetic sales of \$7.75bn in 2022, slips to third as biosimilar competition to its long-acting insulin Lantus and the entry of new competitors into

the space continues to reduce its market share from 18.4% in 2016 to 13.4% in 2022. Sanofi's loss is Eli Lilly's gain; Eli Lilly climbs two places to second with Trulicity providing the driving force behind the company's 8% CAGR and forecast to become the leading GLP-1 in 2022 ahead of Novo's Victoza. Boehringer Ingelheim sees growth of Glyxambi and Jardiance sales push the company to 5th in the rankings; Market share rockets from 3.9% in 2016 to 9.5% in 2022 with an unparalleled 22% CAGR.

Worldwide Sales, Market Share & Sales Growth (2016-2022)

Source: Evaluate, May 2017



Note: Bubble = WW Sales in 2022

Top 10 Companies & Total Worldwide Anti-Diabetic Sales (2016-2022)

Source: Evaluate, May 2017

Rank	Company	WW Sales (\$m)		CAGR 2016-22	WW Market Share		Rank Chg. 2016-22
		2016	2022		2016	2022	
1.	Novo Nordisk	12,938	17,786	+5%	29.7%	30.7%	+0
2.	Eli Lilly	5,146	7,963	+8%	11.8%	13.8%	+2
3.	Sanofi	8,025	7,753	-1%	18.4%	13.4%	-1
4.	Merck & Co	6,139	6,446	+1%	14.1%	11.1%	-1
5.	Boehringer Ingelheim	1,695	5,516	+22%	3.9%	9.5%	+1
6.	AstraZeneca	2,502	3,687	+7%	5.7%	6.4%	-1
7.	Johnson & Johnson	1,407	2,073	+7%	3.2%	3.6%	+0
8.	Novartis	1,273	1,207	-1%	2.9%	2.1%	+0
9.	Takeda	940	995	+1%	2.2%	1.7%	+0
10.	Bayer	586	635	+1%	1.3%	1.1%	+0
	Top 10	40,651	54,060	+5%	93.2%	93.4%	
	Other	2,972	3,839	+4%	6.8%	6.6%	
	Total Industry	43,623	57,899	+5%	100.0%	100.0%	



Top 5 Anti-Diabetic Products Worldwide in 2022

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharma Class	WW Sales (\$m)		CAGR 2016-22	WW Market Share		Current Status
					2016	2022		2016	2022	
1.	Januvia/ Janumet	sitagliptin phosphate	Merck & Co, Ono, Almirall, Daewoong	Dipeptidyl peptidase IV inhibitor	6,440	5,989	-1.2%	14.8%	10.3%	Marketed
2.	Trulicity	dulaglutide	Eli Lilly	Glucagon-like peptide (GLP) 1 agonist	926	3,568	+25.2%	2.1%	6.2%	Marketed
3.	Victoza	liraglutide [rDNA origin]	Novo Nordisk	Glucagon-like peptide (GLP) 1 agonist	2,979	3,485	+2.7%	6.8%	6.0%	Marketed
4.	NovoRapid	insulin aspart	Novo Nordisk	Insulin analogue	2,964	2,553	-2.5%	6.8%	4.4%	Marketed
5.	Tresiba	insulin degludec	Novo Nordisk	Insulin analogue	603	2,502	+26.8%	1.4%	4.3%	Marketed

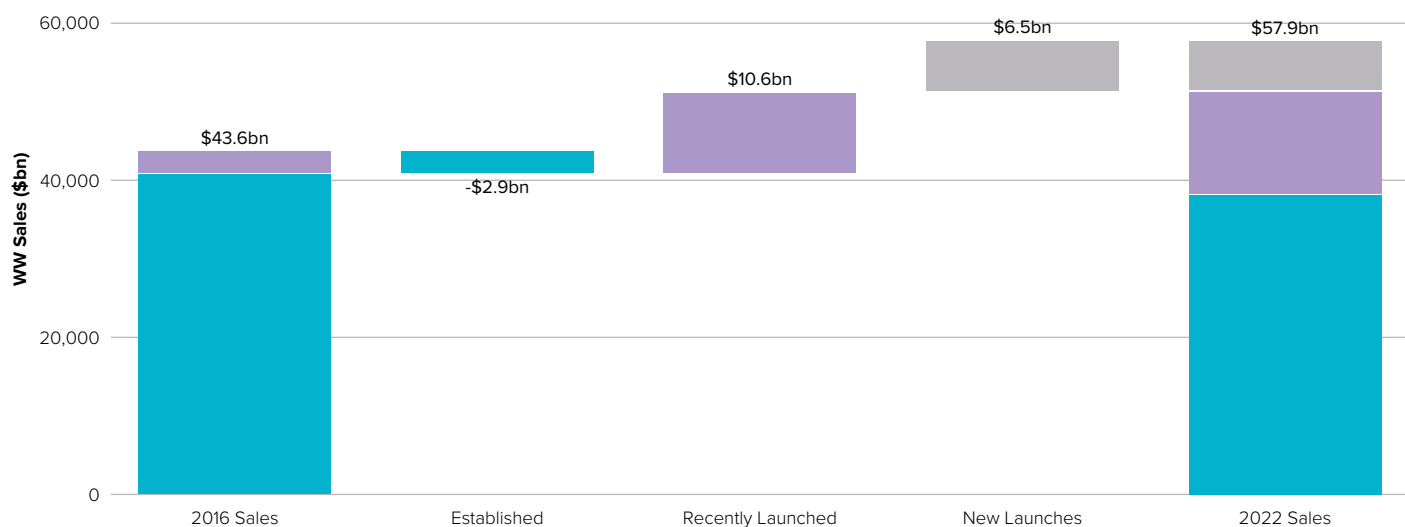
Top 5 Anti-Diabetic R&D Products Worldwide in 2022

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharma Class	WW Sales (\$m) 2022	WW Market Share 2022	Current Status
1.	Semaglutide	semaglutide	Novo Nordisk	Glucagon-like peptide (GLP) 1 agonist	2,243	3.9%	Filed
2.	Sotagliflozin	sotagliflozin	Sanofi	Sodium glucose co-transporter (SGLT) 1/2 inhibitor	1,155	2.0%	Phase III
3.	Semaglutide Oral	semaglutide	Novo Nordisk	Glucagon-like peptide (GLP) 1 agonist	624	1.1%	Phase III
4.	SAR342434	insulin lispro	Sanofi	Insulin analogue	232	0.4%	Filed
5.	Ertugliflozin & Sitagliptin	ertugliflozin; sitagliptin phosphate	Merck & Co	Dipeptidyl peptidase (DPP) IV & sodium-glucose co-transporter (SGLT) 2 inhibitor	220	0.4%	Filed

Product Segment Contribution to Sales in 2022

Source: Evaluate, May 2017



Note: Established: launched prior to 2014 | Recently launched: 2014 to 2016 inclusive | New launches: launch expected after 2016 | 2016 and 2022 sales reflect the sum of these categories.



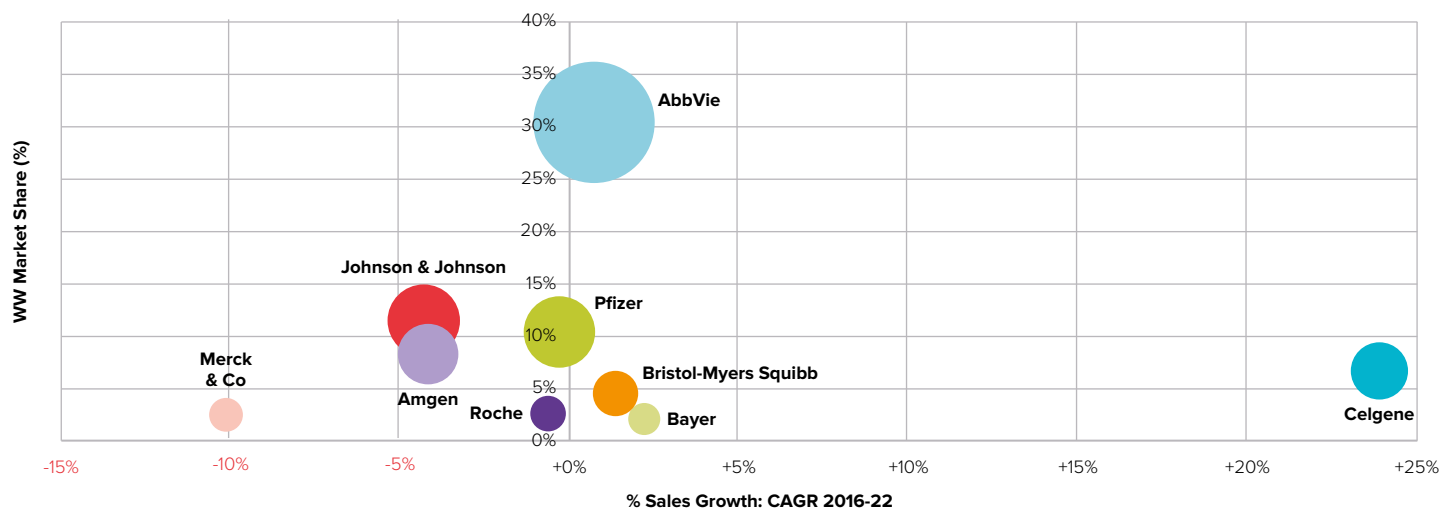
AbbVie continues to dominate anti-rheumatics market in 2022; J&J's Remicade is forecast to lose market share.

Evaluate finds that AbbVie has retained its number one position as the top anti-rheumatic company in 2016 and is forecast to remain the world's leading company in 2022, with an expected market share of 30.4%. Celgene is gaining ground with a 24% CAGR through 2022 fuelled by the performance of Otezla which is expected to add \$2.6bn in sales. Humira is still forecast to be the

best-selling anti-rheumatic product, despite the recent approval of Amgen's Amjevita. AbbVie also takes the lead in R&D for anti-rheumatics, with the anticipated launch of its Phase 3 asset, ABT-494. The anti-rheumatics market continues to be a low growth market at just 1% per year (CAGR) to \$55.4bn in 2022. The low growth rate is primarily affected by the price erosion caused by the anticipated entry of biosimilars.

Worldwide Sales, Market Share & Sales Growth (2016-2022)

Source: Evaluate, May 2017



Note: Bubble = WW Sales in 2022

Top 10 Companies & Total Worldwide Anti-Rheumatic Sales 2016-22

Source: Evaluate, May 2017

Rank	Company	WW Sales (\$m)		CAGR 2016-22	WW Market Share		Rank Chg. 2016-22
		2016	2022		2016	2022	
1.	AbbVie	16,078	16,805	+1%	30.2%	30.4%	+0
2.	Johnson & Johnson	8,127	6,244	-4%	15.2%	11.3%	+0
3.	Pfizer	5,781	5,684	-0%	10.8%	10.3%	+1
4.	Amgen	5,965	4,611	-4%	11.2%	8.3%	-1
5.	Celgene	1,017	3,673	+24%	1.9%	6.6%	+4
6.	Bristol-Myers Squibb	2,265	2,457	+1%	4.2%	4.4%	+0
7.	UCB	1,446	1,398	-1%	2.7%	2.5%	+0
8.	Roche	1,434	1,380	-1%	2.7%	2.5%	+0
9.	Merck & Co	2,484	1,310	-10%	4.7%	2.4%	-4
10.	Bayer	972	1,107	+2%	1.8%	2.0%	+0
	Top 10	45,571	44,670	-0%	85.5%	80.7%	
	Other	7,753	10,691	+6%	14.5%	19.3%	
	Total Industry	53,324	55,361	+1%	100.0%	100.0%	



Top 5 Anti-Rheumatic Products Worldwide in 2022

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharma Class	WW Sales (\$m)		CAGR 2016-22	WW Market Share		Current Status
					2016	2022		2016	2022	
1.	Humira	adalimumab	AbbVie + Eisai	Anti-tumour necrosis factor alpha (TNFa) MAb	16,515	15,901	-1%	31.0%	28.7%	Marketed
2.	Enbrel	etanercept	Amgen + Pfizer + Takeda	Tumour necrosis factor alpha (TNFa) inhibitor	9,248	5,276	-9%	17.3%	9.5%	Marketed
3.	Otezla	apremilast	Celgene	Phosphodiesterase (PDE) 4 inhibitor	1,017	3,673	+24%	1.9%	6.6%	Marketed
4.	Simponi	golimumab	Johnson & Johnson + Merck & Co	Anti-tumour necrosis factor alpha (TNFa) MAb	2,511	3,582	+6%	4.7%	6.5%	Marketed
5.	Remicade	infliximab	Johnson & Johnson + Merck & Co + Mitsubishi Tanabe Pharma	Anti-tumour necrosis factor alpha (TNFa) MAb	8,070	2,742	-16%	15.1%	5.0%	Marketed

Note: Anti-tumour necrosis factor alpha (TNFa) inhibitor sales include RA, Crohn's and Psoriasis.

*Combined Remicade and Simponi sales \$6.3bn in 2022. Simponi (golimumab) is Merck & Co and J&J's next generation product to Remicade (infliximab).

Top 5 R&D Anti-Rheumatic Products Worldwide in 2022

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharma Class	WW Sales (\$m) 2022	WW Market Share 2022	Current Status
1.	ABT-494	upadacitinib tartrate	AbbVie	Janus kinase (JAK) 1 inhibitor	1,214	2.2%	Phase III
2.	Sirukumab	sirukumab	Johnson & Johnson	Anti-IL-6 MAb	1,162	2.1%	Filed
3.	Zilretta	triamcinolone acetonide	Flexion Therapeutics	Corticosteroid	457	0.8%	Filed
4.	ABP 710	infliximab	Amgen	Anti-tumour necrosis factor alpha (TNFa) MAb	235	0.4%	Phase III
5.	Filgotinib	filgotinib	Gilead Sciences + Galapagos	Janus kinase (JAK) 1 inhibitor	227	0.4%	Phase III

Product Segment Contribution to Sales in 2022

Source: Evaluate, May 2017



Note: Established: launched prior to 2014 | Recently launched: 2014 to 2016 inclusive | New launches: launch expected after 2016 | 2016 and 2022 sales reflect the sum of these categories.



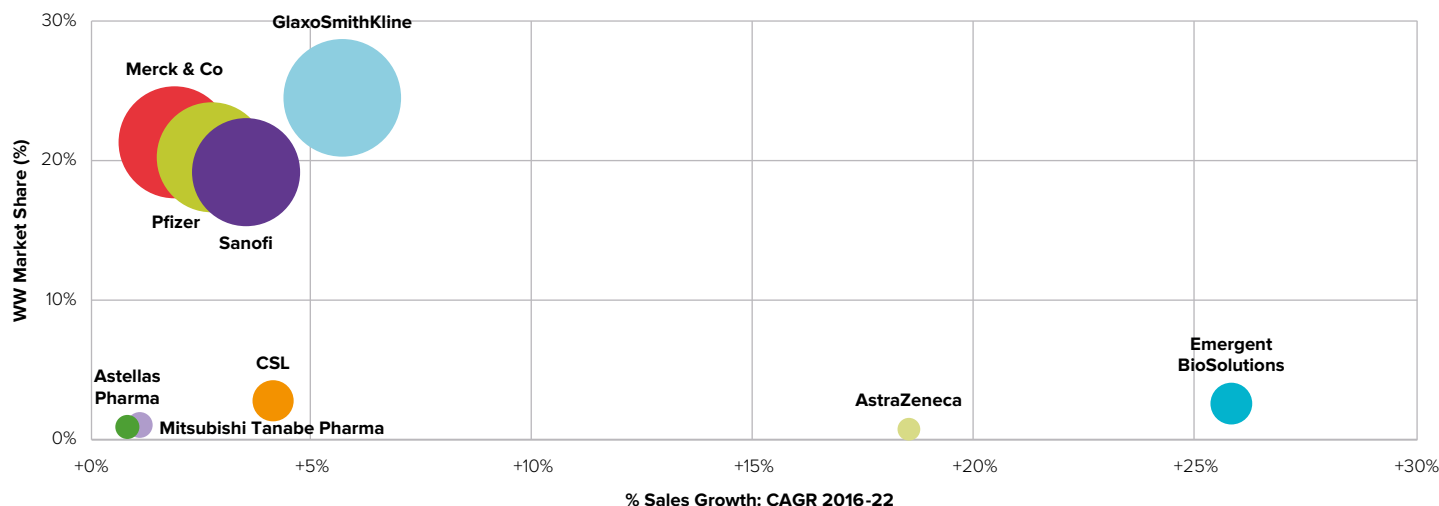
Sanofi, GSK, Pfizer and Merck & Co unchanged leaders in 2022.

Evaluate finds that GSK, Pfizer, Sanofi and Merck & Co are all expected to share around 20% of the worldwide vaccine market by 2022. Despite termination of the joint venture between Sanofi and

Merck & Co both companies are predicted to grow between 2-3% in sales in 2022. Emergent Biosciences is expected to grow 26% thanks to its anthrax vaccine (NuThrax) due to launch in 2019.

Worldwide Sales, Market Share & Sales Growth (2016-2022)

Source: Evaluate, May 2017



Note: Bubble = WW Sales in 2022

Top 10 Companies & Total Worldwide Vaccine Sales 2016-2022

Source: Evaluate, May 2017

Rank	Company	WW Sales (\$m)		CAGR 2016-22	WW Market Share		Rank Chg. 2016-22
		2016	2022		2016	2022	
1.	GlaxoSmithKline	6,219	8,657	+6%	22.6%	24.5%	+1
2.	Merck & Co	6,750	7,545	+2%	24.5%	21.4%	-1
3.	Pfizer	6,071	7,133	+3%	22.0%	20.2%	+0
4.	Sanofi	5,568	6,825	+3%	20.2%	19.3%	+0
5.	CSL	782	997	+4%	2.8%	2.8%	+0
6.	Emergent BioSolutions	237	940	+26%	0.9%	2.7%	+3
7.	Novavax	-	654			1.9%	
8.	Mitsubishi Tanabe Pharma	360	384	+1%	1.3%	1.1%	-2
9.	Astellas Pharma	319	335	+1%	1.2%	0.9%	-1
10.	AstraZeneca	104	288	+19%	0.4%	0.8%	+3
Top 10		26,410	33,757	+4%	95.9%	95.7%	
Other		1,130	1,532	+5%	4.1%	4.3%	
Total Industry		27,540	35,289	+4%	100.0%	100.0%	

Note: Sales in 2016 for Merck & Co and Sanofi include 50% of sales from Sanofi Pasteur MSD. Sanofi Pasteur MSD was the joint venture between Merck & Co and Sanofi that was ended in January 2017.



Top 5 Vaccine Products Worldwide in 2022

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	WW Sales (\$m)		CAGR 2016-22	WW Market Share		Current Status
				2016	2022		2016	2022	
1.	Pevnar 13	pneumococcal vaccine	Pfizer + Daewoong Pharmaceutical	6,034	5,749	-1%	21.9%	16.3%	Marketed
2.	Gardasil	human papillomavirus (HPV) vaccine	Merck & Co + CSL	2,488	2,513	+0%	9.0%	7.1%	Marketed
3.	Pentacel	DTaP, Hib & polio vaccine	Sanofi	1,654	2,128	+4%	6.0%	6.0%	Marketed
4.	Fluzone	influenza vaccine	Sanofi	1,683	2,068	+3%	6.1%	5.9%	Marketed
5.	Bexsero	meningococcal b vaccine	GlaxoSmithKline	528	1,170	+14%	1.9%	3.3%	Marketed

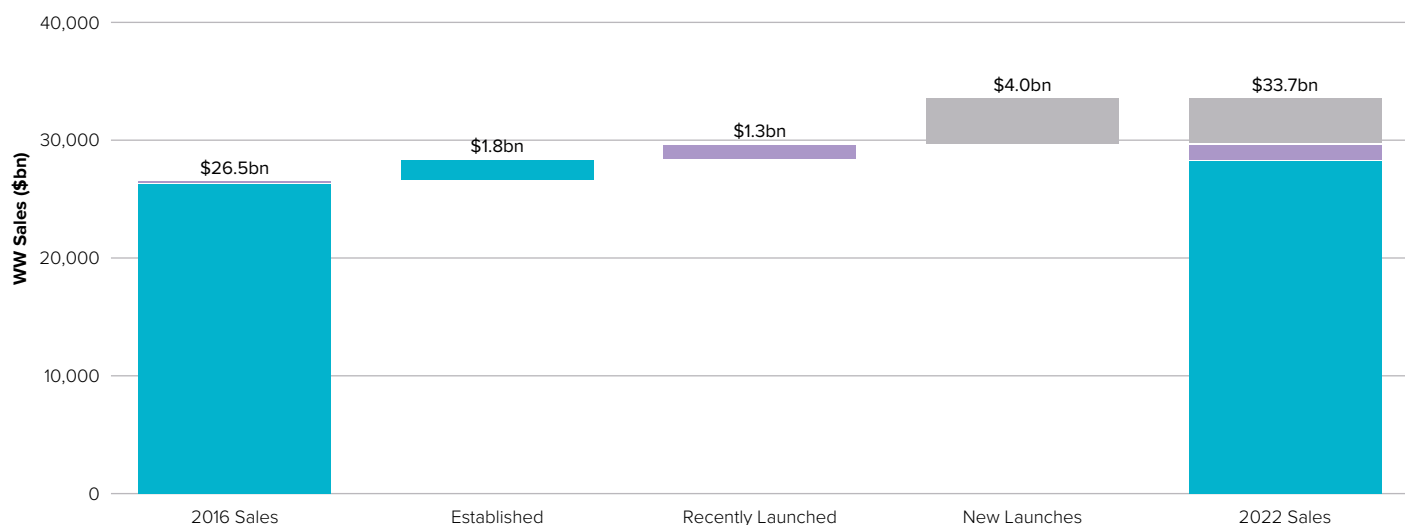
Top 5 Vaccine R&D Products Worldwide in 2022

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	WW Sales (\$m) 2022	WW Market Share 2022	Status
1.	Shingrix	herpes zoster vaccine	GlaxoSmithKline	1,126	3.2%	Filed
2.	NuThrax	anthrax vaccine	Emergent BioSolutions	890	2.5%	Phase III
3.	RSV F Vaccine	respiratory syncytial virus (RSV) vaccine	Novavax	360	1.0%	Phase III
4.	Combination Respiratory Vaccine	influenza vaccine & respiratory syncytial virus (RSV) vaccine	Novavax	247	0.7%	Pre-clinical
5.	GEN-003	herpes simplex virus (HSV) vaccine	Genocea Biosciences	241	0.7%	Phase II

Product Segment Contribution to Sales in 2022

Source: Evaluate, May 2017



Note: Totals in chart above reflect sum of reported or forecasted product level company sales. These may not tally with company segment sales in previous tables. Established: launched prior to 2014 | Recently launched: 2014 to 2016 inclusive | New launches: launch expected after 2016 | 2016 and 2022 sales reflect the sum of these categories.



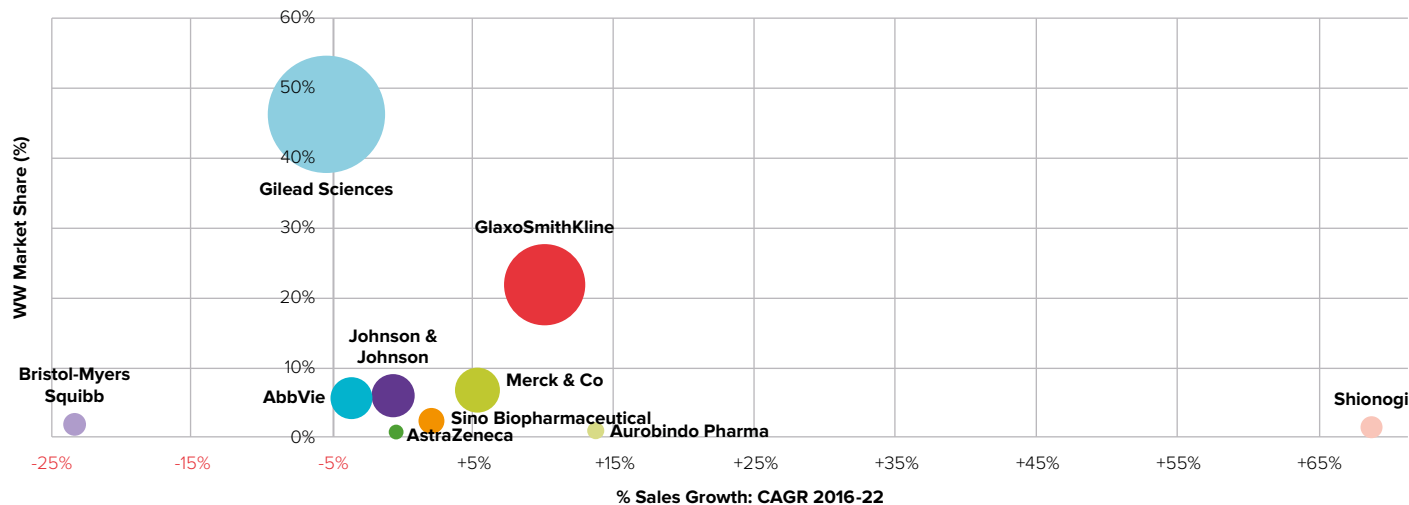
Gilead continues to dominate anti-viral market in 2022.

Evaluate finds that Gilead will continue to command the anti-virals market in 2022, despite the sales of their Hepatitis C franchise decreasing. The 2022 sales forecast of Harvoni and Sovaldi have decreased by 80% since last year, due to competition from drugs

such as Eplusa. Roche sales are forecast to drop by approximately 79% in 2022 versus 2016, causing it to drop out of the top 10 companies for Anti-viral Sales, primarily due to declining Tamiflu and Valcyte sales hit by increased generic competition.

Worldwide Sales, Market Share & Sales Growth (2016-2022)

Source: Evaluate, May 2017



Note: Bubble = WW Sales in 2022

Top 10 Companies & Total Worldwide Anti-viral Sales 2016-22

Source: Evaluate, May 2017

Rank	Company	WW Sales (\$m)		CAGR 2016-22	WW Market Share		Rank Chg. 2016-22
		2016	2022		2016	2022	
1.	Gilead Sciences	27,727	19,789	-5%	57.1%	46.2%	+0
2.	GlaxoSmithKline	5,260	9,347	+10%	10.8%	21.8%	+0
3.	Merck & Co	2,097	2,844	+5%	4.3%	6.6%	+3
4.	Johnson & Johnson	2,680	2,566	-1%	5.5%	6.0%	+1
5.	AbbVie	3,003	2,396	-4%	6.2%	5.6%	-1
6.	Sino Biopharmaceutical	884	994	+2%	1.8%	2.3%	+2
7.	Bristol-Myers Squibb	3,817	779	-23%	7.9%	1.8%	-4
8.	Shionogi	27	618	+69%	0.1%	1.4%	+18
9.	Aurobindo Pharma	185	397	+14%	0.4%	0.9%	+2
10.	AstraZeneca	325	315	-1%	0.7%	0.7%	-1
Top 10		46,004	40,045	-2%	94.8%	93.5%	
Other		2,536	2,786	+2%	5.2%	6.5%	
Total Industry		48,540	42,831	-2%	100.0%	100.0%	



Top 5 Anti-viral Products Worldwide in 2022

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharma Class	WW Sales (\$m)		CAGR 2016-22	WW Market Share		Current Status
					2016	2022		2016	2022	
1.	Triumeq	abacavir sulfate; dolutegravir sodium; lamivudine	GlaxoSmithKline	Nucleoside reverse transcriptase inhibitor (NRTI) & HIV integrase inhibitor	2,350	5,376	+15%	4.8%	12.6%	Marketed
2.	Bictegravir/F/TAF	bictegravir sodium; emtricitabine; tenofovir alafenamide fumarate	Gilead Sciences	Nucleoside reverse transcriptase inhibitor (NRTI) & HIV integrase inhibitor	-	4,378	n/m	-	10.2%	R&D
3.	Descovy	emtricitabine; tenofovir alafenamide fumarate	Gilead Sciences	Nucleoside reverse transcriptase inhibitor (NRTI), cytochrome P450 (CYP) 3A & protease inhibitor	298	3,807	+53%	0.6%	8.9%	Marketed
4.	Genvoya	cobicistat; elvitegravir; emtricitabine; tenofovir alafenamide fumarate	Gilead Sciences + Torii Pharmaceutical	Nucleoside reverse transcriptase inhibitor (NRTI), cytochrome P450 (CYP) 3A & HIV integrase inhibitor	1,501	3,605	+16%	3.1%	8.4%	Marketed
5.	Tivicay	dolutegravir	GlaxoSmithKline	HIV integrase inhibitor	1,291	2,600	+12%	2.7%	6.1%	Marketed

Top 5 R&D Anti-viral Products Worldwide in 2022

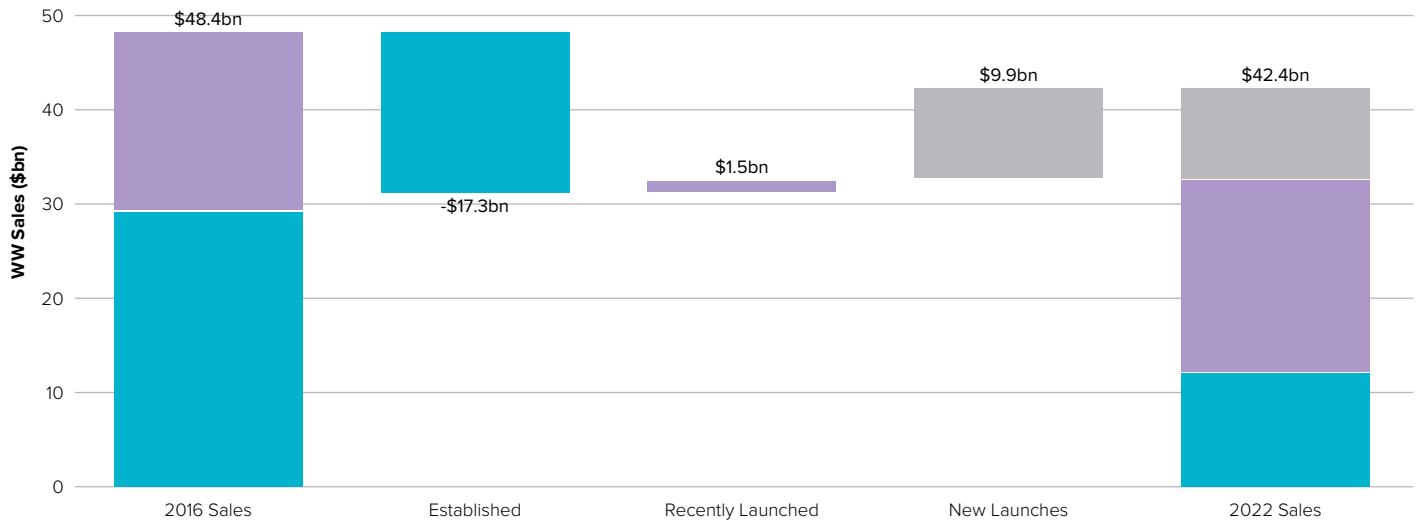
Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharma Class	WW Sales (\$m) 2022	WW Market Share 2022	Current Status
1.	Bictegravir/F/TAF	bictegravir sodium; emtricitabine; tenofovir alafenamide fumarate	Gilead Sciences	Nucleoside reverse transcriptase inhibitor (NRTI) & HIV integrase inhibitor	4,378	10.2%	Phase III
2.	Glecaprevir & pibrentasvir	glecaprevir; pibrentasvir	AbbVie	Hepatitis C NS3/4A protease & hepatitis C NS5A inhibitor	1,254	2.9%	Filed
3.	Sofosbuvir, Velpatasvir & Voxilaprevir	sofosbuvir; velpatasvir; voxilaprevir	Gilead Sciences	Hepatitis C NS3 protease, Hepatitis C nucleoside NS5A & NS5B polymerase inhibitor	1,143	2.7%	Filed
4.	S-033188	-	Shionogi	Cap-dependent endonuclease inhibitor	597	1.4%	Phase III
5.	Fostemsavir Tromethamine	fostemsavir tromethamine	GlaxoSmithKline	HIV attachment inhibitor	434	1.0%	Phase III



Product Segment Contribution to Sales in 2022

Source: Evaluate, May 2017



Note: Totals in chart above reflect sum of reported or forecasted product level company sales. These may not tally with company segment sales in previous tables.
 Established: launched prior to 2014 | Recently launched: 2014 to 2016 inclusive | New launches: launch expected after 2016 | 2016 and 2022 sales reflect the sum of these categories.

2022: Top 50 Selling Products in the World

part 1 of 2



Opdivo knocked off the top spot in 2022 due to setbacks in NSCLC, with Keytruda now hot on its heels; Humira continues to be key player despite risk of biosimilar launch.

Evaluate consensus forecast finds that sales of Opdivo in 2022 will be significantly lower than previously thought, following phase III trial setback in first-line NSCLC, consequently boosting prospects for company's rival, Keytruda which continues to expand its label.

Humira is back at the top, with peak sales forecast in 2019, and an overall CAGR of -1%. Following the recent approvals of highly anticipated drugs such as Dupixent, Ocrevus and Tecentriq, sellside forecasters do not expect any R&D product to make it to the top 50 in 2022, with the exception of Gilead's Bictegravir/F/TAF which is currently in phase III and expected to launch in 2018.

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharmacological Class	WW Product Sales (\$m)			Market Status
					2016	2022	CAGR	
1.	Humira	adalimumab	AbbVie + Eisai	Anti-tumour necrosis factor alpha (TNFα) MAb	16,515	15,901	-1%	Marketed
2.	Revlimid	lenalidomide	Celgene	Immunomodulator	6,974	14,197	+13%	Marketed
3.	Opdivo	nivolumab	Bristol-Myers Squibb + Ono Pharmaceutical	Anti-programmed cell death-1 (PD-1) MAb	4,735	9,912	+13%	Marketed
4.	Keytruda	pembrolizumab	Merck & Co + Otsuka Holdings	Anti-programmed cell death-1 (PD-1) MAb	1,402	9,509	+38%	Marketed
5.	Eliquis	apixaban	Bristol-Myers Squibb	Factor Xa inhibitor	3,343	8,486	+17%	Marketed
6.	Xarelto	rivaroxaban	Bayer + Johnson & Johnson	Factor Xa inhibitor	4,986	8,131	+8%	Marketed
7.	Imbruvica	ibrutinib	AbbVie + Johnson & Johnson	Bruton's tyrosine kinase (BTK) inhibitor	2,218	7,499	+23%	Marketed
8.	Eylea	aflibercept	Regeneron Pharmaceuticals + Bayer + Santen Pharmaceutical	Vascular endothelial growth factor receptor (VEGFR) kinase inhibitor	5,539	7,171	+4%	Marketed
9.	Ibrance	palbociclib	Pfizer	Cyclin-dependent kinase (CDK) 4 & 6 inhibitor	2,135	7,074	+22%	Marketed
10.	Januvia/Janumet	sitagliptin phosphate	Merck & Co + Ono Pharmaceutical + Almirall + Daewoong Pharmaceutical + Merck & Co	Dipeptidyl peptidase (DPP) IV inhibitor	6,440	5,989	-1%	Marketed
11.	Darzalex	daratumumab	Merck & Co + Ono Pharmaceutical + Almirall + Daewoong Pharmaceutical	Anti-CD38 MAb	572	5,833	+47%	Marketed
12.	Pevnar 13	pneumococcal vaccine	Pfizer + Daewoong Pharmaceutical	Pneumococcal vaccine	6,034	5,749	-1%	Marketed
13.	Prolia/Xgeva	denosumab	Amgen + Daiichi Sankyo	Anti-receptor activator of nuclear factor-kappaB ligand (RANKL) MAb	3,459	5,632	+8%	Marketed
14.	Triumeq	abacavir sulfate; dolutegravir sodium; lamivudine	GlaxoSmithKline	Nucleoside reverse transcriptase inhibitor (NRTI) & HIV integrase inhibitor	2,350	5,376	+15%	Marketed
15.	Enbrel	etanercept	Amgen + Pfizer + Takeda	Tumour necrosis factor alpha (TNFα) inhibitor	9,248	5,276	-9%	Marketed
16.	Perjeta	pertuzumab	Roche	Anti-human epidermal growth factor (HER2/ErbB-2) MAb	1,874	5,240	+19%	Marketed
17.	Dupixent	dupilumab	Sanofi	Anti-IL-4 & IL-13 MAb	-	4,938		Marketed
18.	Tecentriq	atezolizumab	Roche	Anti-programmed cell death ligand-1 (PD-L1) MAb	159	4,937	+77%	Marketed
19.	Xtandi	enzalutamide	Astellas Pharma	Androgen receptor antagonist	2,332	4,883	+13%	Marketed
20.	Stelara	ustekinumab	Johnson & Johnson	Anti-IL-12 & IL-23 MAb	3,232	4,858	+7%	Marketed
21.	Soliris	eculizumab	Alexion Pharmaceuticals	Anti-complement factor C5 MAb	2,843	4,661	+9%	Marketed
22.	Cosentyx	secukinumab	Novartis	Anti-IL-17 MAb	1,128	4,598	+26%	Marketed
23.	Bictegravir/F/TAF	bictegravir sodium; emtricitabine; tenofovir alafenamide fumarate	Gilead Sciences	Nucleoside reverse transcriptase inhibitor (NRTI) & HIV integrase inhibitor	-	4,378		R&D

Top 24-50 continued over...



Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharmacological Class	WW Product Sales (\$m)			Market Status
					2016	2022	CAGR	
24.	Avastin	bevacizumab	Roche	Anti-vascular endothelial growth factor receptor (VEGFR) MAb	6,885	4,352	-7%	Marketed
25.	Botox	onabotulinumtoxinA	Allergan	Botulinum toxin	2,786	4,285	+7%	Marketed
26.	Victoza/Saxenda	liraglutide [rDNA origin]	Novo Nordisk	Glucagon-like peptide (GLP) 1 agonist	3,213	4,155	+4%	Marketed
27.	Ocrevus	ocrelizumab	Roche	Anti-CD20 MAb	-	4,088		Marketed
28.	Tecfidera	dimethyl fumarate	Biogen	Fumarate	3,968	4,078	+0%	Marketed
29.	Privigen	immune globulin (human)	CSL	Immunoglobulin	2,712	4,048	+7%	Marketed
30.	Entresto	sacubitril; valsartan	Novartis	Angiotensin II receptor (AT1) antagonist & neprilysin inhibitor (ARNI)	170	3,963	+69%	Marketed
31.	Descovy	emtricitabine; tenofovir alafenamide fumarate	Gilead Sciences	Nucleoside reverse transcriptase inhibitor (NRTI), cytochrome P450 (CYP) 3A & protease inhibitor	298	3,807	+53%	Marketed
32.	Otezla	apremilast	Celgene	Phosphodiesterase (PDE) 4 inhibitor	1,017	3,673	+24%	Marketed
33.	Herceptin	trastuzumab	Roche	Anti-human epidermal growth factor (HER2/ErbB-2) MAb	6,884	3,647	-10%	Marketed
34.	Genvoya	cobicistat; elvitegravir; emtricitabine; tenofovir alafenamide fumarate	Gilead Sciences + Torii Pharmaceutical	Nucleoside reverse transcriptase inhibitor (NRTI), cytochrome P450 (CYP) 3A & HIV integrase inhibitor	1,501	3,605	+16%	Marketed
35.	Simponi	golimumab	Johnson & Johnson + Merck & Co	Anti-tumour necrosis factor alpha (TNFα) MAb	2,511	3,582	+6%	Marketed
36.	Trulicity	dulaglutide	Eli Lilly	Glucagon-like peptide (GLP) 1 agonist	926	3,568	+25%	Marketed
37.	Jakafi	ruxolitinib phosphate	Incyte + Novartis	Janus kinase (JAK) 1 & 2 inhibitor	1,434	3,228	+14%	Marketed
38.	Repatha	evolocumab	Amgen + Astellas Pharma	Anti-protein convertase subtilisin kexin (PCSK) type 9 MAb	151	3,214	+66%	Marketed
39.	Vyvanse	lisdexamfetamine dimesylate	Shire + Shionogi	Dopamine agonist & norepinephrine reuptake inhibitor (SNRI)	2,014	3,134	+8%	Marketed
40.	Entyvio	vedolizumab	Takeda	Anti-alpha 4 beta 7 integrin MAb	1,324	2,849	+14%	Marketed
41.	Neulasta	pegfilgrastim	Amgen + Kyowa Hakko Kirin	Granulocyte colony-stimulating factor (G-CSF)	4,791	2,795	-9%	Marketed
42.	Pomalyst	pomalidomide	Celgene	Tumour necrosis factor alpha (TNFα) inhibitor	1,311	2,793	+13%	Marketed
43.	Remicade	infliximab	Johnson & Johnson + Mitsubishi Tanabe Pharma + Merck & Co	Anti-tumour necrosis factor alpha (TNFα) MAb	8,070	2,742	-16%	Marketed
44.	Spiriva	tiotropium bromide	Boehringer Ingelheim	Long-acting muscarinic antagonist (LAMA)	3,314	2,672	-4%	Marketed
45.	Tivicay	dolutegravir	GlaxoSmithKline	HIV integrase inhibitor	1,291	2,600	+12%	Marketed
46.	Orencia	abatacept	Bristol-Myers Squibb + Ono Pharmaceutical	T-cell costimulation blocker	2,372	2,598	+2%	Marketed
47.	Rituxan	rituximab	Roche + Pharmstandard	Anti-CD20 MAb	7,482	2,580	-16%	Marketed
48.	NovoRapid	insulin aspart	Novo Nordisk	Insulin analogue	2,964	2,553	-2%	Marketed
49.	Gardasil	human papillomavirus (HPV) vaccine	Merck & Co + CSL	Human papillomavirus (HPV) vaccine	2,488	2,513	+0%	Marketed
50.	Tagrisso	osimertinib mesylate	AstraZeneca	Epidermal growth factor receptor (EGFR) tyrosine kinase inhibitor	423	2,505	+35%	Marketed
Total					159,816	249,854	+8%	
Total WW Individual Products Forecast in Evaluate					616,216	855,105	+6%	

Note: Sales represent company reported sales where available, otherwise based on an average of equity analyst estimates.

2022: Top 50 Selling Products in the USA

part 1 of 2



Humira continues to be the leading product in USA in 2022; Roche to have six products in top 50 by 2022.

Evaluate continues to forecast that AbbVie's Humira will be the leading product in the USA in 2022, suggesting there are still no signs of potential biosimilar launch. Celgene's Revlimid will be in second place with sales growing an average 15% per year to

\$10.1bn in 2022. Analysts have slashed Opdivo estimates and hiked Keytruda forecasts, following unexpected trial results in late 2016. Roche's portfolio is looking strong, with potentially six products in the top 50 in 2022. Kite Pharma's (CAR) T cell therapy, axicabtagene ciloleucel, is launching this year and has the potential to make it into the top 50 selling products in the USA by 2022.

Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharmacological Class	USA Product Sales (\$m)			US Market Status
					2016	2022	CAGR	
1.	Humira	adalimumab	AbbVie	Anti-tumour necrosis factor alpha (TNFa) MAb	10,432	12,043	+2%	Marketed
2.	Revlimid	lenalidomide	Celgene	Immunomodulator	4,417	10,147	+15%	Marketed
3.	Eliquis	apixaban	Bristol-Myers Squibb	Factor Xa inhibitor	1,963	5,105	+17%	Marketed
4.	Keytruda	pembrolizumab	Merck & Co	Anti-programmed cell death-1 (PD-1) MAb	792	4,767	+35%	Marketed
5.	Ibrance	palbociclib	Pfizer	Cyclin-dependent kinase (CDK) 4 & 6 inhibitor	2,068	4,632	+14%	Marketed
6.	Opdivo	nivolumab	Bristol-Myers Squibb	Anti-programmed cell death-1 (PD-1) MAb	2,664	4,421	+9%	Marketed
7.	Imbruvica	ibrutinib	AbbVie	Bruton's tyrosine kinase (BTK) inhibitor	1,580	4,368	+18%	Marketed
8.	Eylea	aflibercept	Regeneron Pharmaceuticals	Vascular endothelial growth factor receptor (VEGFR) kinase inhibitor	3,323	4,296	+4%	Marketed
9.	Enbrel	etanercept	Amgen	Tumour necrosis factor alpha (TNFa) inhibitor	5,719	3,623	-7%	Marketed
10.	Prolia/Xgeva	denosumab	Amgen	Anti-receptor activator of nuclear factor-kappaB ligand (RANKL) MAb	2,164	3,609	+9%	Marketed
11.	Darzalex	daratumumab	Johnson & Johnson	Anti-CD38 MAb	471	3,496	+40%	Marketed
12.	Triumeq	abacavir sulfate; dolutegravir sodium; lamivudine	GlaxoSmithKline	Nucleoside reverse transcriptase inhibitor (NRTI) & HIV integrase inhibitor	1,570	3,389	+14%	Marketed
13.	Stelara	ustekinumab	Johnson & Johnson	Anti-IL-12 & IL-23 MAb	2,263	3,379	+7%	Marketed
14.	Xarelto	rivaroxaban	Johnson & Johnson	Factor Xa inhibitor	2,288	3,296	+6%	Marketed
15.	Pevnar 13	pneumococcal vaccine	Pfizer	Pneumococcal vaccine	3,645	3,153	-2%	Marketed
16.	Tecfidera	dimethyl fumarate	Biogen	Fumarate	3,169	3,148	-0%	Marketed
17.	Victoza/Saxenda	liraglutide [rDNA origin]	Novo Nordisk	Glucagon-like peptide (GLP) 1 agonist	2,305	3,065	+5%	Marketed
18.	Januvia/Janumet	sitagliptin phosphate	Merck & Co	Dipeptidyl peptidase (DPP) IV inhibitor	3,270	3,000	-1%	Marketed
19.	Dupilixent	dupilumab	Sanofi	Anti-IL-4 & IL-13 MAb	-	2,869		Marketed
20.	Botox	onabotulinumtoxinA	Allergan	Botulinum toxin	1,983	2,863	+6%	Marketed
21.	Cosentyx	secukinumab	Novartis	Anti-IL-17 MAb	765	2,794	+24%	Marketed
22.	Bictegravir/F/TAF	bictegravir sodium; emtricitabine; tenofovir alafenamide fumarate	Gilead Sciences	Nucleoside reverse transcriptase inhibitor (NRTI) & HIV integrase inhibitor	-	2,775		R&D
23.	Vyvanse	lisdexamfetamine dimesylate	Shire	Dopamine agonist & norepinephrine reuptake inhibitor (SNRI)	1,827	2,728	+7%	Marketed
24.	Xtandi	enzalutamide	Astellas Pharma	Androgen receptor antagonist	1,218	2,706	+14%	Marketed
25.	Tecentriq	atezolizumab	Roche	Anti-programmed cell death ligand-1 (PD-L1) MAb	156	2,651	+60%	Marketed

Top 26-50 continued over...



Source: Evaluate, May 2017

Rank	Product	Generic Name	Company	Pharmacological Class	USA Product Sales (\$m)			US Market Status
					2016	2022	CAGR	
26.	Entresto	sacubitril; valsartan	Novartis	Angiotensin II receptor (AT1) antagonist & neprilysin inhibitor (ARNI)	108	2,644	+71%	Marketed
27.	Otezla	apremilast	Celgene	Phosphodiesterase (PDE) 4 inhibitor	904	2,631	+19%	Marketed
28.	Genvoya	cobicistat; elvitegravir; emtricitabine; tenofovir alafenamide fumarate	Gilead Sciences	Nucleoside reverse transcriptase inhibitor (NRTI), cytochrome P450 (CYP) 3A & HIV integrase inhibitor	1,301	2,630	+12%	Marketed
29.	Descovy	emtricitabine; tenofovir alafenamide fumarate	Gilead Sciences	Nucleoside reverse transcriptase inhibitor (NRTI), cytochrome P450 (CYP) 3A & protease inhibitor	226	2,578	+50%	Marketed
30.	Trulicity	dulaglutide	Eli Lilly	Glucagon-like peptide (GLP) 1 agonist	738	2,486	+22%	Marketed
31.	Ocrevus	ocrelizumab	Roche	Anti-CD20 MAb	-	2,429		Marketed
32.	Perjeta	pertuzumab	Roche	Anti-human epidermal growth factor (HER2/ErbB-2) MAb	919	2,263	+16%	Marketed
33.	Neulasta	pegfilgrastim	Amgen	Granulocyte colony-stimulating factor (G-CSF)	3,925	2,226	-9%	Marketed
34.	Jakafi	ruxolitinib phosphate	Incyte	Janus kinase (JAK) 1 & 2 inhibitor	853	2,018	+15%	Marketed
35.	Soliris	eculizumab	Alexion Pharmaceuticals	Anti-complement factor C5 MAb	1,029	1,973	+11%	Marketed
36.	Avastin	bevacizumab	Roche	Anti-vascular endothelial growth factor receptor (VEGFR) MAb	3,009	1,867	-8%	Marketed
37.	Venclexta	venetoclax	Roche + AbbVie	B-cell lymphoma (Bcl) 2 inhibitor	13	1,844	+129%	Marketed
38.	Entyvio	vedolizumab	Takeda	Anti-alpha 4 beta 7 integrin MAb	921	1,809	+12%	Marketed
39.	Gardasil	human papillomavirus (HPV) vaccine	Merck & Co	Human papillomavirus (HPV) vaccine	1,780	1,798	+0%	Marketed
40.	Repatha	evolocumab	Amgen	Anti-proprotein convertase subtilisin kexin (PCSK) type 9 MAb	101	1,787	+61%	Marketed
41.	Pomalyst	pomalidomide	Celgene	Tumour necrosis factor alpha (TNFα) inhibitor	778	1,777	+15%	Marketed
42.	Orencia	abatacept	Bristol-Myers Squibb	T-cell costimulation blocker	1,532	1,745	+2%	Marketed
43.	H.P. Acthar Gel	repository corticotropin	Mallinckrodt	Adrenal corticotropin hormone (ACTH)	1,160	1,745	+7%	Marketed
44.	Tivicay	dolutegravir	GlaxoSmithKline	HIV integrase inhibitor	860	1,729	+12%	Marketed
45.	Tresiba	insulin degludec	Novo Nordisk	Insulin analogue	112	1,725	+58%	Marketed
46.	Semaglutide	semaglutide	Novo Nordisk	Glucagon-like peptide (GLP) 1 agonist	-	1,627		R&D
47.	Xeljanz	tofacitinib citrate	Pfizer	Janus kinase (JAK) 3 inhibitor	805	1,615	+12%	Marketed
48.	Activase	alteplase	Roche	Plasminogen activator	1,078	1,581	+7%	Marketed
49.	Axicabtagene Ciloleucel	axicabtagene ciloleucel	Kite Pharma	Anti-CD19 chimeric antigen receptor (CAR) T cell therapy	-	1,577		R&D
50.	Taltz	ixekizumab	Eli Lilly	Anti-IL-17 MAb	111	1,572	+56%	Marketed
Total					82,314	151,999	+11%	
Total USA Individual Products Forecast in Evaluate					307,186	448,452	+7%	

Note: Sales represent company reported sales where available, otherwise based on an average of equity analyst estimates.

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