

INVESTMENT DIGEST

AI in Pharma
Publicly Traded Companies
2021

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Investment Digest at a Glance

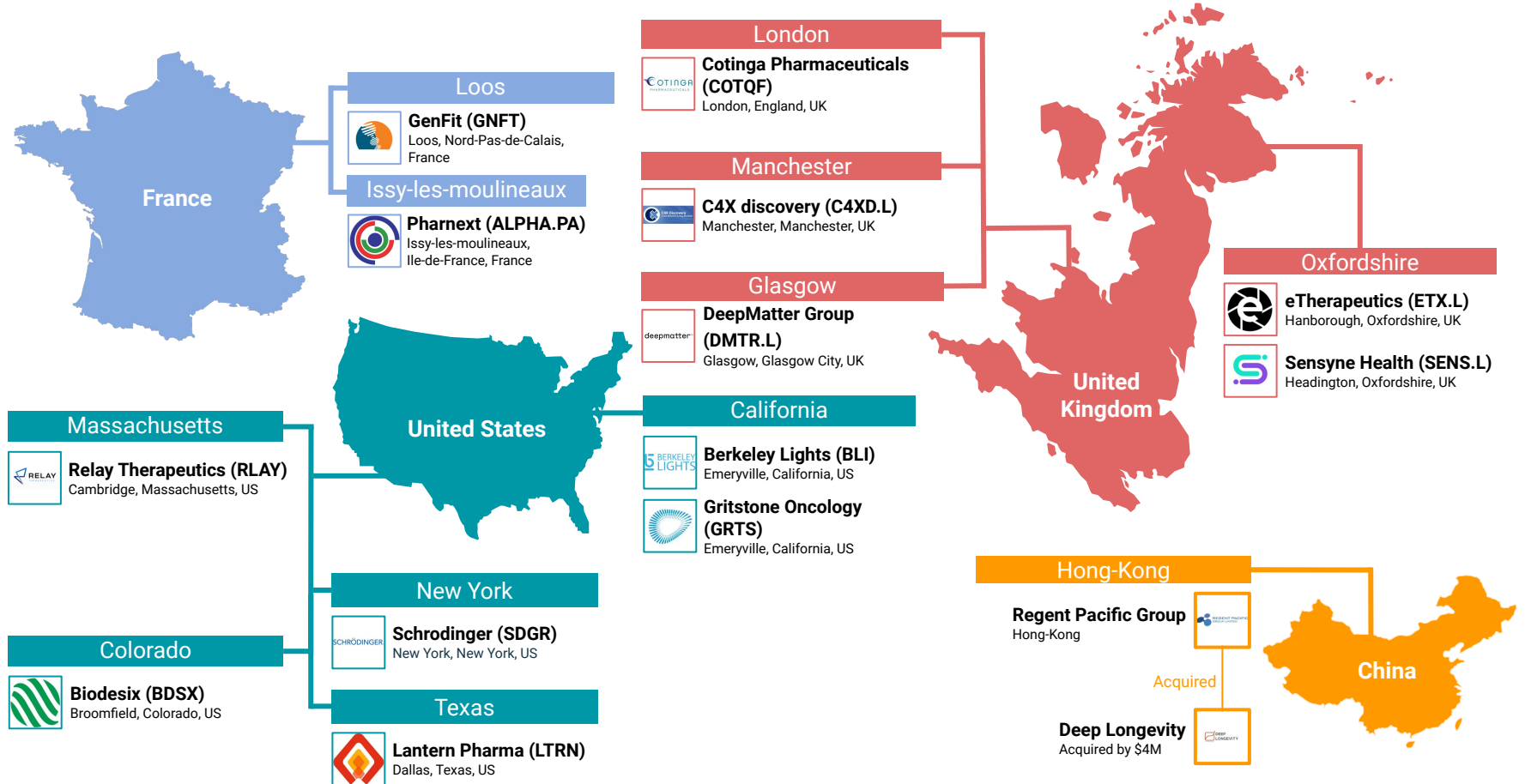
This Investment Digest summarizes the key players and observations in publicly traded companies focusing on pharmaceutical artificial intelligence (AI). We have outlined information about the key industry trends, the most prominent players, and stock market dynamics.

One of the key findings of the report is that the ongoing COVID-19 pandemic has sparked an increased interest in pharmaceutical AI technologies and created a favorable investment climate in the area of pharmaceutical artificial intelligence.

Based on the chapter 'Publicly Traded Companies' in the 130-page industry report "[AI for Drug Discovery, Biomarker Development and Advanced R&D Landscape Overview 2020](#)", the Digest is an overview of the publicly traded part of the pharmaceutical AI sector, including 13 AI-driven pharma public companies and one company with upcoming IPO across the globe.

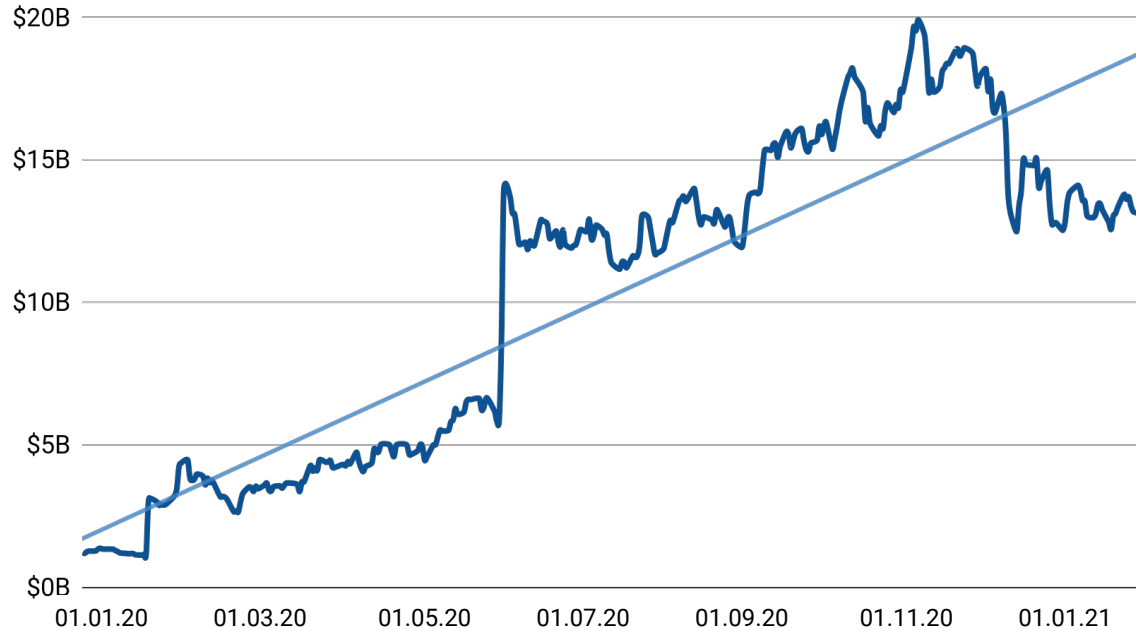
Also, exclusively, this report has an additional chapter called 'Portfolio Analysis' This part includes four different investment strategies for AI-driven pharma company stocks, depending on the portfolio's riskiness.

AI in Pharma Publicly Traded Companies



Dynamics of Publicly Traded AI-Driven Pharma Companies

Cumulative Capitalization in 2020-2021



Despite the crisis, publicly traded companies continued their growth, having reached **\$16.3 billion of cumulative capitalization or 13 times growth by the end of 2020.**

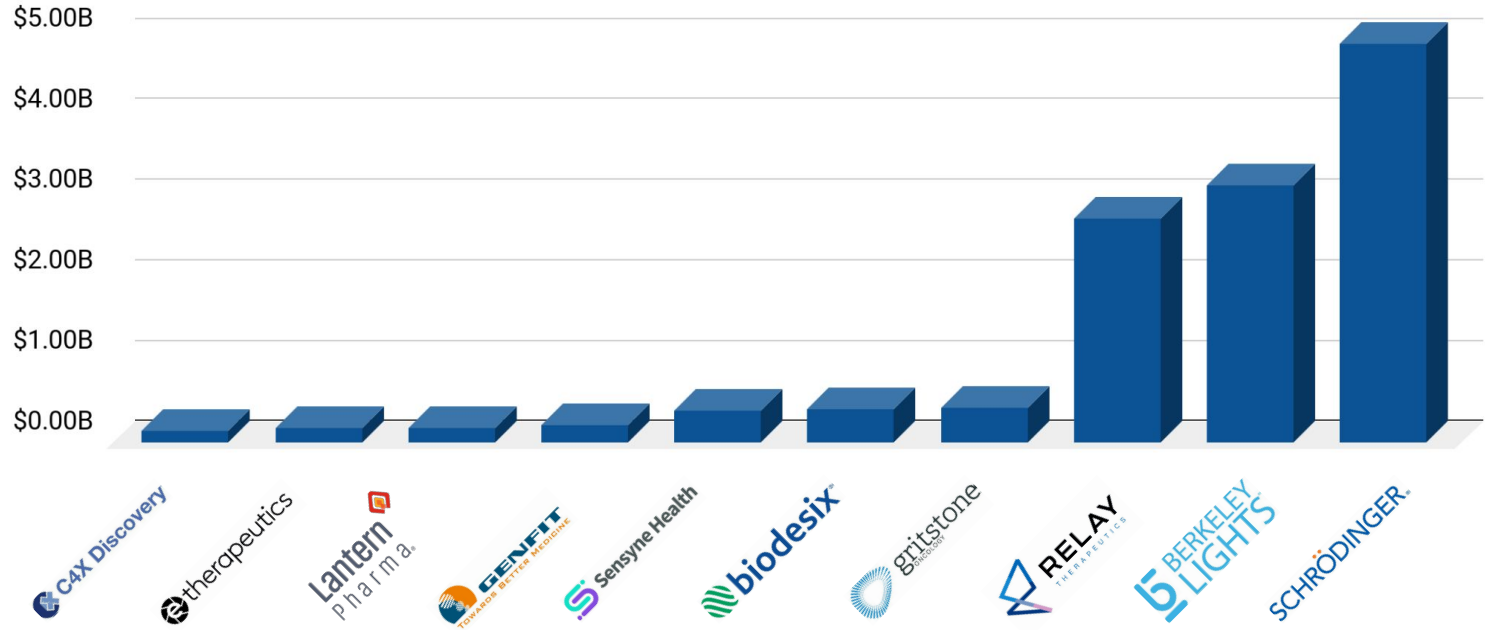
Five companies - Biodesix, Relay Therapeutics, Berkeley Lights, Lantern Pharma, and Schrödinger - announced the **closing of their IPOs.**

The **largest companies by market capitalization** are **Schrödinger, Berkeley Lights, and Relay Therapeutics.**

However, the beginning of **2021** saw a decline in the prices of shares of several major companies. We believe that the decline is due to the outflow of speculative capital and will not affect the long-term growth of the market.

Technologically, publicly traded AI-driven pharma companies are similar to other companies in the industry (which reached B or C funding rounds), which means that their market capitalization growth can approximate the dynamics of the whole industry.

Top 10 Publicly Traded Pharma Companies by Market Capitalization in 2021



The chart represents top 10 AI-driven drug discovery public companies according to their market capitalization (as of March of 2021). Schrödinger, the leader of the ranking, has the highest capitalization, having successfully closed its IPOs and achieved growth of 148%. After steady growth in January, Relay Therapeutics and Berkeley Lights, two other leaders, lost 41% and 13% of their capitalization in the last two months.

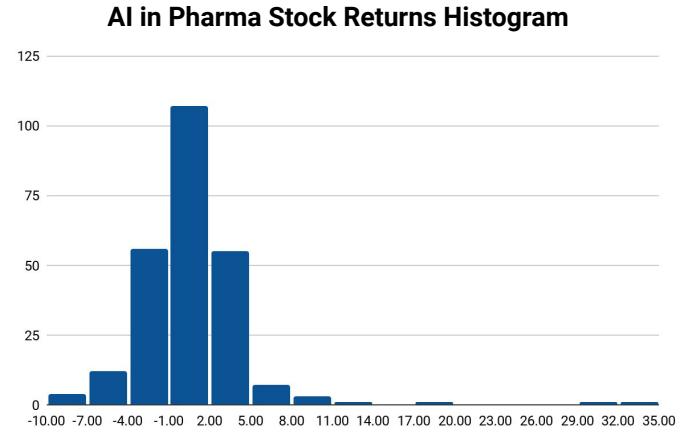
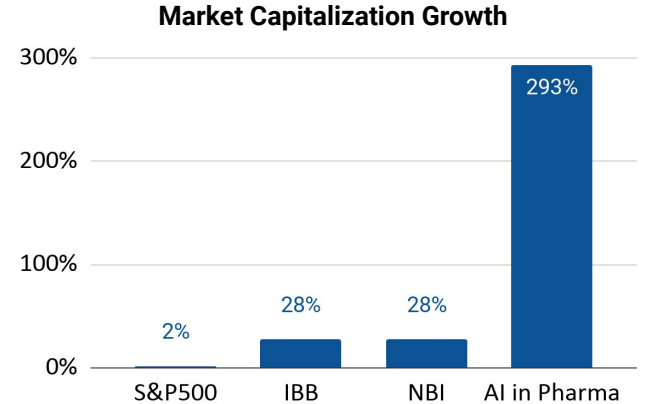
AI in Pharma Market Capitalization

Growth in market capitalization of AI-driven pharma corporations dramatically exceeds that of the entire market (represented as S&P500 index) and general biotech industry indices (IBB and NBI). However, compared to them, the AI-driven pharma market segment is more volatile (as measured by standard deviation).

Interestingly, distribution of the returns in the segment of AI-driven pharma companies is right-skewed, which differentiates it from the vast majority of stock indices and segments. It means that rare extraordinary positive events play a major role in the dynamics of the market capitalization of the segment, which can be described as the presence of "anti-black swans". However, many other indices are characterized by negative skewness, which means increased likelihood of extraordinary negative events.

Distribution of AI in pharma stock returns is definitely abnormal, with curtosis exceeding 4.7.

Index	Correlation with AI in Pharma market	Average daily return in 2020	Average daily volatility in 2020	Skewness	Curtosis
AI in Pharma	-	0.55	4.01	2.64	17.22
IBB	0.83	0.12	2.13	-0.15	3.11
S&P500	0.72	0.03	2.31	-0.97	8.56
NBI	0.84	0.12	2.16	-0.19	3.40

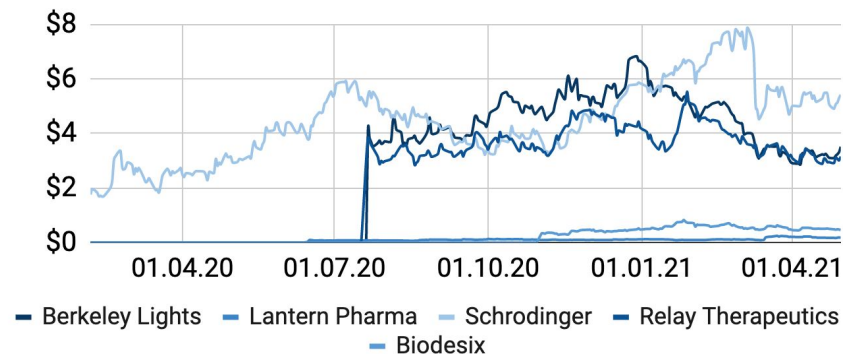


AI in Pharma IPOs in 2020

Despite the crisis, all newly formed public companies announced the successful closing of their IPOs. All of them demonstrate a volatile but steady growth, even though their net income remains negative. All IPOs took place in the US in summer. All companies have a beta smaller than 1 (although positive), which means that fluctuations in prices of AI pharma stock follow a general market pattern. However, the fluctuations tend to be less pronounced; however, their volatility, as measured by standard deviation, can be relatively high.

Major adverse market events in 2020 did not significantly affect AI in the pharma sector.

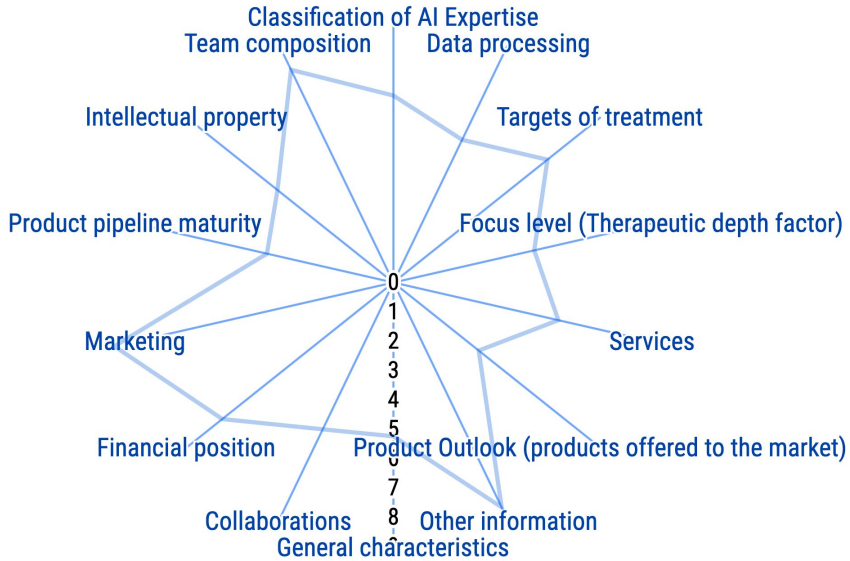
Capitalization change in 2020, \$B



Name	Country	Funding Amount. M\$	Investments in 2020 (M\$)	IPO Date	Capitalization (M\$)	ROA	ROE	Profit margin	Operating margin	EV/EBITDA	Net income
Lantern Pharma	USA	8.7	-	15.06.20	114.1	N/A	N/A	0.0	0.0	-25.4	-111.6
Schrödinger	USA	562.3	346.5	05.02.20	5830	-0.0781	-0.0604	-0.1992	-0.5172	-107.91	-20.093
Berkeley Lights	USA	208.4	50.9	21.07.20	5746	N/A	N/A	-55.63	-53.81	-225.63	-32.92
Relay Therapeutics	USA	520.0	40.0	16.07.20	3660	N/A	N/A	0	0	-26.25	-111.601
Biodesix	USA	239.7	20.9	28.10.20	389.98	-0.1664	-6.27	-0.68	-0.48	-19.21	-31.35

Company Profiles

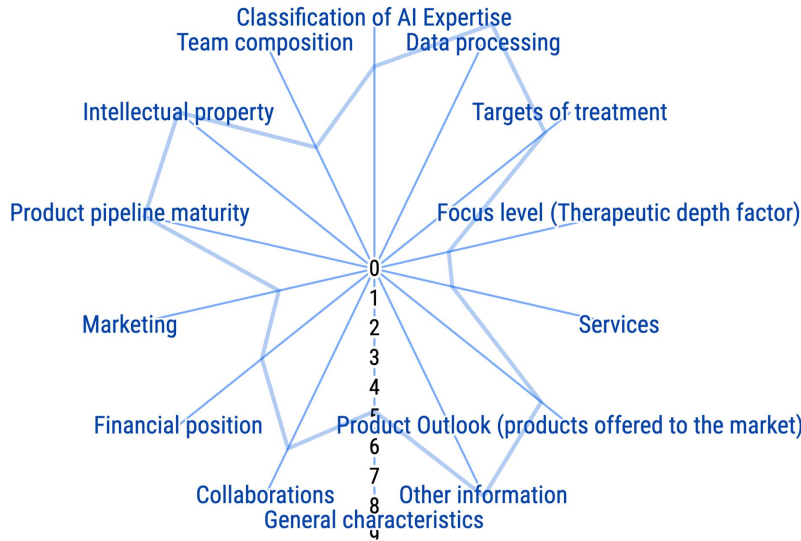




Berkeley Lights is a leading Digital Cell Biology company focused on enabling and accelerating the rapid development and commercialization of biotherapeutics and other cell-based products for customers. Their proprietary technology – automation, optimized workflows, software, consumables, assay reagents – enables scientists to find the best cells the first time they look.



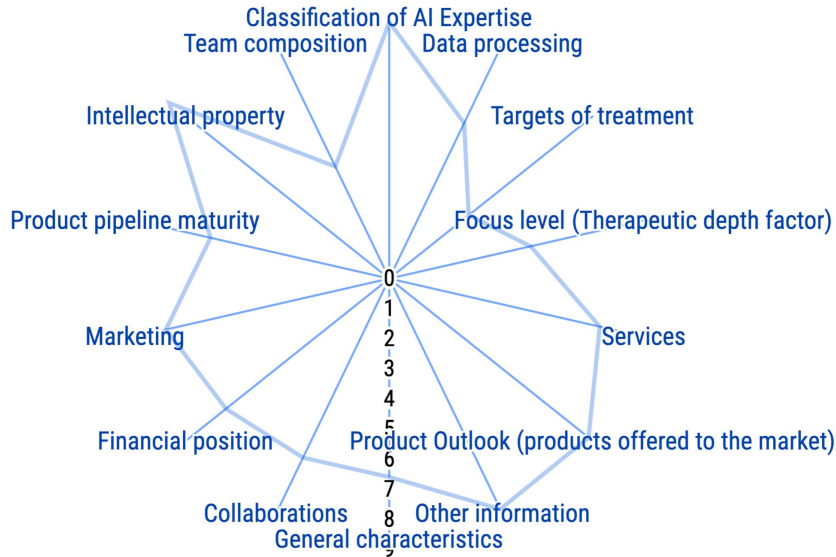
Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
BLI	-0.17%	4.28%	-24.52%	3.19



Biodesix is a diagnostic solutions company. The company uses its AI platform, the Diagnostic Cortex, to discover, develop, and commercialize solutions for unmet clinical needs, focusing on lung disease. In addition to its diagnostic tests, it provides biopharmaceutical companies with services that include diagnostic research, clinical trial testing, and the discovery, development, and commercialization of companion diagnostics.



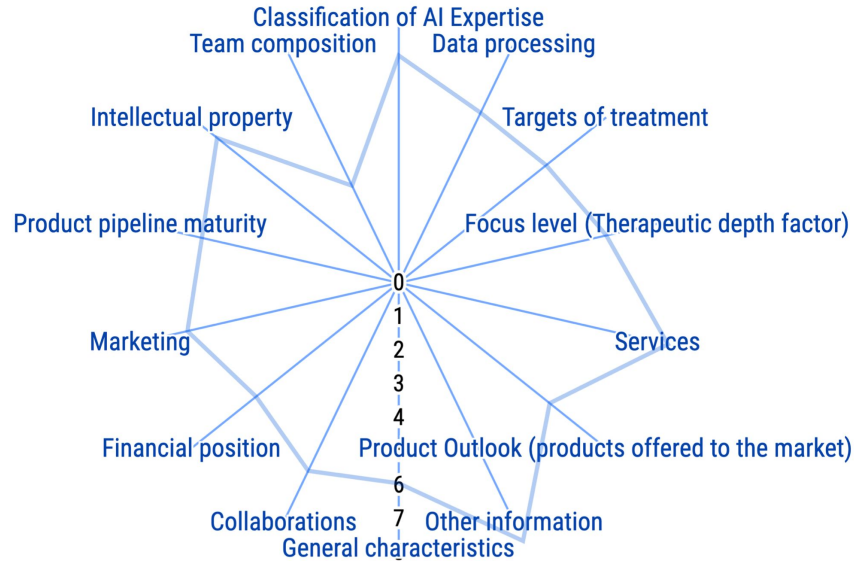
Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
BDSX	0.49%	5.82%	57.46%	0.4



C4X Discovery is a drug discovery and development company. The company is engaged in developing technologies to improve the drug discovery process for small molecule therapies. Its discovery portfolio targets addiction, diabetes, inflammatory diseases, and oncology, including minor molecule versions of marketed biologics. Its products include Orexin-1, NRF-2, GPR142, GLP-1, Anti-IL-17, SGC Collaboration, and Target 1.

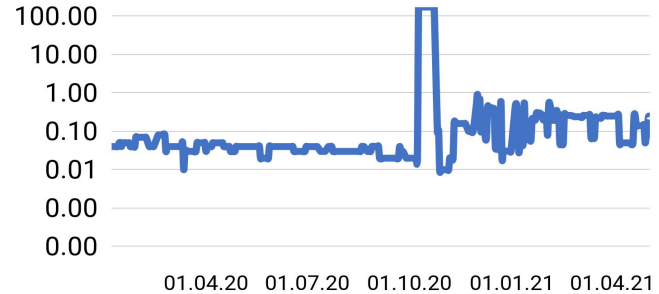


Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
C4XD.L	0.29%	5.44%	N/A	0.13



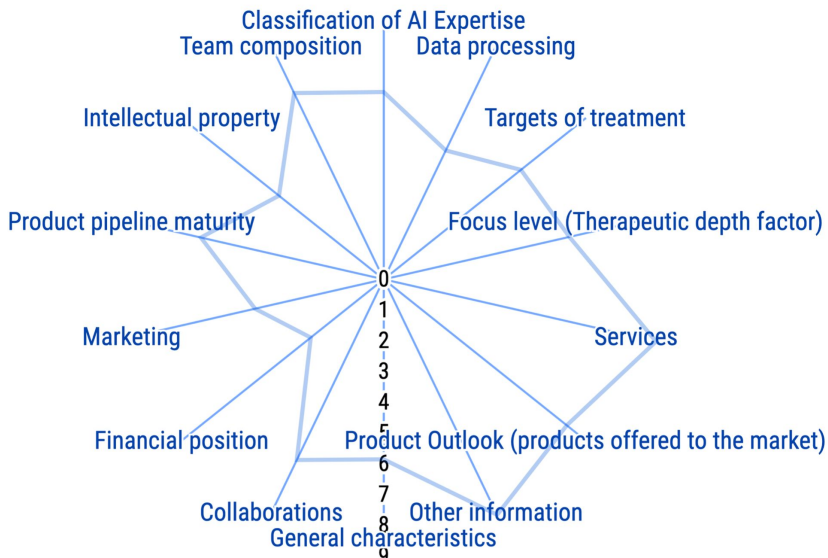
Cotinga Pharmaceuticals is a Canada-based clinical-stage biopharmaceutical company. The company's artificial intelligence platform, CHEMSAS, utilizes a series of predictive computer models to identify compounds with a high probability of being developed from disease-specific drug discovery through chemical optimization and preclinical testing. The company's initial focus is on advancing the treatment of cancer.

Stock price, \$

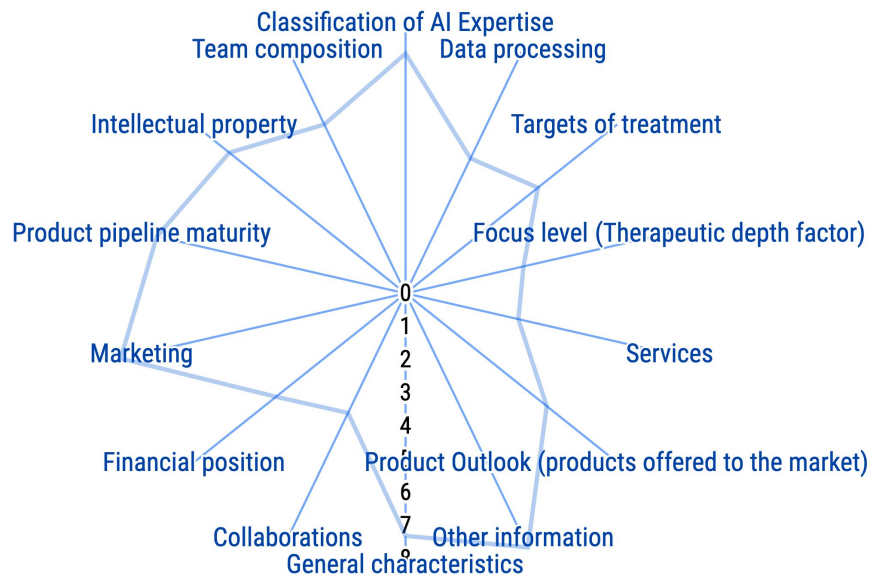


Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
COTQF	0.61%	55.23%	N/A	0.01

DeepMatter Group is a UK-based company engaged in digitization of chemical space coupled with chemical drug discovery through its subsidiary, Cronin 3D Limited (Cronin 3D). Cronin 3D is a spin-out company created to commercialize a platform technology to research and develop proprietary chemistry.



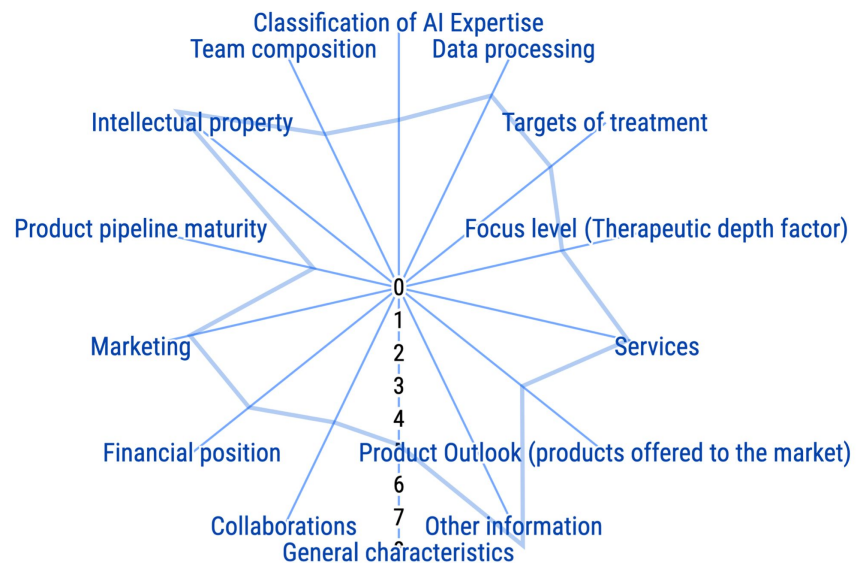
Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
DMTR.L	-0.08%	6.31%	N/A	0.03



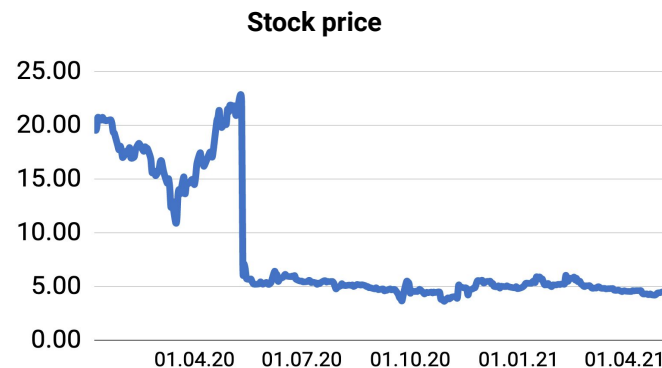
eTherapeutics is a UK-based company, which uses its Network-Driven Drug Discovery (NDD) platform to develop intellectual property protected and preclinical drug discovery programs. NDD enables network analysis, data mining, machine learning, artificial intelligence, and optimization to match drug-like small molecules to its networks based on their potential bioactivity.



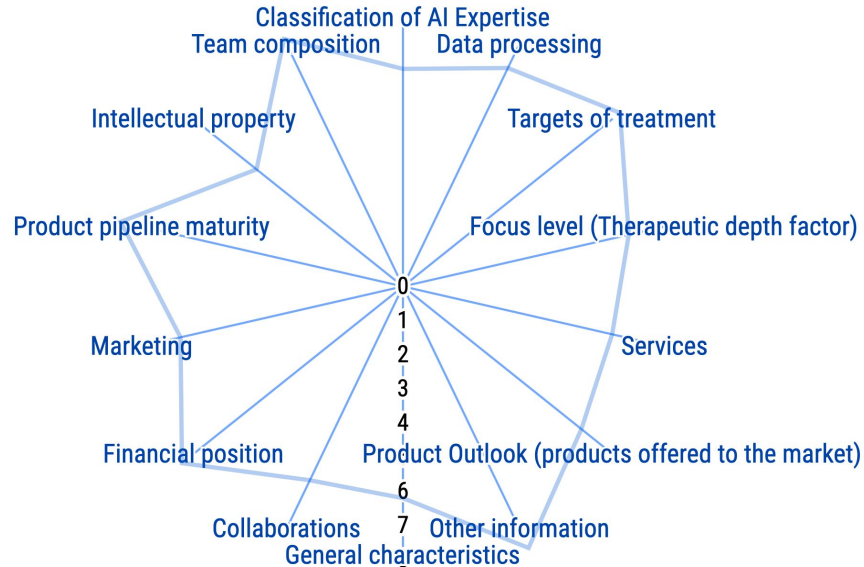
Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
ETX.L	0.58%	5.17%	N/A	0.17



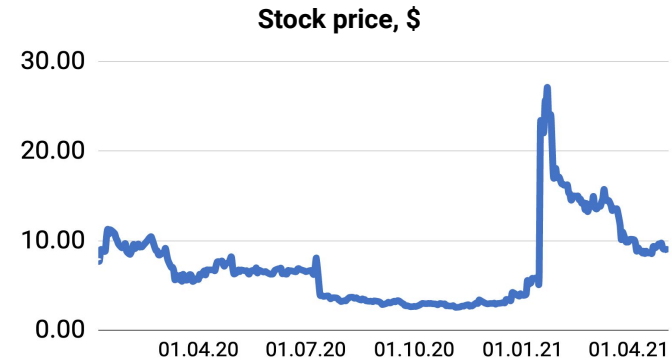
GenFit is a France-based biopharmaceutical company specializing in the development of medicines for the prevention and treatment of diabetes and related disorders. The company focuses on bringing drugs to market for patients with metabolic, inflammatory, autoimmune, and fibrotic diseases that affect the liver.



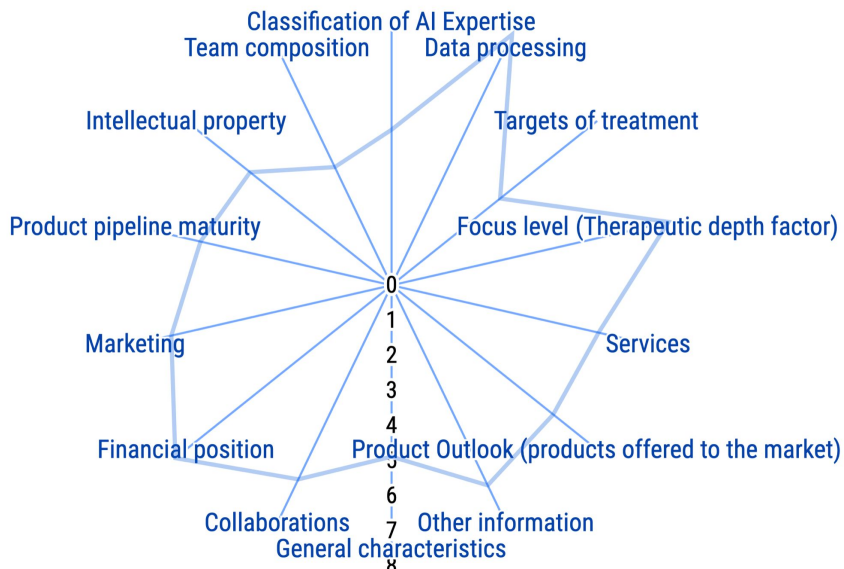
Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
GNFT	-0.50%	7.83%	N/A	0.20



Gritstone Oncology is an immuno-oncology company that develops tumor-specific cancer immunotherapies to fight multiple cancer types. The company focuses on identifying and deploying therapeutic neo-antigens from individual patients' tumors to develop treatments for lung cancer.



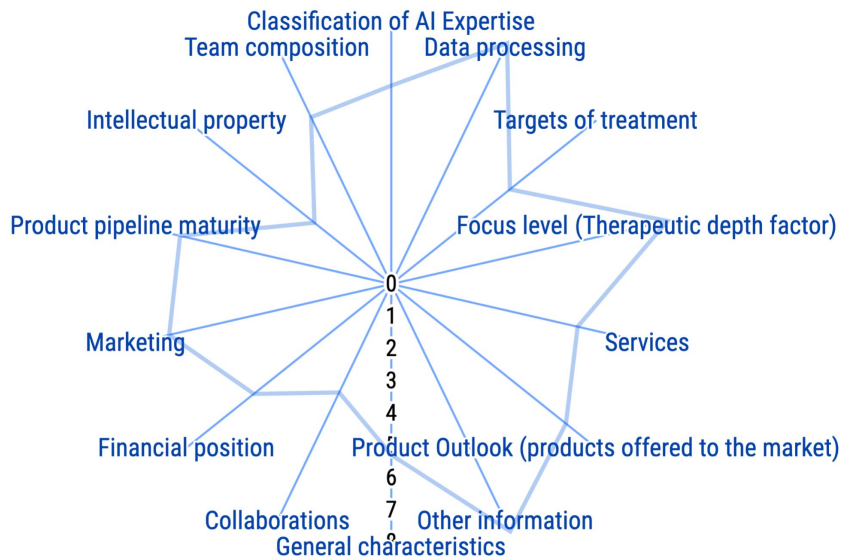
Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
GRTS	0.19%	8.65%	N/A	0.43



Lantern Pharma is a clinical-stage biotechnology company focusing on developing oncology therapies. It has its own artificial intelligence (AI) platform, RADR, which uses big data analytics to uncover biologically relevant genomic signatures correlated to drug response and then identify the cancer patients that benefits from its compounds.



Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
LTRN	0.16%	5.11%	27.09%	0.18

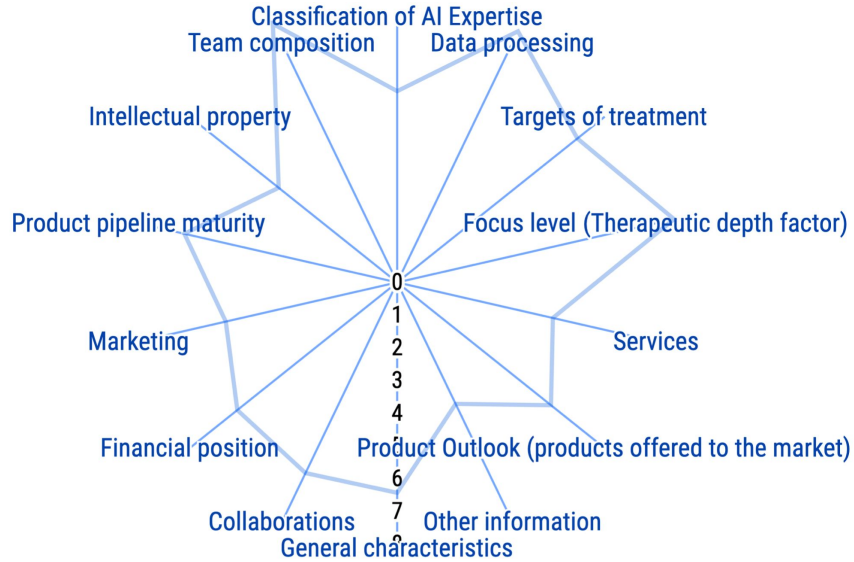


Pharnext is a France-based biopharmaceutical company focused on discovering, developing, and licensing new therapeutic solutions (Pleodrugs) and companion tests for unmet medical needs (large and niche markets) by using the Pleotherapy approach. The company's prime focus is on neurodegenerative diseases and metabolic diseases.

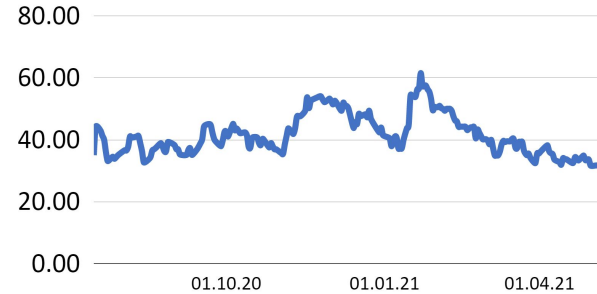


Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
ALPHA.PA	-0.23%	4.63%	N/A	0.09

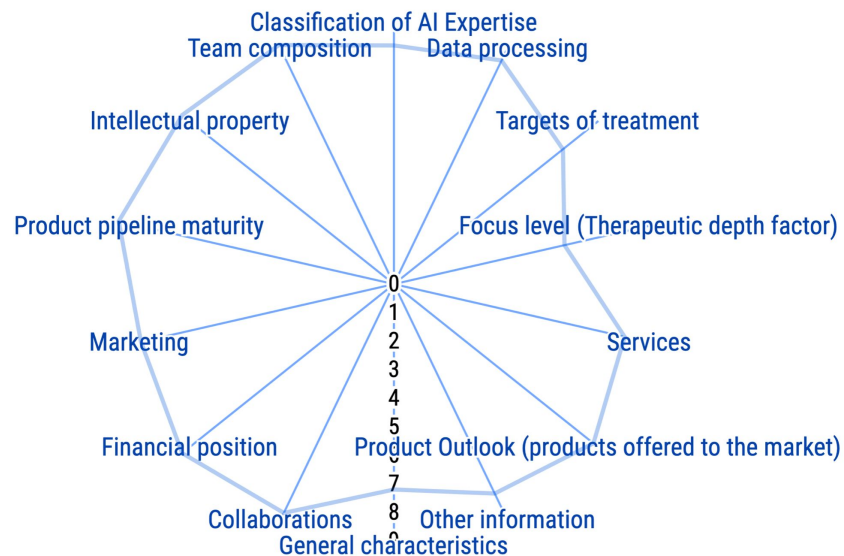
Relay Therapeutics is a clinical-stage precision medicines company focused on transforming the drug discovery process and enhancing small molecule therapeutic discovery in targeted oncology. The company is also developing a number of medicines for the needs of precision oncology.



Stock price, \$



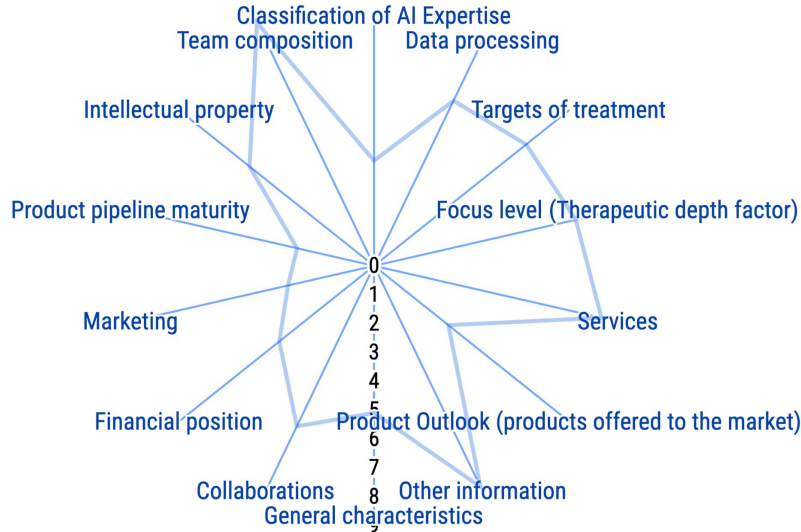
Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
RLAY	0.02%	4.59%	3.99%	2.78



Schrödinger’s industry-leading computational platform facilitates the research efforts of biopharmaceutical and industrial companies, academic institutions, and government laboratories worldwide. Schrödinger also has wholly-owned and collaborative drug discovery programs in a broad range of therapeutic areas.

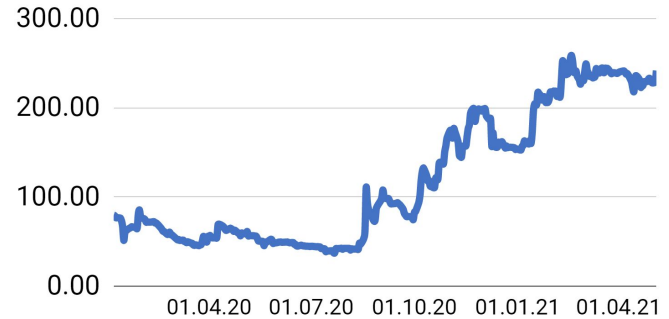


Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
SDGR	0.34%	6.03%	147.87%	4.95



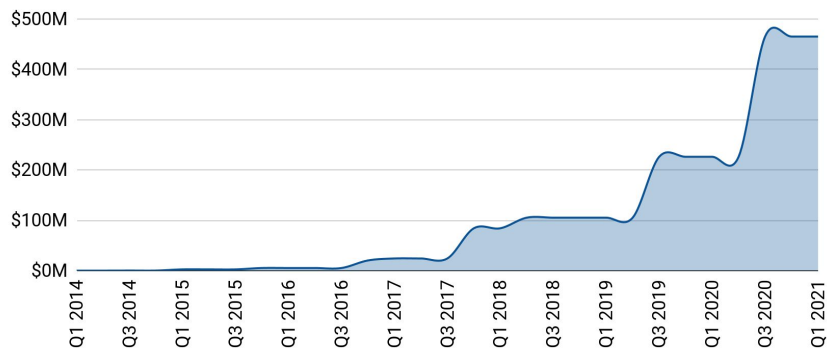
Sensyne Health is a UK-based healthcare technology company that provides digital health software products, such as SEND, EDGE: COPD, GDM-Health and Support-HF, and a software/device combination product (CleanSpace).

Stock price

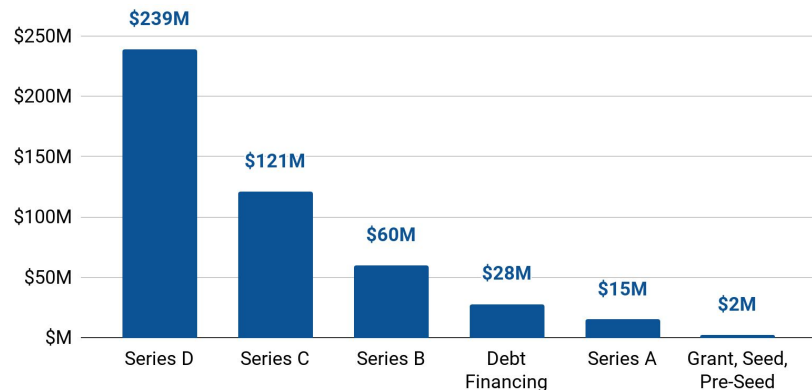


Ticker	Mean daily return	Volatility of daily returns	Growth after IPO	Capitalization (B\$)
SENS.L	0.28%	6.07%	N/A	0.40

Cumulative Funding Raised Over Time



Funding Types by Money Raised



Recursion Pharmaceuticals is a clinical-stage biotechnology company that uses Recursion Operating System (Recursion OS), a multi-layer system for generating, analyzing, and deriving insights from biological and chemical datasets. It consists of three parts: Infrastructure Layer, The Recursion Data Universe, and The Recursion Map. Its programs include REC-4881, REC-3599, REC-2282, REC-994, lead molecules for the treatment of C. difficile Colitis, lead molecules for the treatment of Neuroinflammation, lead molecules for the treatment of Batten Disease and lead molecules for the treatment of CMT2A.

On March 22, 2021, Recursion Pharmaceuticals filed for an **initial public offering**, seeking to **sell \$100 million worth of shares**; however, that figure is often a placeholder used to calculate filing fees. The company reported a net loss of \$2.4 million, or \$5.99 a share, on revenue of \$4 million in 2020, compared with a net loss of \$4.30 a share on revenue of \$2.3 million in 2019. The company is listed on **Nasdaq under the RXXR symbol**. Underwriters include Goldman Sachs and J.P. Morgan.

AI in Pharma Corporations Financials

Company	Capitalization (M\$)	Mean daily return	Volatility of daily returns	IBB Beta	S&P500 Beta	Total funding amount (M\$)	Operating margin	EV/ EBITDA	Net income (M\$)
Berkeley Lights	5648.00*	0.25%	4.79%	0.69	0.17	208.50	-53.81%	-225.63	-32.92
Biosesix	592.13	0.90%	7.73%	0.03	-0.27	188.80	-81.88%	-25.84	-33.34
C4X Discovery	74.69	0.46%	34.51%	0.92	0.47	6.81	0.00%	-6.53	N/A
Cotinga Pharmaceuticals	6.64	0.69%	5.31%	-0.04	-0.03	4.20	N/A	-0.44	N/A
DeepMatter Group	28.28	-0.01%	5.75%	0.10	0.09	N/A	-180.69%	-8.02	-2.53
eTherapeutics	108.39	0.68%	3.87%	1.10	0.97	66.80	-1335.74%	-18.31	-3.41
GenFit	212.20	-0.56%	2.90%	0.22	0.19	95.70	0.00%	-2.71	-65.14

* - All data were gathered by the 31.12.2020

The market capitalization of some AI-driven pharma corporations (such as Schrodinger) reaches \$6 billion. In contrast, other companies are priced in the range of dozens of millions of dollars. The difference in the valuation is immense. There is no strong correlation between operating margin or net income and market capitalization - the valuation of unprofitable corporations can exceed billion of dollars.

All companies are young and have a negative EV/EBITDA ratio. There is one company that has this indicator slightly below zero is Cotinga Pharmaceuticals.

Large
Medium
Low

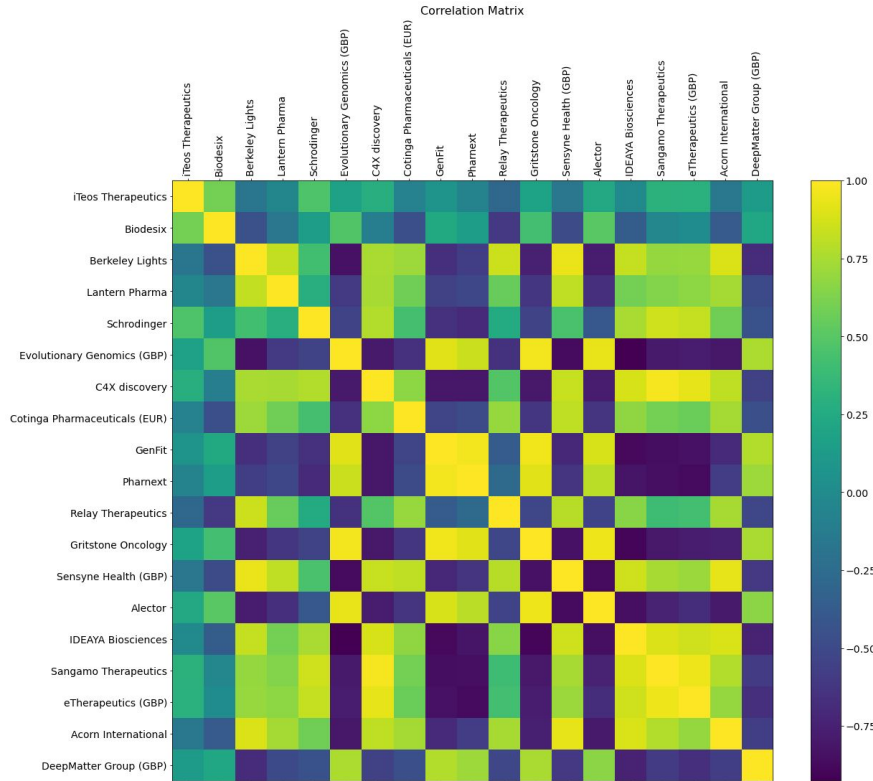
AI in Pharma Corporations Financials

Company	Capitalization (M\$)	Mean daily return	Volatility of daily returns	IBB Beta	S&P500 Beta	Total funding amount (M\$)	Operating margin	EV/EBITDA	Net income (M\$)
Gritstone Oncology	277.47	-0.17%	5.78%	0.79	0.75	341.00	-3000.64%	-2.05	-94.43
Lantern Pharma	118.13	0.17%	5.76%	0.59	0.30	8.70	0.00%	-25.35	-2.45
Pharnext	66.06	-0.20%	5.09%	1.92	1.89	45.70	-624.01%	-3.63	-23.31
Relay Therapeutics	3560.70	0.10%	6.43%	0.95	1.55	520.00	0.00%	-26.25	-111.60
Schrodinger	6223.83	0.45%	4.43%	0.34	0.04	562.30	-51.72%	-107.91	-20.09
Sensyne Health	259.10	0.25%	6.79%	0.57	0.19	37.48	-1026.29%	-6.63	-21.84
Recursion Pharmaceuticals	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

AI-driven pharma corporations tend to be more volatile than an average publicly traded company; however, higher returns compensate for it. For most corporations, daily returns are positive and abnormal (compared to the market). More volatile stocks are usually characterized by higher betas (both calculated for the IBB index and S&P500). Moreover, higher volatility tends to imply smaller current financial indicators. The AI segment is a segment of growth stocks where investors focus mostly on companies' prospects rather than on dividends.

Large
Medium
Low

Correlation Analysis of AI in Pharma Stocks



Unsurprisingly, most of the **AI in pharma stocks are positively correlated**. However, several companies, such as **GenFit and Pharnext**, tend to be **moving in the opposite direction** relative to the market.

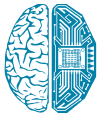
A typical correlation coefficient of 2 AI in pharma stocks lies in the range of 0.5-0.75; however, it can achieve the value of -0.8. **Correlated stocks tend to be the stocks of similar companies in terms of the product and technology.**

The **most volatile** AI in pharma stocks tend to be **C4X discovery, Berkeley Lights, Schrödinger, GenFit, Relay Therapeutics, Sensyne Health**. The majority of these companies have recently launched IPOs. Abnormal returns predominantly compensate for high volatility.

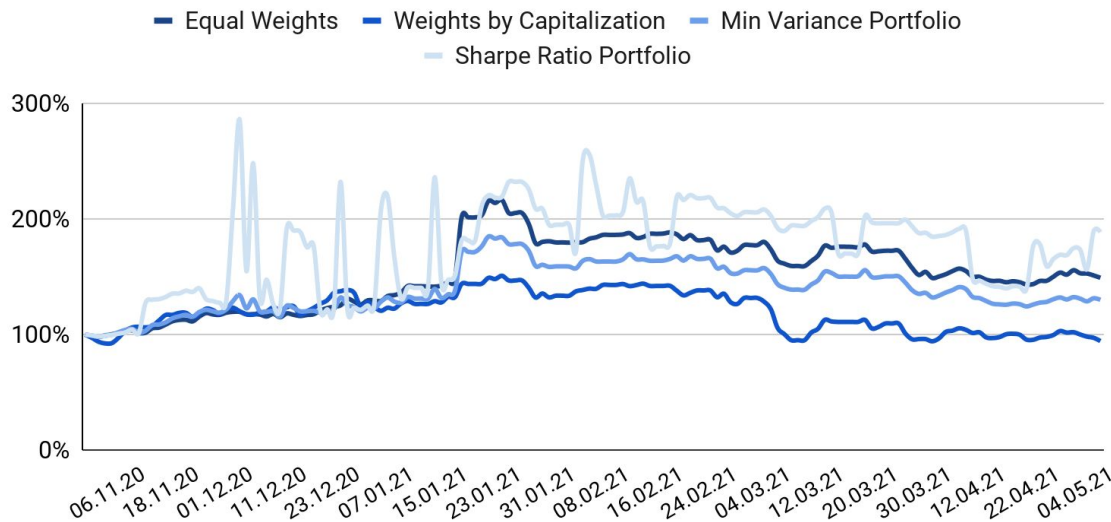
Although **negative profit margins still characterize almost all corporations**, stock dynamics demonstrate that investors believe in their prospects.

To some extent, the stocks are correlated with biotech indices (corresponding betas are in the range 0.2-0.6), whereas the correlation with the total market is predominantly low.

Portfolio Analysis



DEEP
PHARMA
INTELLIGENCE



Return Comparison	Equal Weight Portfolio	Capitalization Weight Portfolio	Minimum Variance Portfolio	Sharpe Ratio Portfolio
6-month Portfolio Returns	49.12%	-5.60%	30.06%	88.59%

The portfolio overview represents all portfolios built by DPI for AI in Pharma Companies.

Main news that affected the market:

- **Gritstone Oncology** achieved a threefold increase in the value of stocks over four trading days after entering into a licensing pact for an experimental Covid-19 vaccine. Meanwhile, the price moves back and finalizes with a twofold increase till March 2020.
- **Cotinga Pharmaceutical** published positive data from a preclinical study of COTI-2 (anti-cancer drug). After an announcement was made, its stocks grew in value and continued to fluctuate till March 2021.
- **Schrödinger** lost 38% of market capitalization after the announcement of the losses in the 2020 FY Report. Berkeley Lights and Relay Therapeutics also faced this tendency.
- The most stable companies within 2020-2021 are **Lantern Pharma, C4X Discovery, and eTherapeutics**.

Portfolio 1: Equal Parts Portfolio

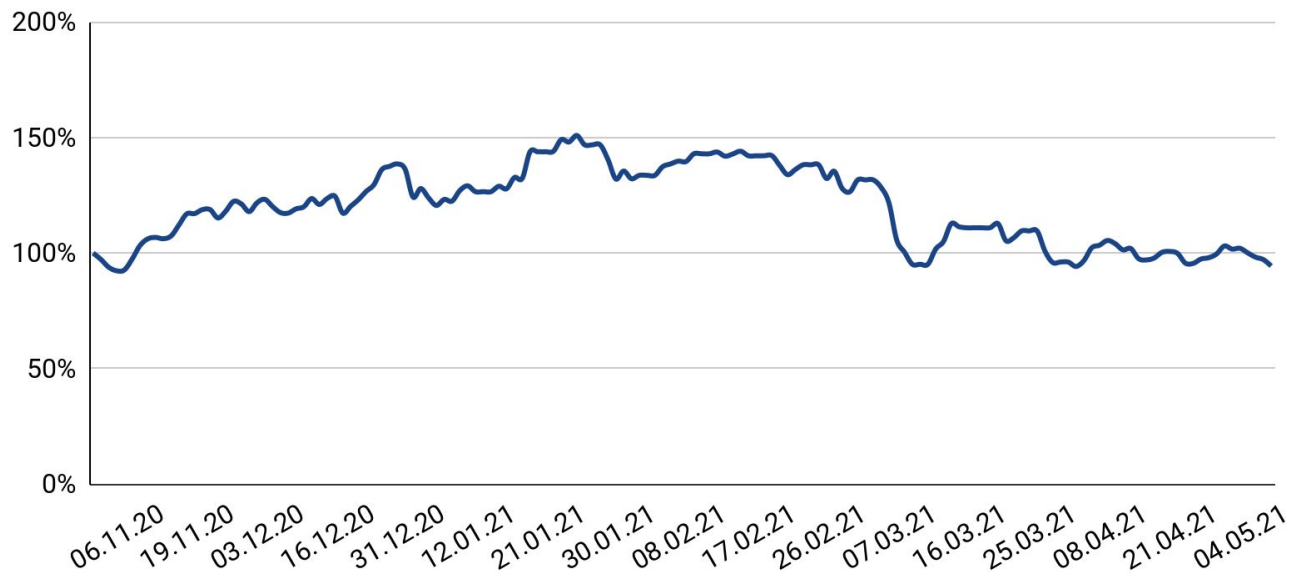


Average daily return in 2020	Average daily volatility in 2020	Skewness	Curtosis	6-month Growth
0.31%	3.55%	-0.07	-1.00	49.12%

Equal Parts Portfolio is the most straightforward representation of the average movement of the market.

The main fluctuation of this portfolio has been observed at the beginning of 2021. In January, Gritstone Oncology stocks skyrocketed after positive results of their preclinical trials had been published.

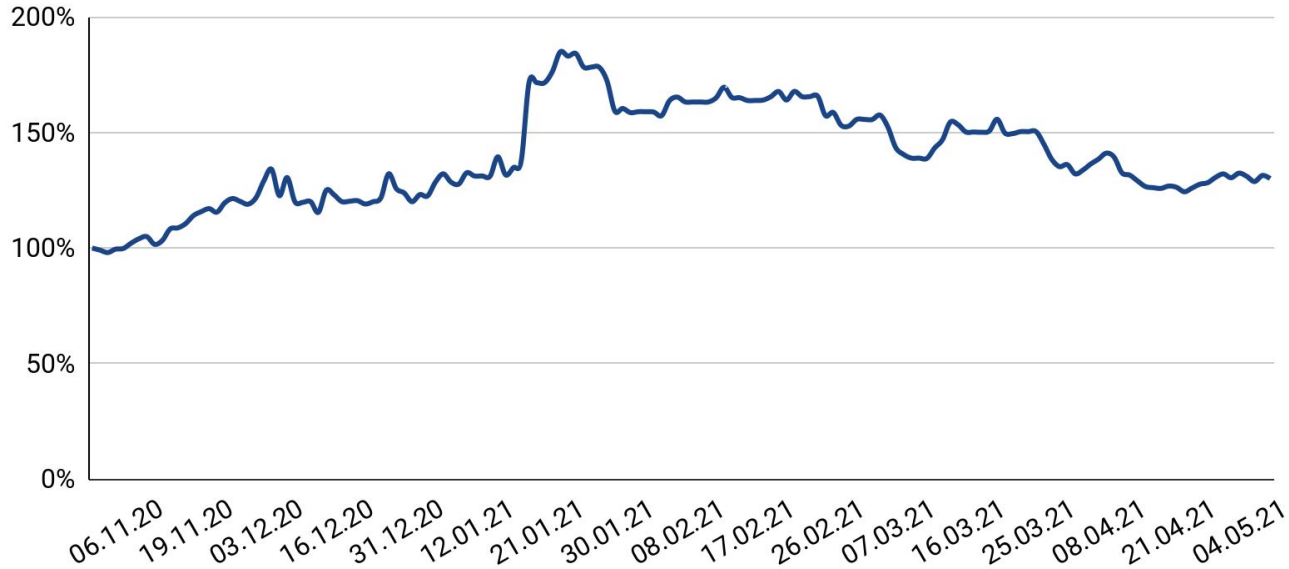
Portfolio 2: Capitalization Weight Portfolio



Average daily return in 2020	Average daily volatility in 2020	Skewness	Curtosis	6-month Growth
0.01%	3.03%	0.01	-1.30	-5.60%

Capitalization Weight Portfolio represents the movement of the biggest companies in the market. Despite increased interest in Berkeley Lights, Schrodinger, and Relay Therapeutics, their price fluctuations can be attributed to speculative operations without significant organic growth. As a result, after significant growth in 2020, a decline in the value of Schrodinger and Relay Therapeutics' shares led to a general decline in their portfolio growth.

Portfolio 3: Minimum Variance Portfolio

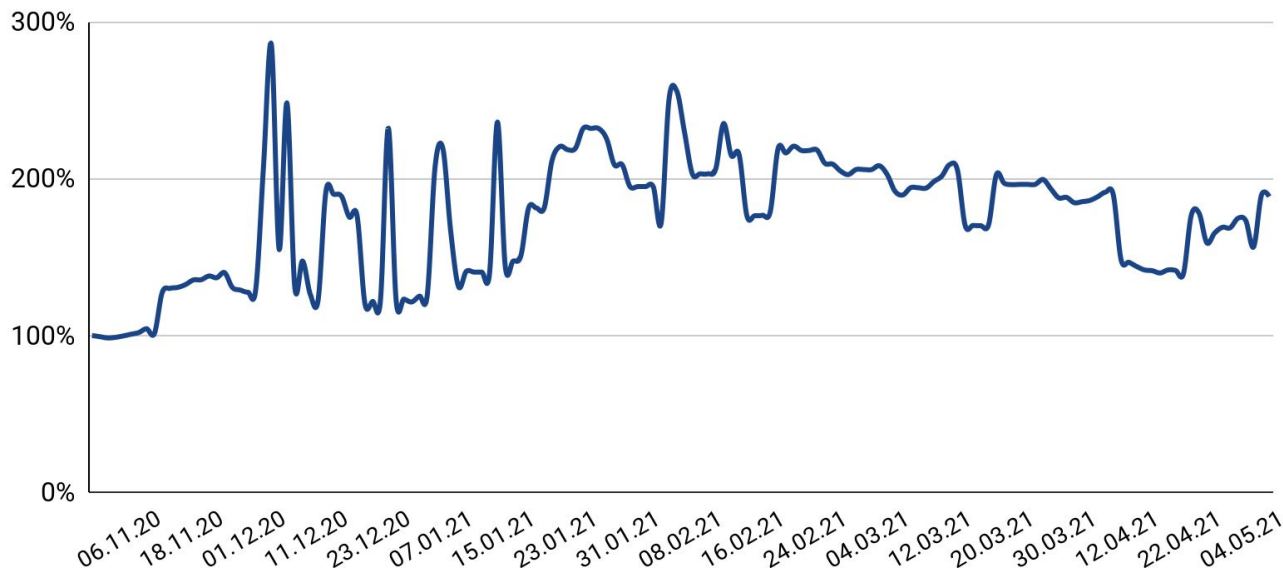


Average daily return in 2020	Average daily volatility in 2020	Skewness	Curtosis	6-month Growth
0.36%	3.62%	0.11	-0.81	30.06%

Minimum Variance Portfolio presents the least risky approach to investing in AI in Pharma companies.

This portfolio excluded Cotinga Therapeutics, with the majority of the stocks being issued by major companies. In comparison with Capitalization Weight Portfolio, greater diversification of small fast-growing companies allowed to increase the return of this portfolio.

Portfolio 4: Sharpe Ratio Portfolio



Average daily return in 2020	Average daily volatility in 2020	Skewness	Curtosis	6-month Growth
2.20%	19.14%	-0.14	-0.64	88.59%

Sharpe Ratio Portfolio presents the most effective approach to investing in AI in Pharma companies. With the highest volatility of stocks, it allows investors to get the highest return.

Affected by the fluctuation of small Cotinga Pharmaceuticals and growth of big players, such as Berkeley Lights it allows investors to get high income without exposing themselves to significant risks.

Key Market Takeaways



DEEP
PHARMA
INTELLIGENCE

Major Observations for 2020: Key Business Takeaways

1. **The segment of pharmaceutical AI continues consolidation** with a growing number of later stage mega-rounds, including those of Insitro (\$143M), Recursion Pharmaceuticals (\$239M), XtalPi (\$319M) and others. The AI startups pack is clearly differentiating into leaders, i.e companies that have developed substantial resources, financial leverage, and technological advantage. Others. I.e. companies with fewer resources and less mature technology and scientific assets are lagging behind. The latter are usually focused on narrow therapeutic or technological niches and are following service-oriented business models.
2. **Pharmaceutical AI sector is “heating up”**, and becomes a lucrative area for specialized biotech investors and organizations just entering the pharma space with the goal of including high-risk/high-return companies in their investment portfolios. This is backed by several observations, including an increase in investment activity in this sector in 2020, desire of leading pharma and contract research organizations (CROs) to compete for partnerships with AI-driven companies, and an increasing number of proof-of-concept breakthroughs confirming that AI technology has achieved substantial maturity to be able to bring tangible value for drug discovery – far beyond a simple optimization gain.
3. Driven by rapidly emerging evidence of the AI tech feasibility and innovation potential, **big pharma and contract research organizations increasingly compete for AI partnerships** and continue building in-house AI workflows. A number of highly notable proof-of-concept results were announced in 2019-2020.
4. **The COVID-19 pandemic appears to be a positive catalyst for the acceleration of AI adoption** by pharmaceutical organizations. This is primarily stipulated by the necessity to rapidly process vast amounts of data and come up with innovations under strict deadlines. Therefore, this urgency pushed companies and investors into more opportunistic projects than ever before.

Major Observations for 2020: Key Financial and Investment Takeaways

1. Due to the COVID-19 pandemic, **the biotech and drug discovery sectors are currently experiencing a dramatic growth**. During 2020, we have observed multiple medium and large funding rounds for biotech and drug design companies, especially those focused on antiviral therapies and vaccines.
2. A number of successful **AI-driven companies closed large-sum late-stage venture capital rounds (B, C, and D)** over 2019-2020, with several of them currently developing clinical stage drug candidates. We expect some of them to go public by 2021-2022.
3. In 2020, a notable IPO in the AI-driven drug design space took place: New York-based **Schrödinger closed its initial public offering in February, raising a total of \$232.3 million** in proceeds (more than had been planned originally).
4. 2020 was marked by a **“biotech IPO boom”** (non AI sectors), which was partly catalyzed by the COVID-19 pandemic (directly and indirectly).
5. After some of the companies close their IPOs in the near future, **a significant number of non-biotech investors are expected to enter the Life Sciences sector**.
6. Reflected in the increasing number of R&D partnerships between big pharma and CROs with AI-startups, the growing industry traction is a sign that **the market will soon be ripe for a rapid increase in M&A activity**.
7. Despite the crisis, publicly traded companies show rapid growth, reaching **\$62.8 billion in cumulative capitalization or 266.6% growth rate**.

Key Technology Takeaways

1. AI is regarded by some top executives at big pharma ([GSK and others](#)) as **a tool to uncover not only new molecules, but also new targets**. Ability of deep neural networks to build ontologies from multimodal data (e.g. “omics” data) is believed to be among the most disruptive areas for AI in drug discovery, alongside with data mining from unstructured data, like text (using natural language processing, NLP).
2. There is **a considerable trend for “AI democratization”** where various machine learning/deep learning technologies become available in pre-trained, pre-configured “of-the-shelf” formats, or in relatively ready-to-use formats – via cloud-based models, frameworks, and drag-and-drop AI-pipeline building platforms (for example, KNIME). This is among key factors in the acceleration of AI adoption by the pharmaceutical organizations – where a non-AI experts can potentially use fairly advanced data analytics tools for their research.
3. **Proof-of-concept projects keep yielding successful results** – in research studies, and in the commercial partnerships alike. For example, companies like Recursion Pharmaceuticals and Exscientia achieved important research milestones using their AI-based drug design platforms.

Obstacles That Still Remain

1. **Global shortage of AI talent** continues to be a serious challenge for the biopharma industry - a trend that was observed in our previous reports. While major pharmaceutical companies invest a lot of money in the recruitment of AI specialists, the majority of them end up working for large tech corporations (e.g. Google, Amazon, Alibaba, Tencent, Baidu and others). However, a growing number of specialized university programs and courses geared toward data science and AI application is projected to address this issue to a certain extent in the near future.
2. **Lack of available quality data is still a challenge for unleashing the full potential of deep learning technologies**. Numerous variations of deep learning (DL) are believed to be the most lucrative area for AI application (e.g. in drug discovery and clinical research). The key challenge here is that DL algorithms are “data-greedy”, while big data in biotech is not always suitable for modeling or is inaccessible due to privacy reasons.
3. **Ethical, legal, and regulatory issues for AI adoption in the pharmaceutical sciences**. This set of challenges is related to the previous point; however it also includes other questions: AI explainability, patentability of AI-generated results, non-optimal regulations in various countries, deceleration of progress and adoption of AI technologies, and more specifically, in the pharmaceutical industry.

AI in the Global Context

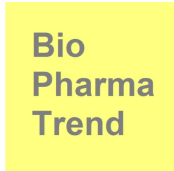
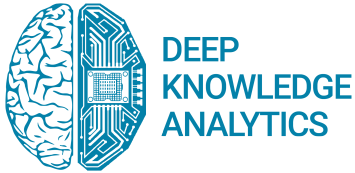
US is a main player in AI industry. In the beginning of AI implementation, US was a pioneer and then the main player with the greatest number of companies using AI to force R&D, research centres and institutes, and investments. However, we observe the increased level of the UK and EU activity through big corporations that use AI to reorganise drug discovery and in launching government initiatives. It is also important to note a great increase in activity from the Asia-Pacific region generally, and particular from China – AI superpower.

China engages in extensive investment activity. In particular, it has promised to invest \$5 billion in AI. Tianjin, one of the biggest municipalities, is going to invest \$16 billion in its local AI industry, and the Beijing authorities will build \$2.12 billion AI development project. China also has at least ten privately owned AI startups valued at more than US\$1 billion. Moreover, China has been heavily investing in biotech R&D, although lately a serious decrease in Chinese investment in US biotech startups has been observed which can be explained by the trade conflicts between the US and China.

China plans to become the world AI leader by 2030, according to the AI Strategic Plan released in July 2017. The analysis of the the Asia-Pacific region has shown that the main forciers of AI implementation include Saama Technologies, Inc., a leading clinical data analytics company. It has announced a collaboration with researchers at the Tufts Center for the Study of Drug Development to ascertain how biopharmaceutical companies optimize automation and information technologies, including machine learning and neural networks, to support the research and development of new therapeutics. Moreover, XtalPi provides a huge number of talent to work with machine learning, create drug discovery and development applications that predict the properties of small molecules. Another innovators of Asian AI industry are Cytlimic and Fujitsu that offer software for predicting how well compounds will bind with each other and proteins.

Europe has traditionally been a strong breeding ground for biopharma activity, with some recent large valuations and mega deals. The UK and EU activity in the pharmaceutical AI race is mainly boosted by Novartis that announced an important step in reimagining medicine by founding the Novartis AI innovation lab and by selecting Microsoft Corp. as its strategic AI and data-science partner for this effort. Furthermore, GlaxoSmithKline has announced a few deals with companies such as Exscientia, Insilico Medicine, Insilico Biotechnology to use new computer modelling systems. BenevolentAI, a global leader in the application of AI for scientific innovation, also has several high-profile research collaborations, including AstraZeneca, and licensed in a group of drugs to develop from Janssen in 2016. This all demonstrate that Pharma is increasingly turning to AI to transform the drug discovery process.

Deep Pharma Intelligence produces regular analytical reports on highly promising areas of pharmaceutical and healthcare industries, maintains ratings of companies and governments based on their innovation potential and business activity in BioTech, and provides strategic consulting and investment intelligence services to top-tier clients, including major investment funds, banks, family offices, insurance companies, government organizations, and big pharma companies. Deep Pharma Intelligence is a joint venture between two UK-based market intelligence hubs specializing in Pharma/ BioTech, namely:



Being a specialized subsidiary of Deep Knowledge Analytics (DKA), **Pharma Division of Deep Knowledge Analytics** (PD-DKA) is a leading analytical entity specializing in deep intelligence of highly promising areas in the pharma industry, including artificial intelligence (AI) for drug discovery sector.

Deep Knowledge Analytics Pharma Division is the main supplier of investment intelligence and analytics for AI-Pharma, a specialized index hedge fund for AI in the drug discovery sector. PD-DKA's insights are frequently covered by the top media, such as Forbes and the Financial Times, and acknowledged by top pharma executives.

Recently, MIT named this division a top technology think-tank, thus its development of an AI-based ranking framework.

BPT Analytics (BiopharmaTrend) is a rapidly growing analytical portal and media resource dedicated to tracking emerging companies (startups/scaleups), innovations, investments, and trends in the pharma and biotech space.

BiopharmaTrend's reports and articles have been repeatedly referenced by Deloitte, Forbes, and other high profile media and consulting companies.

BiopharmaTrend is a media partner to a number of top-tier conferences and symposia in preclinical and clinical research, and healthcare research.

Overview of Proprietary Analytics by Pharma Division of Deep Pharma Analytics

In matters related to investment, strategic positioning, and policy development in pharmaceutical, biotech research, and healthcare tech **Deep Pharma Intelligence (DPI)** is a strategic partner of the leading Life Science organizations, investment institutions (VC funds, investment banks), and governments.

While Deep Pharma Intelligence regularly produces freely accessible industry reports covering high-growth sectors in the Life Sciences, including artificial intelligence (AI), digital health, and new therapies, some of its more in-depth research (found under the “Proprietary Analytics” category) is only available to our clients and strategic partners.

Our proprietary services include consulting projects based on specific needs of our customers, as well as pre-produced and “ready-to-use” proprietary reports produced by our research team and covering general trends and specific actionable ideas and strategy insights related to the most promising investment prospects (e.g. new technologies, biotech startups), M&A prospects (e.g. pipeline development targets), and strategic growth ideas (trends profiling, industry overviews etc).

Services:

- Investment landscape profiling, identifying investment ideas in the biotech/healthcare tech space.
- Preliminary due-diligence (business, science and technology, intellectual property (IP) profiling, freedom of operation assessment, legal assessment etc).
- Comprehensive due-diligence (deep business, science and technology assessment, IP and legal assessment, growth potential assessment etc).
- Infringement analysis of technology (i.g. If you plan to partner or invest in a data-analytics biotech, or AI-development vendors, it is essential to understand their technological assets, both in terms of innovation potential and in terms of legal protection and non-infringement risk management).
- SWOT analysis of companies and technological sectors, as well as competitive profiling.
- Industry profiling and growth strategy development for top-tier companies and governments.

Overview of Proprietary Analytics by Pharma Division of Deep Pharma Analytics

Proprietary Reports

Containing 40+ pages, our reports provide practical answers to specific questions, aiming to optimize the short- and long-term strategies of biopharma corporations and other institutions related to the industry. Their updated editions are released each quarter, incrementally increasing the precision, practicality and actionability of the technological and financial analysis contained therein.

The reports are supported by our rapidly developing data mining engine, data visualization platform and analytics dashboards.



The value our reports can deliver:

- Deep analysis of deal-making prospects in biotech and healthcare tech, identification of top mini-trends and larger tendencies in innovations and technology adoption (e.g. AI, blockchain, eHealth tech, longevity biomarkers, new therapeutics and therapies etc.);
- 3- to 5-year forecasts, providing an overview of future scenarios of the development of various technologies in the pharma industry;
- Practical guidelines for adopting various technological solutions and best practises, vendor profiling and contract research strategy building;
- Analysis of key market players in the emerging and high-growth areas of the pharmaceutical and biotech industries.

By gaining early access to the reports, their readers will gain indepth insights into how their strategic agendas can be optimized. They will also be able to take advantage of novel research, new technologies, and emerging market opportunities. This will enable them to stay competitive in a rapidly-changing technological environment and be aware of the constantly changing global priorities and trends.

AI for Drug Discovery, Biomarker Development and Advanced R&D Landscape Overview 2020

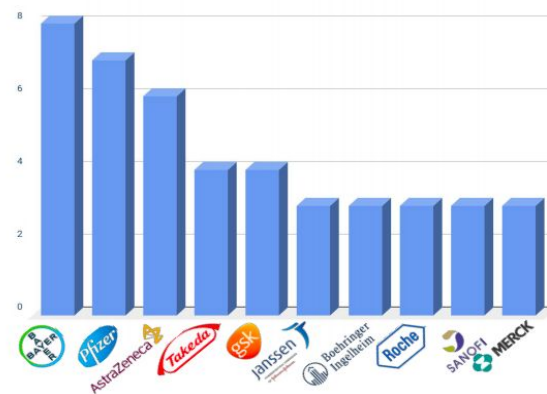
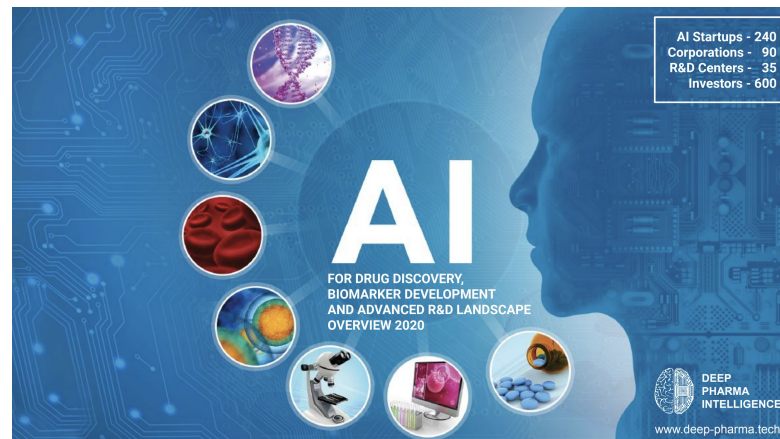
[“AI for Drug Discovery, Biomarker Development and Advanced R&D Landscape Overview 2020”](#)

Called “AI for Drug Discovery, Biomarker Development, and Advanced R&D Landscape Overview 2020”, our 130-page report provides its readers with advanced market intelligence, interactive mind maps, benchmarking for companies, investors and technologies, competitive and SWOT analysis done with the help of our interactive IT-Platform and Big Data analytical Dashboard.

Its most recent edition includes insights into **more than 240 biotech companies, 600 investors, 90 pharma corporations, and 35 R&D centers** in the area of pharmaceutical and healthcare artificial intelligence (AI).

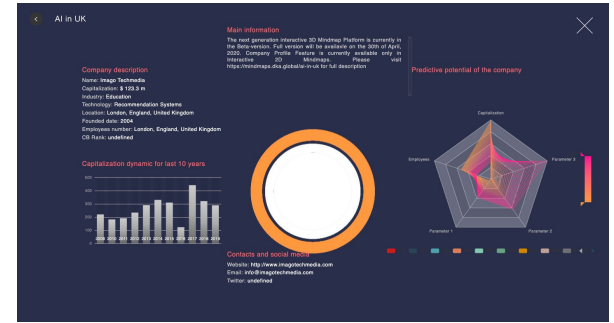
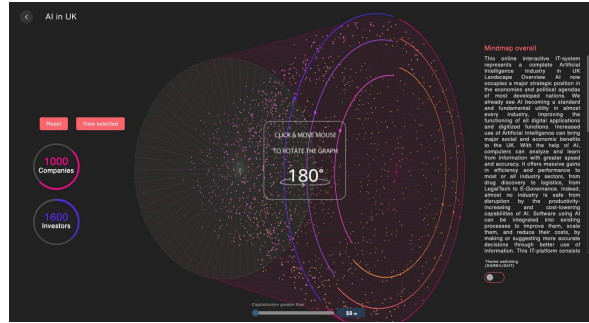
Some of its key takeaways include:

- The segment of pharmaceutical AI is continuing its consolidation;
- Pharmaceutical AI sector is “heating up” for investments;
- Big pharma and contract research organizations are increasingly competing for AI partnerships;
- The sector of pharmaceutical AI will be ripe for a likely wave of IPOs and M&As by 2021-2022;
- COVID-19 pandemics appears to have become a positive catalyst for the acceleration of AI adoption;
- Reflected in the increasing number of R&D partnerships between big pharma and CROs with AI-startups, the growing industry traction is a sign that the market will soon be ripe for a rapid increase in M&A activity;
- Despite the crisis, publicly traded companies are showing rapid growth, having achieved \$62.8 billion of cumulative capitalization or a 266.6% growth rate.

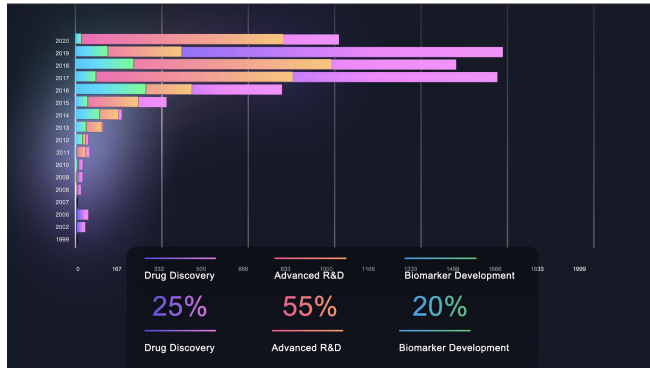


Top 10 Leading Corporations by The Number of Major Pharma AI Deals

Deep Pharma Intelligence: Upcoming Projects and Analytical Tools



3D Visualisation Prototypes



Deep Pharma Intelligence Big Data Analytics Dashboard

Deep Pharma Intelligence: Upcoming Projects and Analytical Tools



Deep Pharma Intelligence Big Data Analytics Dashboard

Landscapes Analytics

AI in Pharma 2020 Industry Landscape

Mindmap (Sectors)

Mindmap (Sub-Sectors)

Mindmap (Regions)

AI in Pharma Industry Landscape



[View More](#)

Dashboard Parameters

COMPANIES

286

INVESTORS

733

R&D DEALS

117

FUNDING
ROUNDS

592

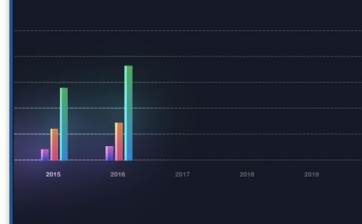
PARAMETERS

4192

DATA POINTS

43000+

Industry Growth Dynamics



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[Investment Digest](#)

[Funding Rounds](#)

[Deals](#)

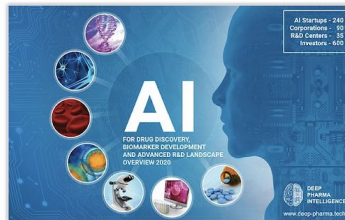
Industry Developments

[Matching Tool](#)

[Downloadable Materials](#)

[FAQ](#)

Industry Report 2020



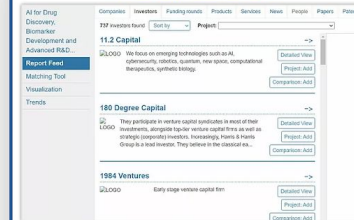
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Industry Database



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AI in Drug Discovery

[Business Trends](#)

[Investment Trends](#)

[Technology Trends](#)

[Current Challenges](#)

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www.deep-pharma.tech/dashboard

Deep Pharma Intelligence: Platform Features

Deep Pharma Intelligence

AI database | Admin area | **Workzone** | BiopharmaTrend

Back to Mainpage - A Landscape of Artificial Intelligence (AI) in the Pharmacoe - Visualization: Companies

7400+ biotech companies, vendors, CROs, and more

AI Companies (Drug Discovery) | Companies | Investors | Funding Rounds | Collaborators | Countries | Papers

Report Feed | Matching Tool | Visualization

Companies: top 20 | sorted by: Funding | Get

Project: --select project--

Number of Companies vs Year

Chart Parameters:

- Main category: Year founded
- Secondary category: --select category--

Filters:

- Region: --select--
- Country: --select--

Show filters in iframe

Type of chart: on development

Build Chart

API URL: <https://api.biopharmatrend.com/api/v1>

Company list (top 20):

- Tempus
- Recursion Pharmaceuticals
- WuXi NextCODE
- Fatiron Health
- Ericasca
- Bioventural
- Hydro
- Berkeley Lights
- CaribonX
- Alomwise
- Concetto HealthAI
- BlackThorn Therapeutics
- Excilienta
- AI Therapeutics
- Foundation Medicine
- Action
- Emerald Cloud Lab
- PathAI
- CGT
- GNS Healthcare

AI Companies (Drug Discovery)

Search company title

Report Feed | Matching Tool | Visualization

Insilico Medicine

Insilico Medicine, an artificial intelligence company headquartered in Boston, MA, pioneered the applications of the generative adversarial networks (GANs), reinforcement learning, transfer learning and meta-learning for generation of novel molecular structures for the diseases with known and unknown targets, and, unlike the other companies in the field, is developing the end-to-end pipeline covering every step of drug discovery, clinical trials analysis and digital medicine. Insilico Medicine is pursuing internal drug discovery programs in cancer, dermatological diseases, fibrosis, Parkinson's Disease, Alzheimer's Disease, ALS, diabetes, sarcopenia, and aging. Through a partnership with Life Extension, the company launched a range of nutraceutical products, which were compounded using the advanced bioinformatics techniques and deep learning approaches. It also provides a range of consumer-facing applications including Young AI.

Founded 2014 | Funding \$51.200 M | Status Private company

Website <http://www.insilico.com/> | Patents 7 | Research papers 75

Insilico Medicine's Investors

- A-Level Capital
- Baidu Ventures
- Bold Capital Partners
- Deep Knowledge Ventures
- Eight Roads Ventures
- F-Prime Capital
- Formic Ventures
- Juvenescence
- Lily Asia Ventures
- Longevity Vision Fund
- Pavilion Capital

Insilico Medicine's Competitors

- Genialis
- Engine Biosciences
- E-Therapeutics
- Engine Precision Medicine
- Nano Therapeutics
- Anima Biotech
- Intomics
- Eurotas
- Cellarity
- Cloud Pharmaceuticals
- Foundation Medicine

Investors into Insilico Medicine's Competitors

- 500 Startups
- 6 Dimensions Capital
- AME Cloud Ventures
- ARCH Venture Partners
- Alexandria Real Estate Equities
- Alexandria Venture Investments
- Allen & Company
- Alum Ventures Group
- Amplify Partners
- Baidu Ventures
- Baillie Gifford

AI Companies (Drug Discovery)

Companies | Investors | Funding Rounds | Collaborators | Countries | Papers

Report Feed | Matching Tool | Visualization

Diagram Builder

Chart Parameters:

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- Secondary category: --select category--

Filters:

- Region: --select--
- Country: --select--

Show filters in iframe

Type of chart: on development

Build Chart

API URL

iframe snippet

Back to Mainpage - AI in Drug Discovery: Biomarker Development and Advanced R&D - Report Feed

7400+ biotech companies, vendors, CROs, and more

AI for Drug Discovery, Biomarker Development and Advanced R&D Landscape Overview 2020

Companies | Investors | Funding rounds

258 companies found | Sort by

A2A Pharmaceuticals

A2A PHARMACEUTICALS

A2A Pharmaceuticals of innovative science

Report Feed | Matching Tool | Visualization

AI Therapeutics

AI Therapeutics

We are an AI-driven and precision approach to drug critical trials. AI.

Accutar Biotech

Accutar Biotech empowers capabilities to use AI/ML property computation.

Acellera

Acellera is a biotech company and applications. By using Molecular Dynamics, Machine learning and exploring the

A2A Pharmaceuticals

Overview | SWOT Analysis | Products | Services | Brand and PR | R&D | People | Sales | Deals

Combined | Reports

A2A Pharmaceuticals

Year Founded: --select--

Total Funding: --select--

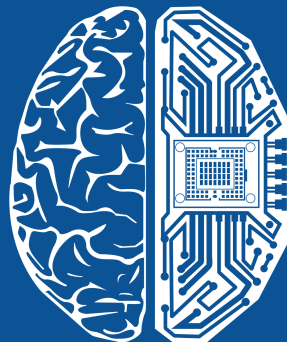
Business State: --select--

Region:

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- South and Central America
- Europe
- Middle East and Africa
- Asia-Pacific

Country:

- United States of America
- United Kingdom
- Canada
- Netherlands
- France
- Israel
- China
- Japan



Link to Full Report:

<http://analytics.dkv.global/deep-pharma/AI-for-Drug-Discovery-2020.pdf>

E-mail: info@deep-pharma.tech

Website: deep-pharma.tech

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