

## Making the Case for the S&P Biotechnology Select Industry Index

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Biotechnology has famously improved our quality of life for decades. It addresses many global health problems, such as infectious and age-related diseases. Investors can see the potential for significant gains in this sector, due to its potential for new sources of return and diversification of risk. However, this also comes with the possibility of losses. The [S&P Biotechnology Select Industry Index](#)'s "basket" approach to allocation may provide a solution for those concerned with risk. It aims to provide diverse exposure to listed biotechnology (biotech) companies across large-, mid-, small-, and micro-cap companies in the U.S.

### WHY INVEST IN BIOTECHNOLOGY?

Based in genetic analysis and engineering, biotech firms primarily engage in the research, development, manufacturing, and, to a lesser extent, marketing of healthcare products based on genetic analysis and engineering. Biotech has a few important industry-specific characteristics.

- a. **High Investment and Long Waiting Period:** It can take as much as a decade to get a new drug from the test tube to the pharmacy shelf. During this lead time, biotech companies may not generate revenue, and hence are highly dependent on venture capital funds and trading publicly on stock exchanges to fund research and development.
- b. **High Risk:** The discovery of new drugs is an expensive, slow, and risky business. Investors need to be aware that the risk of failure of new drugs to reach approval is exceptionally high. Typically, 85%-95% of all new drugs fail to reach approval.<sup>1</sup> Historically, many biotech companies have experienced serious losses after failing critical research or drug trials.
- c. **High Yield:** During the research phase, biotech companies tend to be unprofitable. However, once a new breakthrough drug is discovered that proves to be successful in treating diseases, it has the potential to be highly (or exponentially) profitable. Then, the high yield is protected by adequate IP or copyright to ensure that the company can appropriate its research and design results and reduce the likelihood of imitation by competitors.

<sup>1</sup> Biotech industry's national trade group: [Clinical Development Success Rates 2006-2015](#).

The rewards and risks of investing in biotech stocks can be significant. Key factors to consider include the research pipeline, stage of research and clinical trials, secure sources of future financing, regulatory changes, and mergers & acquisitions.

*The rewards and risks of investing in biotech stocks can be significant.*

*Key factors to consider include the research pipeline, stage of research and clinical trials...*

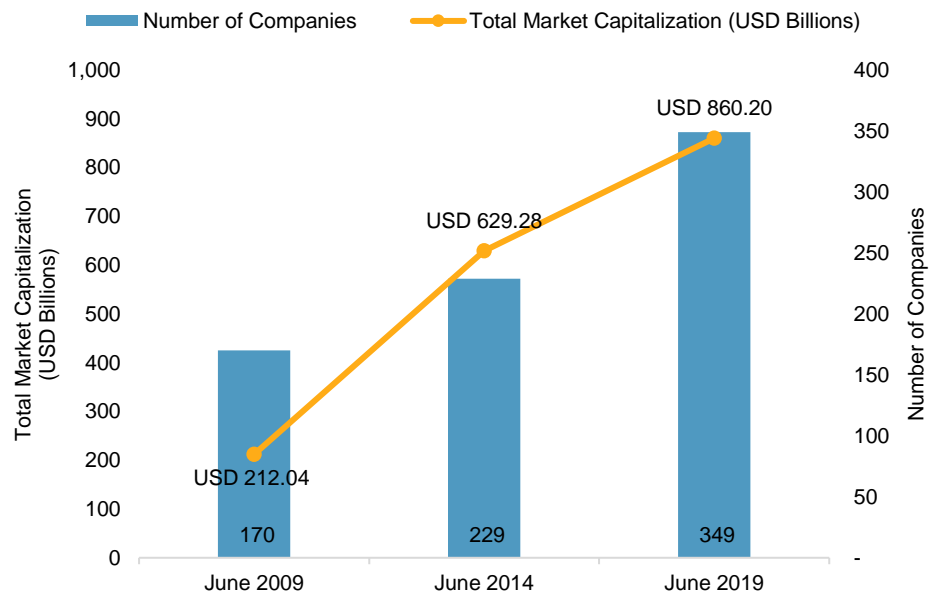
*...secure sources of future financing, regulatory changes, and mergers and acquisitions.*

### GROWTH OF LISTED BIOTECH COMPANIES IN THE U.S.

In the U.S., most biotech companies are privately owned; in 2015, 2,336 out of a total 2,772 biotech companies were private.<sup>2</sup> However, the number of public (or listed) companies has increased gradually. In 2015, there were 442 public biotech companies, compared to 316 in 2012. The primary advantages of listed vehicles are daily price transparency, relative liquidity, extensive financial reporting requirements, and less dependency on venture capital.

Of the more than 400 public biotech companies in 2019, 349 qualified for the [S&P Total Market Index](#)<sup>3</sup> (S&P TMI; the U.S.'s broadest benchmark index), compared to 170 companies in 2009. During the same period, the total market capitalization of these companies quadrupled, from USD 212 billion to USD 860 billion (see Exhibit 1).

**Exhibit 1: Growth of Biotechnology Companies in the U.S.**



Source: S&P Dow Jones Indices LLC. Data from June 30, 2009, to June 30, 2019. Past performance is no guarantee of future results. Chart is provided for illustrative purposes. Number of biotech companies in the U.S. as measured by the S&P Total Market Index.

<sup>2</sup> Source: Statista, [Number of biotechnology companies in the United States from 212 to 2016](#).

<sup>3</sup> The S&P Total Market Index is designed to track the performance of large-, mid-, small-, and micro-cap stocks listed in the U.S. For more information, please visit <https://spindices.com/indices/equity/sp-total-market-index-tmi>.

## BENCHMARKING LISTED BIOTECH

*The S&P Biotechnology Select Industry Index is a leading biotechnology index.*

There are a number of listed biotech indices on the market. They differ mainly in coverage and weighting. Some investors may favor pure-play biotech companies, while others may include biopharma companies, considering them part of the value chain. Investors also take different views on constituent weighting approaches—some think that equal weighting will allow each company an equal opportunity to contribute to index total returns, while others may prefer a market-cap-weighted approach, aiming to capture the industry as a whole.

## S&P BIOTECHNOLOGY SELECT INDUSTRY INDEX

*It offers pure-play biotech exposure...*

The S&P Biotechnology Select Industry Index is a leading biotechnology index. It was launched in January 2006 and has a long back-test history, with a first value date of Dec. 17, 1999. It offers pure-play biotech exposure and follows a modified equal weighting approach to provide the potential for unconcentrated industry exposure across large-, mid-, and small-cap stocks. Key competitor indices are the NASDAQ Biotechnology Index (which includes a broad basket of biotech and pharmaceutical companies and follows a market-cap-weighted methodology) and the NYSE Arca Biotechnology Index (which includes the top 30 large-cap biotech companies and weights them equally).<sup>4</sup>

*...and follows a modified equal weighting approach.*

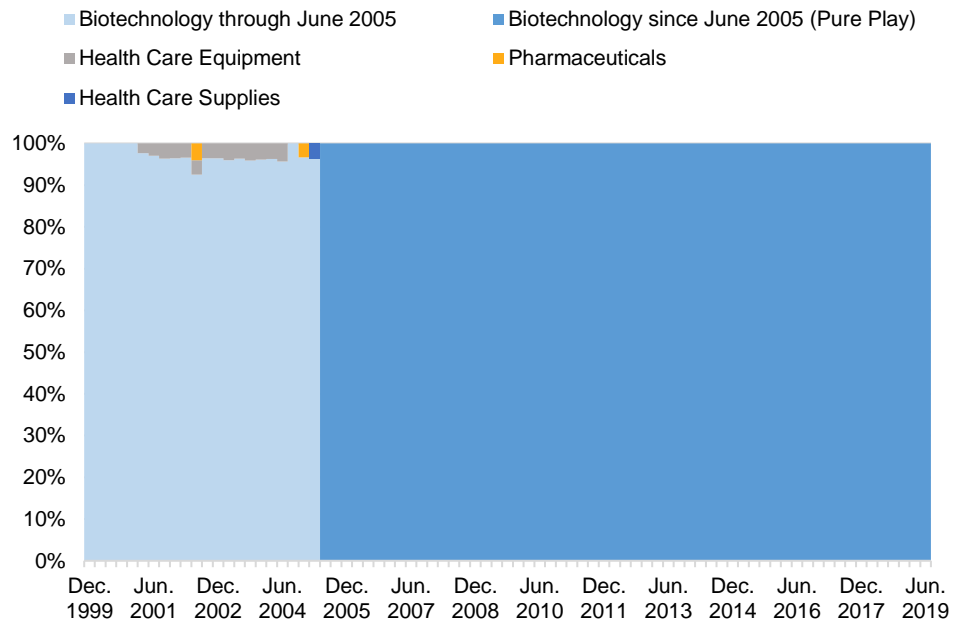
## INDEX CONSTRUCTION

### Biotech Pure-Play

Constituents of the S&P TMI that meet liquidity and market cap requirements and are classified as members of the GICS® Biotechnology sub-industry qualify for inclusion in the S&P Biotechnology Select Industry Index. In case the total constituent count falls below 35, the index methodology permits inclusion of companies classified by GICS as members of the Life Sciences Tools & Services sub-industry. However, the index has been purely biotech since June 2005 (see Exhibit 2).

<sup>4</sup> See Exhibit 14 in the Appendix for index methodology comparison.

**Exhibit 2: S&P Biotechnology Select Industry Index GICS Sub-Industry Exposure**



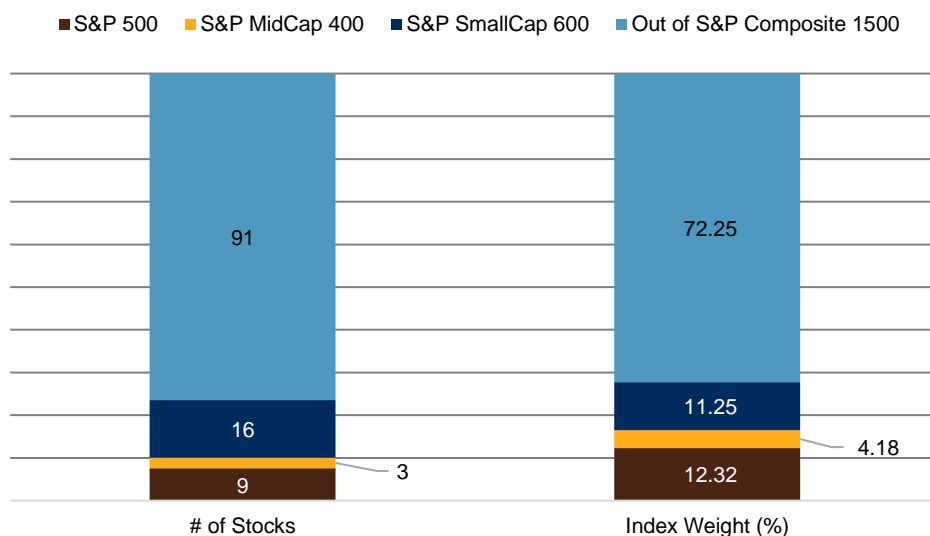
*As of June 28, 2019, there were 119 companies with a total market capitalization of USD 814.1 billion in the S&P Biotechnology Select Industry Index.*

Source: S&P Dow Jones Indices LLC and FactSet. Data as of June 30, 2019. Quarterly GICS index weights are shown from Dec. 31, 1999, to June 28, 2019. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

**Exposure across all Size Segments**

As of June 28, 2019, there were 119 companies with a total market capitalization of USD 814.1 billion in the S&P Biotechnology Select Industry Index. The top three biotech companies in the index were Amgen Inc, AbbVie Inc, and Gilead Sciences Inc. Of the 119, nine companies were part of the [S&P 500®](#), with a total index weight of 12.32%. There were 91 constituents from the [S&P Composite 1500®](#) (considered as micro-cap), with a total index weight of 72.25%. The top 10 constituents accounted for 13.73% of the total index weight (see Exhibit 3).

**Exhibit 3a: Index Composition**



The top 10 constituents accounted for 13.73% of the total index weight of the S&P Biotechnology Select Industry Index.

**Exhibit 3b: Top 10 Companies by Total Market Capitalization**

COMPANY NAME	TOTAL MARKET CAP	INDEX WEIGHT (%)
Amgen Inc	112,399	1.39
AbbVie Inc.	107,504	1.23
Gilead Sciences Inc	85,906	1.35
Celgene Corp	65,194	1.27
Vertex Pharmaceuticals Inc	46,967	1.43
Biogen Inc	45,346	1.36
Regeneron Pharmaceuticals Inc	33,719	1.36
Alexion Pharmaceuticals Inc	29,371	1.47
Incyte Corp	18,219	1.45
Biomarin Pharmaceutical Inc	15,337	1.41
<b>Total</b>		<b>13.73</b>

It is difficult to identify winners at an early stage of clinical trials.

Source: S&P Dow Jones Indices LLC. Data as of June 30, 2019. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

This uncertainty supports an equal weight investment approach.

**Modified Equal Weighting**

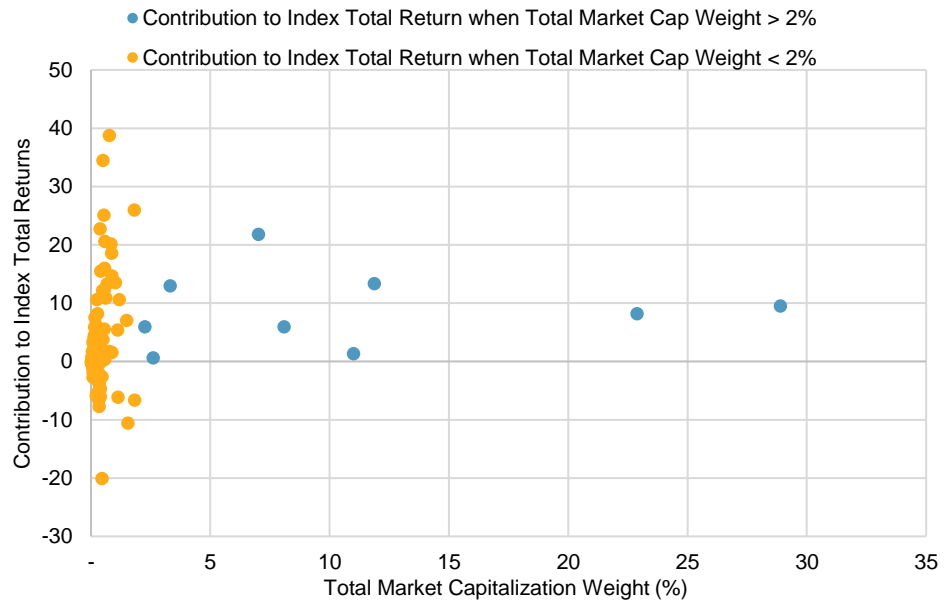
Given the uncertainty of clinical trial drugs making it to market, it is difficult to identify winners at an early stage of clinical trials, regardless of the size of the biotech company. This uncertainty supports an equal weight investment approach.

For the past 10 years, we analyzed each stock’s return contribution to the cumulative index performance of the S&P Biotechnology Select Industry Index. We compared this to the stock’s total market capitalization as a percentage of the index’s total market capitalization when it was first added to the index (see Exhibit 4).

Top performers were usually smaller names when they were first included in the S&P Biotechnology Select Industry Index. For example, Regeneron

Pharmaceuticals (REGN) was the biggest return contributor to the index over the past 10 years. Its market capitalization grew from USD 1.4 billion as of June 2009 to its highest level, at USD 55.5 billion, in December 2015. The stock remains in the index with a market capitalization of USD 33.7 billion.

**Exhibit 4: Stock Contribution to Index Returns and Initial Total Market Cap Weight in the S&P Biotechnology Select Industry Index**



*Each constituent in the S&P Biotechnology Select Industry Index has to have a minimum float-adjusted liquidity ratio.*

Source: S&P Dow Jones Indices LLC and FactSet. Data from June 30, 2009, to June 28, 2019. Weights are calculated using the total market capitalization at the end of the first quarter following the stock's inclusion in the index. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

*This minimum basket liquidity approach improves overall index liquidity without eliminating exposure to small- or micro-cap stocks.*

**Emphasis on Liquidity**

Each constituent in the S&P Biotechnology Select Industry Index has to have a minimum float-adjusted liquidity ratio as defined in the index methodology. In addition, at each quarterly rebalancing, stocks are initially equal weighted, then adjustments are made to ensure that there are no individual constituents with a weight exceeding the value that can be traded in a single day for a given theoretical portfolio value of USD 2 billion (a hypothetical portfolio value, which is reviewed annually). This minimum basket liquidity approach improves overall index liquidity without eliminating exposure to small- or micro-cap stocks.

**Key Characteristics**

1. The valuation multiples are different from pharmaceuticals.
2. There is low correlation with key equity benchmarks.
3. There is high return potential.

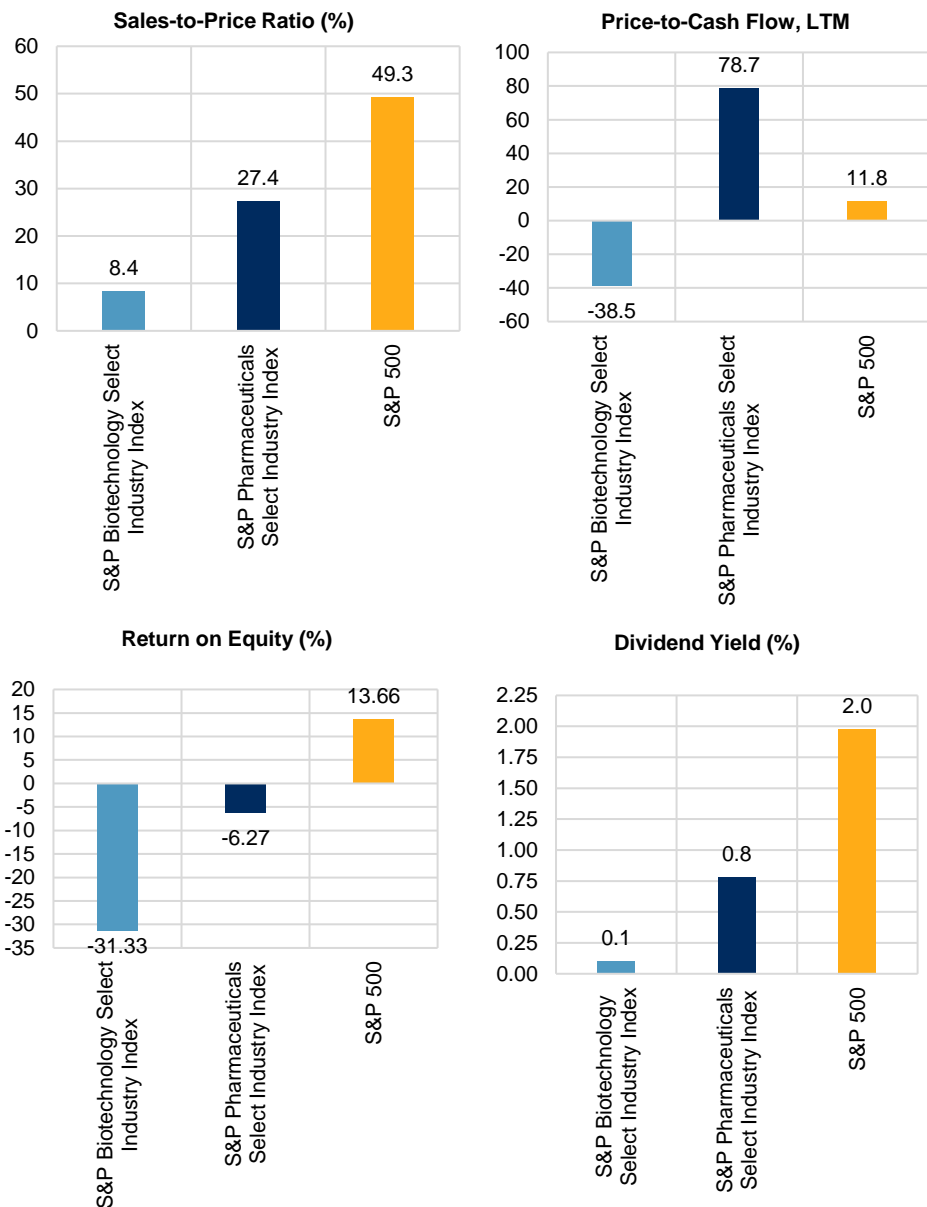
### Valuation Multiples Are Different from Pharmaceuticals

Exhibit 5 illustrates the key fundamental ratios of the S&P Biotechnology Select Industry Index compared with the [S&P Pharmaceuticals Select Industry Index](#) and the S&P 500. It can be seen that the two types of companies are different, and hence may deliver different performance characteristics. Biotech companies focus on core expertise in the research and development of new drugs. Cash flows prior to approval of a drug will be significantly negative, meaning that "standard" valuation multiples are less relevant.

**Exhibit 5: Fundamental Ratios**

*Biotech companies focus on core expertise in the research and development of new drugs.*

*Cash flows prior to approval of a drug will be significantly negative, meaning that "standard" valuation multiples are less relevant.*



Source: S&P Dow Jones Indices LLC. Average of monthly fundamental ratio from June 30, 2013, to June 30, 2019. Past performance is no guarantee of future results. Charts are provided for illustrative purposes.

## Low Correlation with Key Equity Benchmarks

Historically, the S&P Biotechnology Select Industry Index had low correlation with various broad market and industry indices. Therefore, allocating toward biotech could provide diversification benefits. Over the past 15 years, the S&P Biotechnology Select Industry Index had correlations of 0.57 with the S&P 500, 0.41 with the [S&P/ASX 200](#), 0.40 with the [S&P China BMI](#), and 0.06 with the [S&P Emerging BMI](#). Among various S&P Select Industry Indices, its lowest correlation was 0.20 with the [S&P Technology Hardware Select Industry Index](#). As expected, the highest correlation of 0.74 was with the [S&P Pharmaceuticals Select Industry Index](#) (see Exhibit 6).

*Historically, the S&P Biotechnology Select Industry Index had low correlation with various broad market and industry indices.*

**Exhibit 6: Correlations of the S&P Biotechnology Select Industry Index**

S&P BROAD MARKET INDEX	CORRELATION	S&P SELECT INDUSTRY INDEX	CORRELATION
S&P Global BMI	0.542	Aerospace & Defense	0.560
S&P Global Ex-U.S. BMI	0.472	Banks	0.459
S&P 500	0.574	Capital Markets	0.578
S&P MidCap 400	0.603	Technology Hardware	0.200
S&P SmallCap 600	0.610	Health Care Services	0.613
S&P United Kingdom BMI	0.441	Homebuilders	0.472
S&P/ASX 200 (WM USD)	0.412	Internet	0.384
S&P China BMI	0.401	Metals and Mining	0.376
S&P Emerging BMI	0.065	Oil & Gas Exploration & Production	0.300
		Pharmaceuticals	0.745
		Retail	0.472
		Software & Services	0.633
		Telecom	0.522
		Transportation	0.551

Source: S&P Dow Jones Indices LLC. Data from June 30, 2004, to June 30, 2019. \*The data for the [S&P Internet Select Industry Index](#) is from June 30, 2005, to June 30, 2019. Index performance based on monthly total return in USD. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

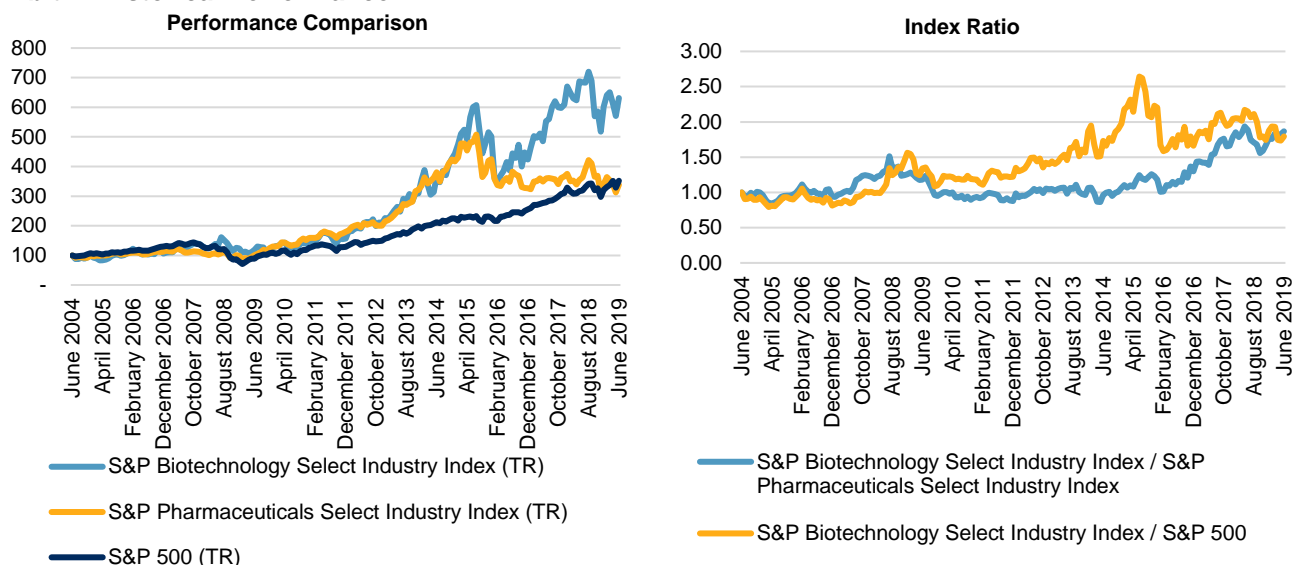
*The S&P Biotechnology Select Industry Index outperformed the S&P Pharmaceuticals Select Industry Index and the S&P 500 consistently.*

## High Return Potential

From the inception of the S&P Biotechnology Select Industry Index through the period ending June 28, 2019, the S&P Biotechnology Select Industry Index outperformed the S&P Pharmaceuticals Select Industry Index and the S&P 500 consistently (see Exhibits 7 and 8). After posting total returns of -15% during a volatile 2018, the S&P Biotechnology Select Industry Index started 2019 with absolute total returns of 22% (see Exhibit 17 in the Appendix).



**Exhibit 7: Historical Performance**



Source: S&P Dow Jones Indices LLC. Data from June 30, 2004, to June 30, 2019. Index performance based on monthly total return in USD. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

**Exhibit 8: Historical Risk/Return Comparison**

PERIOD	S&P BIOTECHNOLOGY SELECT INDUSTRY INDEX (TR)	S&P PHARMACEUTICALS SELECT INDUSTRY INDEX (TR)	S&P 500 (TR)
<b>ANNUALIZED RETURNS (%)</b>			
3-Year	17.7	-0.9	14.2
5-Year	11.5	-2.3	10.7
10-Year	18.1	12.8	14.7
15-Year	13.1	8.5	8.8
19.51-Year	9.1	9.0	5.7
<b>ANNUALIZED VOLATILITY (%)</b>			
3-Year	28.3	20.7	12.2
5-Year	30.6	23.0	12.0
10-Year	28.0	19.6	12.7
15-Year	26.2	18.3	13.8
19.51-Year	35.9	17.9	14.6
<b>RISK-ADJUSTED RETURNS</b>			
3-Year	0.63	-0.04	1.16
5-Year	0.38	-0.10	0.89
10-Year	0.65	0.65	1.16
15-Year	0.50	0.46	0.63
19.51-Year	0.25	0.50	0.39

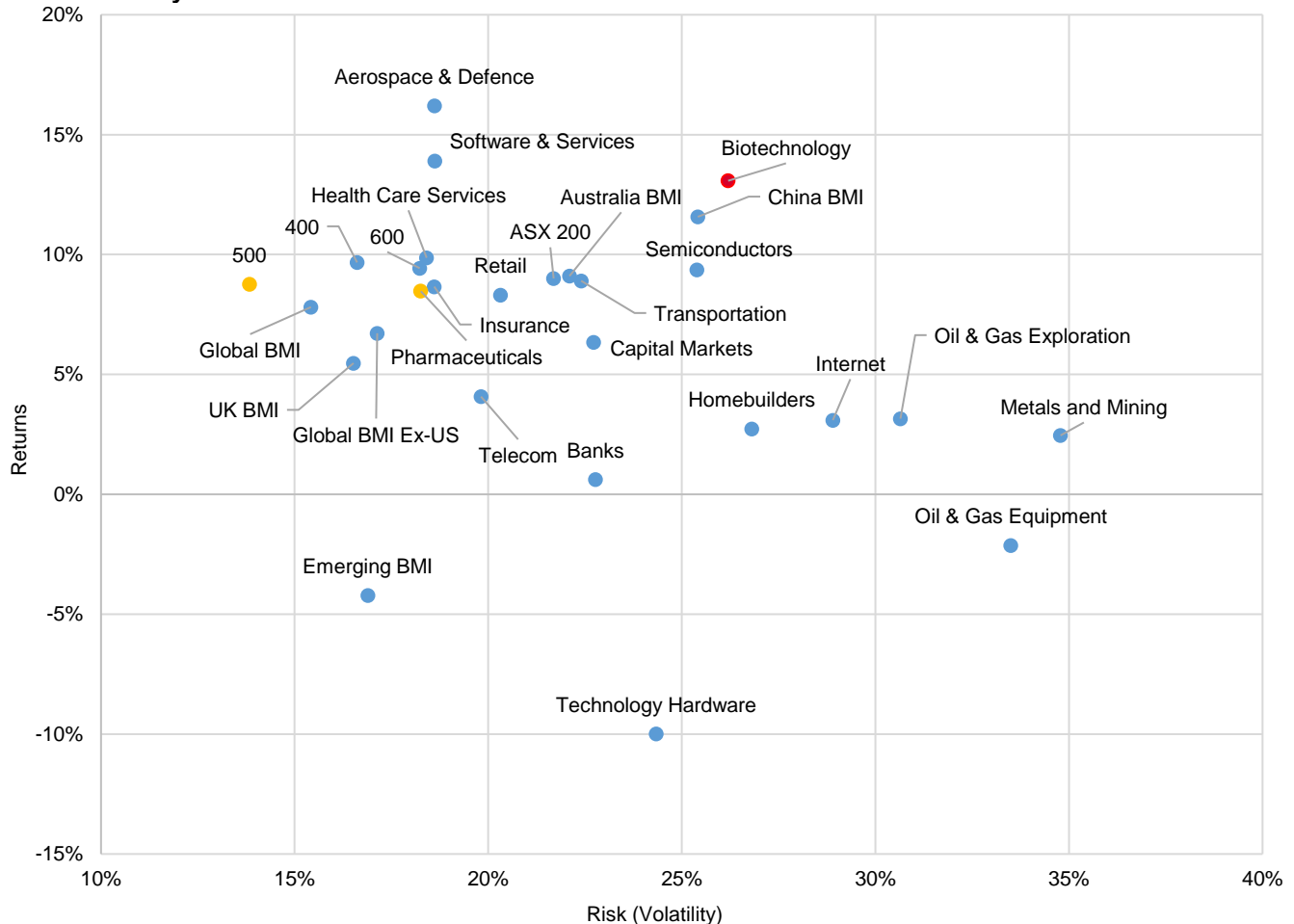
Source: S&P Dow Jones Indices LLC. Data from December 1999 to June 2019. Index performance based on monthly total return in USD. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

**Exhibit 8: Historical Risk/Return Comparison (cont.)**

CHARACTERISTIC	S&P BIOTECHNOLOGY SELECT INDUSTRY INDEX	S&P PHARMACEUTICALS SELECT INDUSTRY INDEX	S&P 500
Maximum Drawdown (%)	-76.3	-38.7	-50.9
Worst Monthly Return (%)	-40.4	-18.9	-16.8
Best Monthly Return (%)	75.8	12.4	10.9
Average Monthly Return (%)	1.2	0.9	0.5
Minimum 12-Month Rolling Returns (%)	-52.6	-34.1	-43.3
Maximum 12-Month Rolling Returns (%)	80.7	66.1	53.6
Correlation	1.00	0.59	0.42

Source: S&P Dow Jones Indices LLC. Data from December 1999 to June 2019. Index performance based on monthly total return in USD. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

**Exhibit 9: Risk/Return Profile of the S&P Biotechnology Select Industry Index versus Various Broad and Select Industry Indices**



Source: S&P Dow Jones Indices LLC. Data from June 30, 2004, to June 30, 2019. Index performance based on monthly total return in USD. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

## BIOTECHNOLOGY IN A PORTFOLIO

It can be helpful to consider how the inclusion of the S&P Biotechnology Select Industry Index would affect the characteristics of core equity (100% equity) and traditional portfolios (60/40 equity/fixed income). We moved 10% of the weight from the core equity (as measured by the S&P 500) to the S&P Biotechnology Select Industry Index. In the case of the traditional portfolio, 10% of the weight from equity was moved to biotech, keeping the fixed income allocation (measured by the [S&P Global Developed Aggregate Ex-Collateralized Bond Index](#)) unchanged, at 40% (see Exhibit 10 for the hypothetical allocations).

*Inclusion of the S&P Biotechnology Select Industry Index has helped enhance the overall performance of core equity and traditional portfolios.*

**Exhibit 10: Hypothetical Portfolios Allocations**

HYPOTHETICAL PORTFOLIOS	S&P BIOTECHNOLOGY SELECT INDUSTRY INDEX	S&P 500	S&P GLOBAL DEVELOPED AGGR. EX-COLLATERALIZED BOND INDEX
Core Equity	-	100	-
Core Equity +	10	90	-
Traditional Portfolio	-	60	40
Traditional Portfolio +	10	50	40

Source: S&P Dow Jones Indices LLC. Data as of March 31, 2002. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Exhibit 11 demonstrates the risk/return profiles of the hypothetical portfolios and their underlying indices from March 2002 to June 2019. Inclusion of the S&P Biotechnology Select Industry Index has helped enhance the overall performance of core equity and traditional portfolios (amid marginal increases in volatility). The core equity and traditional portfolios experienced increases in returns by 50 bps and 49 bps, respectively, from March 31, 2002, to June 28, 2019. Inclusion of the S&P Biotechnology Select Industry Index in these portfolios has also resulted in marginal increases in overall portfolio volatility.

**Exhibit 11: Hypothetical Portfolio Risk/Return Profiles**

METRIC	S&P BIOTECHNOLOGY SELECT INDUSTRY INDEX	S&P 500	S&P GLOBAL DEVELOPED AGGREGATE EX-COLLATERALIZED BOND	60% (500) : 40% (DEBT)	90% (500) : 10% (BIOTECH)	50% (500) : 10% (BIOTECH) : 40% (DEBT)
SHORT NAME	(BIOTECH)	(500) CORE EQUITY PORTFOLIO	(DEBT)	(60:40) TRADITIONAL PORTFOLIO	(90:10) CORE EQUITY +	(50:10:40) TRADITIONAL PORTFOLIO +
Returns (Annual, %)	10.53	7.77	2.93	6.44	8.27	6.93
Volatility (Annual, %)	26.35	14.18	10.45	6.86	14.47	7.40
Risk Adjusted Returns	0.40	0.55	0.28	0.94	0.57	0.94
Maximum Drawdown (%)	-46.89	-50.95	-30.02	-21.93	-48.45	-18.44

The 60% (500) : 40% (Debt), 90% (500) : 10% (Biotech), and 50% (500) : 10% (Biotech) : 40% (Debt) are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from March 31, 2002, to June 30, 2019. Index performance based on monthly total return in USD. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

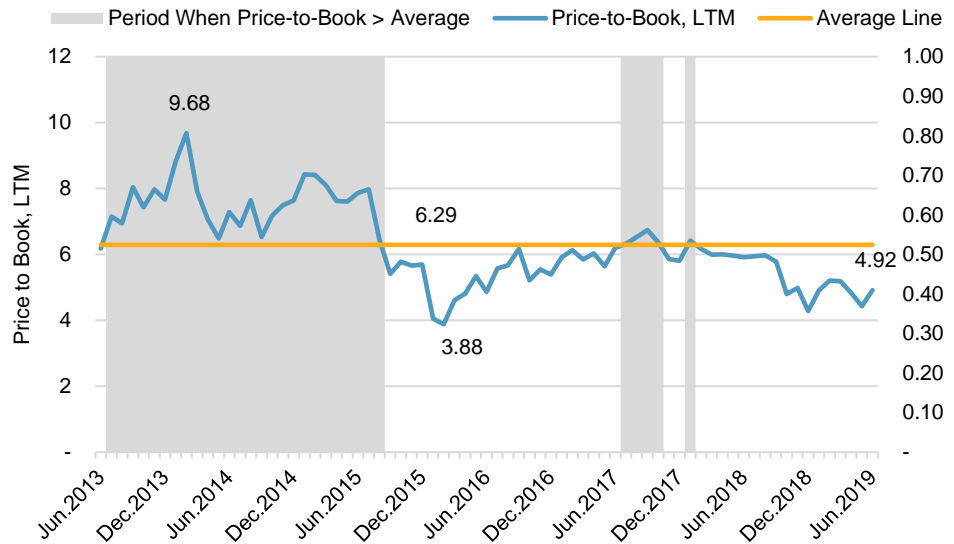
### WHY NOW?

The S&P Biotechnology Select Industry Index historically traded at multiples that were elevated relative to broader benchmarks, but after the past few years of correction, it may have arrived at an attractive valuation (see Exhibit 12). Furthermore, with the S&P Biotechnology Select Industry Index value coming closer to the 12-month moving average, there are signs of a potentially upward trend in index performance (see Exhibit 13).

*With the S&P Biotechnology Select Industry Index value coming closer to the 12-month moving average...*

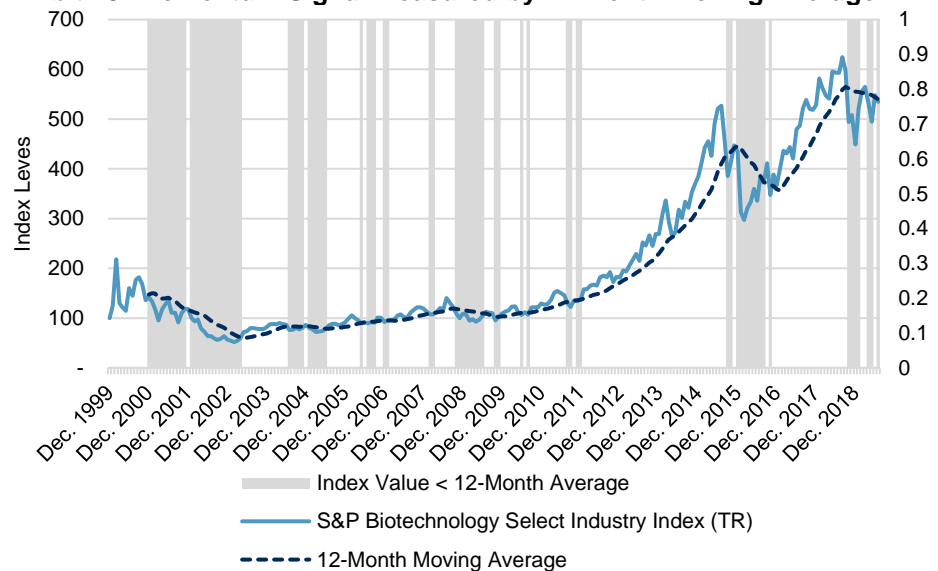
*...there are signs of a potentially upward trend in index performance*

**Exhibit 12: Monthly Price-to-Book Value for the S&P Biotechnology Select Industry Index**



Source: S&P Dow Jones Indices LLC. Data for average of monthly price-to-book (last twelve months) ratio from June 30, 2013, to June 30, 2019. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

**Exhibit 13: Momentum Signal Measured by 12-Month Moving Average**



Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1999, to June 30, 2019. Index performance based on monthly total return in USD. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

## **CONCLUSION**

Biotechnology has unique characteristics that include large investments with long lead-time for research and development, high risk of failure, and significant gains if a drug makes it to the pharmacy shelf successfully. The S&P Biotechnology Select Industry Index offers diversified pure-play, unconcentrated biotech exposure across large-, mid-, small-, and micro-cap stocks, with an emphasis on basket liquidity. Historically, the S&P Biotechnology Select Industry Index has been characterized by high potential reward paired with high potential risk.

## APPENDIX A: COMPETITOR INDICES COMPARISON

### Index Methodology Comparison

Exhibit 14: Methodology Comparison																		
CRITERIA	S&P BIOTECHNOLOGY SELECT INDUSTRY INDEX	NYSE ARCA BIOTECHNOLOGY INDEX	NASDAQ BIOTECHNOLOGY INDEX															
Universe	S&P Total Market Index (TMI)	NA	NA															
Classification	Global Industry Classification Standard® (GICS)® - <b>Main Sub-Industry:</b> Biotechnology <i>(Supplementary sub-industry: Life Sciences Tools &amp; Services)</i>	Companies engaged in biotechnology business (primarily involved in the use of biological processes)	Industry Classification Benchmark (ICB) - Biotechnology or Pharmaceutical															
Listings	Listing on various U.S. exchanges eligible	Not Available	New security - exclusively NASDAQ															
Size and Liquidity	Stock must float-adjusted market capitalization (FMC) and float-adjusted liquidity ratio (FALR) that is greater than or equal to as below <table border="1"> <thead> <tr> <th></th> <th>FMC</th> <th>FALR<sup>2</sup></th> <th></th> </tr> </thead> <tbody> <tr> <td>Existing</td> <td>USD 300 million</td> <td>50%</td> <td rowspan="2">OR</td> </tr> <tr> <td></td> <td>USD 500 million</td> <td>90%</td> </tr> <tr> <td>New</td> <td>USD 400 million</td> <td>150%</td> <td></td> </tr> </tbody> </table>		FMC	FALR <sup>2</sup>		Existing	USD 300 million	50%	OR		USD 500 million	90%	New	USD 400 million	150%		<b>Total Market Cap -</b> New stock > USD 1 billion Existing stock > USD 900 million  <b>3-Month ADVT -</b> New stock > USD 1 million Existing stock > USD 0.9 million	Total Market Cap > USD 200 million Volume > 100,000 shares
	FMC	FALR <sup>2</sup>																
Existing	USD 300 million	50%	OR															
	USD 500 million	90%																
New	USD 400 million	150%																
Constituent Count	Variable (at present 119 stocks); minimum 35 stocks	Fixed (30 stocks)	Variable (at present > 200 stocks)															
Weighting	Quarterly - Equal Weighted; subject to adjustment for portfolio liquidity	Equal Weighted	Modified Market Cap Weighted Quarterly; maximum stock weight capped at 8%															
Rebalancing	Quarterly in March, June, September, December	Quarterly in January, April, July and October	Annually in December															

Source: S&P Dow Jones Indices LLC, [www.nyse.com](http://www.nyse.com), [www.indexes.nasdaqomx.com](http://www.indexes.nasdaqomx.com). Data as of June 28, 2019. Table is provided for illustrative purposes.

The risk/return profile of the S&P Biotechnology Select Industry Index, which offers a pure-play approach, is different from that of more competitive indices. The S&P Biotechnology Select Industry Index noted outperformance over its competitors over the medium to long term, amid higher volatility. This outperformance can be attributed to higher weight allocation to small- and micro-cap stocks (which are typically more volatile but tend to outperform larger stocks).

## Historical Risk/Return Profiles of Biotechnology Indices

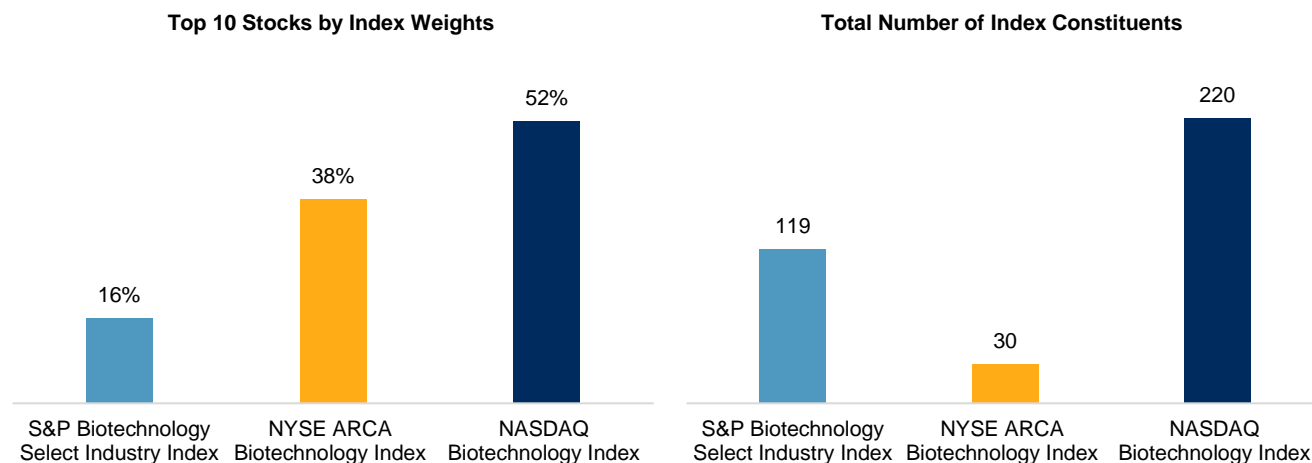
**Exhibit 15: Risk/Return Profile**

STATS	S&P BIOTECHNOLOGY SELECT INDUSTRY INDEX	NYSE ARCA BIOTECHNOLOGY TR INDEX	NASDAQ BIOTECHNOLOGY INDEX
<b>ANNUALIZED RETURNS (%)</b>			
3-Year	17.7	16.9	8.9
5-Year	11.5	11.9	5.4
10-Year	18.1	Data NA	16.8
<b>ANNUALIZED VOLATILITY (%)</b>			
3-Year	28.3	24.8	22.0
5-Year	30.6	25.9	22.9
10-Year	28.0	NA	20.4
<b>RISK-ADJUSTED RETURNS</b>			
3-Year	0.63	0.68	0.41
5-Year	0.38	0.46	0.24
10-Year	0.65	NA	0.82

Source: S&P Dow Jones Indices LLC, FactSet, and [https://indexes.nasdaqomx.com/docs/FS\\_XNBI.pdf](https://indexes.nasdaqomx.com/docs/FS_XNBI.pdf), as of June 30, 2019. Data from June 30, 2009, to June 30, 2019. Index performance based on monthly total return in USD. Past performance is no guarantee of future results. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

## Top 10 Stock Weights and Total Number of Constituents in S&P Biotechnology Select Industry Index

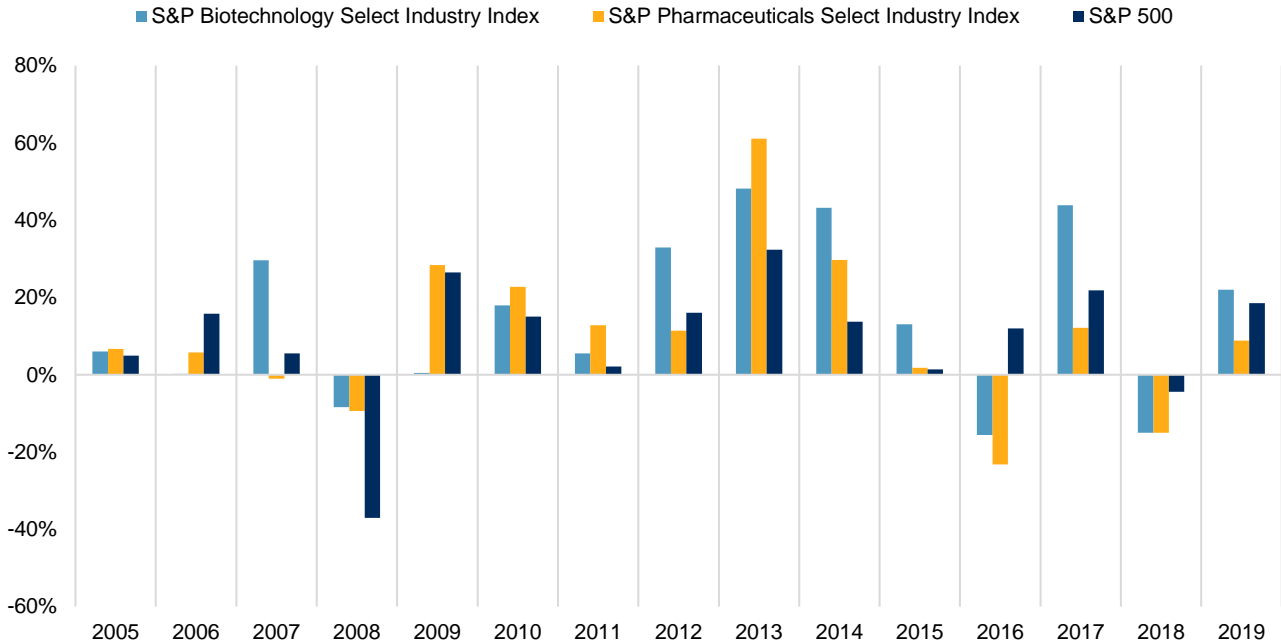
**Exhibit 16: Top 10 Stocks**



Source: S&P Dow Jones Indices LLC, First Trust NYSE Arca Biotechnology Index Fund Fact Sheet, and [https://indexes.nasdaqomx.com/docs/FS\\_XNBI.pdf](https://indexes.nasdaqomx.com/docs/FS_XNBI.pdf). Top 10 holding as of June 28, 2019. Past performance is no guarantee of future results. Charts are provided for illustrative purposes.

## APPENDIX B: CALENDAR YEAR RETURN OF THE S&P BIOTECHNOLOGY SELECT INDUSTRY

Exhibit 17: Calendar Year Returns



Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2004, to June 30, 2019. Index performance based on monthly total return in USD. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.



## PERFORMANCE DISCLOSURE

The S&P Biotechnology Select Industry Index and S&P Homebuilders Select Industry Index were launched January 27, 2006. The S&P Pharmaceuticals Select Industry Index, S&P Aerospace & Defense Select Industry Index, S&P Health Care Services Select Industry Index, S&P Metals and Mining Select Industry Index, S&P Retail Select Industry Index, S&P Telecom Select Industry Index, S&P Technology Hardware Select Industry Index, S&P Transportation Select Industry Index, and S&P Oil & Gas Exploration & Production Select Industry Index were launched June 19, 2006. The S&P Banks Select Industry Index, S&P Capital Markets Select Industry Index, S&P Select Industry Index were launched on September 9, 2011. The S&P Software & Services Select Industry Index was launched September 19, 2011. The S&P Internet Select Industry Index was launched February 1, 2016. The S&P Global Developed Aggregate Ex-Collateralized Bond Index was launched July 5, 2016. All information presented prior to an index's Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index Launch Date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. Complete index methodology details are available at [www.spdji.com](http://www.spdji.com). Past performance of the Index is not an indication of future results. Prospective application of the methodology used to construct the Index may not result in performance commensurate with the back-test returns shown.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the Index is set at a fixed value for calculation purposes. The Launch Date designates the date upon which the values of an index are first considered live: index values provided for any date or time period prior to the index's Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company's public website or its datafeed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed "Date of introduction") is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index's public release date.

The back-test period does not necessarily correspond to the entire available history of the Index. Please refer to the methodology paper for the Index, available at [www.spdji.com](http://www.spdji.com) for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Another limitation of using back-tested information is that the back-tested calculation is generally prepared with the benefit of hindsight. Back-tested information reflects the application of the index methodology and selection of index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the equities, fixed income, or commodities markets in general which cannot be, and have not been accounted for in the preparation of the index information set forth, all of which can affect actual performance.

The Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices LLC maintains the Index and calculates the Index levels and performance shown or discussed, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US \$100,000 investment for a 12-month period (or US \$10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US \$1,650), the net return would be 8.35% (or US \$8,350) for the year. Over a three year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US \$5,375, and a cumulative net return of 27.2% (or US \$27,200).

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