

Biopharma deals of 2020 break through

The COVID-19 pandemic dealt a blow to the deals landscape in early 2020, but the sector bounced back.

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As lockdowns aimed at handling the COVID-19 pandemic swept the world during the first quarter of 2020, new dealmaking trends began to emerge. Competitors partnered for the first time, never-before-seen deals were penned and other deals were agreed in record time. With the help of biotech database DealForma, we overview dealmaking in a year dominated by the pandemic, including a highlight of activity in the respiratory disease area.

The deals landscape—aside from those fast-tracked to tackle COVID-19—almost ground to a halt as global lockdowns struck in March and April. The number of mergers and acquisitions (M&As) also declined as the pandemic took hold, but recovered and started to increase in frequency as some restrictions lifted. Venture investment continued to flow throughout 2020, and some

therapy areas, such as immuno-oncology (IO), continued to thrive despite the pandemic; the number of IO drugs in development increased by 22% compared with 2019 (*Nat. Rev. Drug Discov.* **19**, 751–752; 2020).

High-value licensing deals

As some lockdowns began easing from May, dealmaking started to accelerate, with larger upfront payments being made for earlier-stage development deals. In July, the highest value deal of 2020 was signed between AstraZeneca and Daiichi Sankyo for the development and marketing of DS-1062, an antibody–drug conjugate (ADC) targeting TROP2 that was then in phase 1 development to treat multiple tumor types including lung and breast cancer (Table 1). AstraZeneca made an upfront payment

Table 1 | Top ten R&D biopharma therapeutics and platforms partnerships in 2020 by deal value

Seller	Buyer	Date announced	Total deal value (\$ million)	Upfront cash and equity (\$ million)	Total milestones (R&D, Sales; \$ million)	Stage at signing/asset
Daiichi Sankyo	AstraZeneca	27/07/2020	\$6,000	\$1,000	\$5,000	Phase 1/DS-1062, an ADC directed at TROP2 for multiple tumors
Seagen (formerly Seattle Genetics)	Merck & Co.	14/09/2020	\$4,200	\$1,600	\$2,600	Phase 2/ladiratumzumab vedotin, an ADC targeting LIV1 for breast cancer and other solid tumors
Genmab	AbbVie	10/06/2020	\$3,900	\$750	\$3,150	Phase 1/epcoritamab (DuoBody-CD3xCD20), DuoHexaBody-CD37, and DuoBody-CD3x5T4 for hematological cancers; options for additional programs
Alteogen	Undisclosed 'Top ten pharma'	24/06/2020	\$3,881	\$16	\$3,865	Platform/ALT-B4 Hybrozyme, hyaluronidase-derived technology for subcutaneous administration of biologics
Fate Therapeutics	Janssen Biotech	02/04/2020	\$3,100	\$100	\$3,000	Preclinical-IND/four iPSC-derived CAR NK and CAR T cell therapies for hematologic cancers and solid tumors
Repare Therapeutics	Bristol Myers Squibb	26/05/2020	\$3,065	\$65	\$3,000	Platform/SNIPRx synthetic lethal discovery platform for cancer
Sangamo Therapeutics	Biogen	27/02/2020	\$2,720	\$350	\$2,370	Preclinical/ST-501 for tauopathies; ST-502 for synucleinopathies; and a third, undisclosed neuromuscular disease target, plus up to nine additional undisclosed neurological disease targets using ZFP technology
Nurix Therapeutics	Sanofi	09/01/2020	\$2,555	\$55	\$2,500	Platform/DELigase platform for three targets, plus options to five additional programs
Taiho Pharmaceutical	Merck & Co.	06/01/2020	\$2,550	\$50	\$2,500	Discovery/small molecule and data for the treatment of cancer
Denali Therapeutics	Biogen	06/08/2020	\$2,150	\$1,025	\$1,125	Phase 1/DNL151 small molecule LRRK2 inhibitor for Parkinson disease

ADC, antibody–drug conjugate; CAR, chimeric antigen receptor; iPSC, induced pluripotent stem cell; IND, investigational new drug; NK, natural killer; ZFP, zinc finger protein.

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of \$1 billion to Daiichi Sankyo and committed to paying up to \$5 billion in commercial and sales milestones.

Table 1 shows that many of the year's highest-value deals were focused on oncology treatments. The second largest deal was a partnership between Merck & Co. and Seattle Genetics Inc. (now known as Seagen) in a development deal for ladiratuzumab vedotin, a LIV1-targeting ADC in phase 2 trials to treat solid tumors including breast cancer. The deal involved Merck buying a \$1 billion equity stake in Seagen, with further payment milestones down the line worth up to \$2.6 billion. Bispecific antibodies—another platform that has attracted a lot of recent attention—were the focus of the third most valuable deal, in which AbbVie agreed to pay Genmab \$750 million upfront and up to \$3.15 billion in milestones to partner on bispecific antibodies, including the leading candidate epcoritamab, which is in phase 1/2 development for blood cancers.

Outside of oncology, there were a couple of high-value deals focused on neurodegenerative disorders, both involving Biogen. In February, the company announced a deal worth up to \$2.7 billion to gain rights to license, develop and commercialize preclinical gene regulation therapies identified by Sangamo Therapeutics for neurological diseases including Alzheimer and Parkinson diseases. And in August, Biogen teamed up with Denali Therapeutics in a deal worth \$2.1 billion to co-develop small-molecule drugs for Parkinson disease that target *LRRK2* gene mutations, including a phase 1 small-molecule *LRRK2* inhibitor DNL151.

Slow-start M&As accelerate

M&A activity started steadily in 2020 but at lower volumes than in Q1 2019. Mega mergers were also scarce, but, as the year progressed, activity started to pick up. The largest acquisition of 2020 was Gilead Science's purchase of Immunomedics for \$21 billion in September, which gave Gilead access to the TROP2-targeted ADC Trodelvy (sacituzumab govitecan), a rival to Daiichi's DS-1062 that was approved by the US Food and Drug Administration (FDA) in April to treat triple-negative breast cancer (Table 2).

In October, Bristol Myers Squibb (BMS) purchased cardiovascular therapeutics company MyoKardia for \$13 billion, giving BMS MyoKardia's lead drug candidate mavacamten. The myosin inhibitor is in late-stage development for hypertrophic cardiomyopathy and is expected to be submitted for FDA approval in 2021. Late-stage assets also drove a number of other M&As in the immunology area. Janssen Pharmaceuticals signed the third highest value acquisition when it bought Momenta Pharmaceuticals, gaining the autoimmune disease candidate nipocalimab, an anti-FcRn monoclonal antibody that has completed phase 2 trials for myasthenia gravis, which is also predicted to have blockbuster potential. Sanofi's \$3.7-billion acquisition of Principia Biopharma

brings a portfolio of candidates for autoimmune disease, including the BTK inhibitor rilzabrutinib currently in phase 3 trials. Finally Palforzia, the first approved oral immunotherapy for peanut allergy, no doubt fuelled Nestle's \$2.6 billion acquisition of Aimmune Therapeutics in August.

A number of significant medical device industry M&As were also signed this year including Teladoc's \$18.5-billion merger with Livongo Health in the virtual care field, which has become increasingly important given the challenges that COVID-19 has posed for in-person care. Teladoc, a specialist in telehealth, announced the merger in August and it was completed by late October. Three of the other top five M&As focused on cancer diagnostics, with the largest being Siemens Healthineers' \$16.4 billion all-cash acquisition of oncology systems and software company Varian Medical Systems.

COVID-19 takes hold

Many partnerships were established in 2020 to tackle the coronavirus pandemic, including vaccine development, diagnostics and treatments to test for and manage COVID-19 (*Biopharma Dealmakers* B18–19; June, 2020).

Deals started to trickle in through Q1, beginning as early as January when the Coalition for Epidemic Preparedness and Innovations—set up in 2017 to coordinate the work of public, private, philanthropic and civil organizations for vaccine development to stop epidemics—partnered with both Moderna Therapeutics and Curevac among others to provide funding to develop their respective vaccine candidates. The US Biomedical Advanced Research and Development Authority also funded a host of companies developing a vaccine candidate.

The volume of COVID-19 deals gained momentum by the end of Q1. Sanofi and GlaxoSmithKline joined forces for the first time in a partnership that combined Sanofi's spike protein antigen with GlaxoSmithKline's adjuvant technology. A number of the partnerships on vaccine candidates that are now close to the end of phase 3 trials were also signed in the first half of the year, including one signed in April between AstraZeneca and the University of Oxford on their adenovirus vector-based vaccine and another between Pfizer and BioNTech signed in March on their mRNA-based vaccine that has recently become a front runner in the vaccine race after announcing promising phase 3 trial results.

Partnerships on antibody candidates have also been prominent (*Biopharma Dealmakers*, B3–5; September 2020), such as those Regeneron signed with the US government public-private partnership Operation Warp Speed to supply its antibody candidate REGN-COV2 and with the National Institute of Allergy and Infectious Diseases (NIAID) to conduct COVID-19 prevention trials. Partnerships have been instrumental in tackling COVID-19 and have accelerated the development of treatments and vaccines.

Table 2 | Top ten biopharma merger and acquisitions (M&As) in 2020

Date announced	Seller	Buyer	Leading asset stage	Total deal value (\$ million)	Upfront cash and equity (\$ million)
13/09/2020	Immunomedics	Gilead	Marketed	\$21,000	\$21,000
05/10/2020	MyoKardia	BMS	Phase 3	\$13,100	\$13,100
19/08/2020	Momenta Pharmaceuticals	Janssen/J&J	Phase 3	\$6,500	\$6,500
02/03/2020	Forty Seven	Gilead	Phase 1b	\$4,900	\$4,900
26/10/2020	Asklepios BioPharmaceutical	Bayer	Phase 1/2	\$4,000	\$2,000
17/08/2020	Principia Biopharma	Sanofi	Phase 3	\$3,360	\$3,360
31/08/2020	Aimmune Therapeutics	Nestle	Marketed	\$2,600	\$2,600
11/06/2020	Corvidia Therapeutics	Novo Nordisk	Phase 2b	\$2,100	\$725
05/05/2020	Portola Pharmaceuticals	Alexion Pharmaceuticals	Marketed	\$1,410	\$1,410
10/01/2020	Dermira	Eli Lilly	Phase 3 + marketed	\$1,100	\$1,100

Respiratory disease deals in 2020

The COVID-19 pandemic caused some areas to see a decline in deals, but the number of deals in the respiratory disease area increased substantially, as COVID-19 infection can cause severe respiratory disease and exacerbate existing conditions such as asthma and chronic obstructive pulmonary disease (COPD). According to DealForma, more than 300 respiratory disease-related deals—many focused on COVID-19—have been signed since the start of 2020, compared to 44 deals announced in 2019.

The majority of respiratory disease deals were signed at the platform/discovery stage (Fig. 1) as companies looked to develop vaccine candidates and antibody treatments based on emerging knowledge about the virus. Most deals were signed for vaccines, followed by small molecules, antibodies and diagnostics (Fig. 2).

Looking past COVID-19, many companies have signed other respiratory disease-related deals (Table 3), although some are not focused on respiratory diseases alone. Oneness Biotech granted LEO Pharma worldwide rights to develop and commercialize FB825, a monoclonal antibody that targets membrane-bound IgE, in a deal potentially worth up to \$610 million. LEO Pharma will take over development responsibilities for FB825, once a phase 2a trial run by Oneness in atopic dermatitis and a phase 2a trial in allergic asthma run by Microbio Shanghai are completed. And in a deal worth approximately \$268 million, Curadev granted Bayer rights to develop small-molecule STING antagonists for the treatment of lung, cardiovascular and other inflammatory diseases.

Deals involving technologies to deliver novel therapies to the lung have also been signed. Vertex Pharmaceuticals partnered with Moderna Therapeutics to develop and commercialize lipid nanoparticles and mRNAs for the delivery of gene-editing therapies for the treatment of cystic fibrosis in deal worth up to \$455 million. Within the deal, Moderna will develop a lipid nanoparticle delivery system and mRNAs, and Vertex will manage the preclinical, clinical development and commercialization of the therapies.

Finally, via a deal signed in March with undisclosed terms, Vir Biotechnology has collaborated with Alnylam Pharmaceuticals to explore the development of ‘inhaled RNA’, focusing on lung-targeted small interfering RNA conjugates against SARS-CoV-2 and other coronaviruses (*Nat. Biotech.* 38, 1110–1112; 2020).

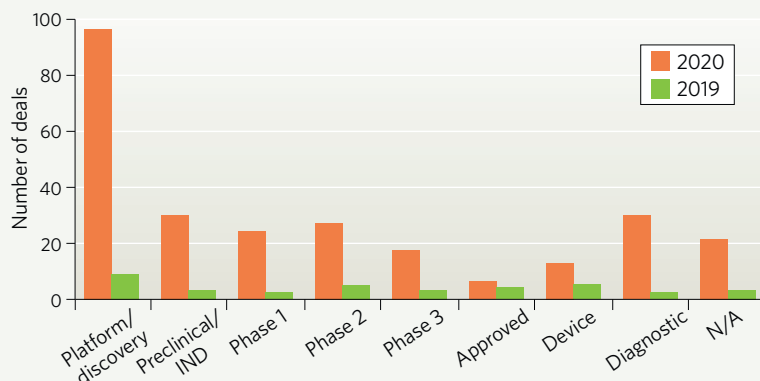


Fig. 1 | Respiratory disease type deals by development stage (January 2019–October 2020). IND, investigational new drug.

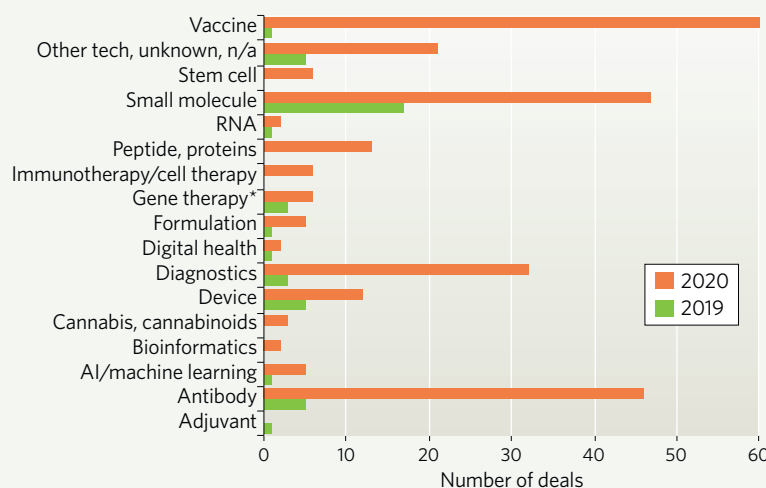


Fig. 2 | Respiratory disease deals by primary technology type (January 2019–October 2020). *Deals also include those covering genomics and gene-editing. AI, artificial intelligence.

Table 3 | Selected respiratory deals by value in 2020

Partners 1 and 2	Date	Deal value (\$ million)	Upfront payment (\$million)	Deal summary
Oneness Biotech; LEO Pharma	15/04/2020	\$570	\$40	LEO Pharma gains exclusive worldwide rights to develop and commercialize FB825 for atopic dermatitis and allergic asthma from Oneness.
Moderna Therapeutics; Vertex Pharmaceuticals	16/09/2020	\$380	\$75	Vertex enters collaboration to develop and commercialize lipid nanoparticles (LNPs) and mRNAs for the delivery of gene-editing therapies for cystic fibrosis from Moderna.
Curadev Pvt.; Bayer AG	23/03/2020	\$268	Undisclosed	Curadev grants Bayer rights to develop and commercialize small-molecule STING antagonists for the treatment of lung, cardiovascular and other inflammatory diseases.
aTyr Pharma; Kyorin Pharmaceutical	06/01/2020	\$175	\$8	aTyr Pharma grants Kyorin Pharmaceutical exclusive rights to develop and commercialize ATYRI923 for the treatment of interstitial lung diseases in Japan.
Pulmatrix; Johnson and Johnson (Lung Cancer Initiative)	02/01/2020	\$100	\$7	Pulmatrix signs licensing deal with the Lung Cancer Initiative, which has an option to access lead candidate RV1162/PUR1800 and a portfolio of lung cancer interception-kinase inhibitors. The Lung Cancer Initiative will pay \$7.2million up front.

DealForma data and methodology

The DealForma database was used to analyze mergers and acquisitions (M&As) and licensing transactions announced between 1 Jan 2020 and 29 Oct 2020. Lists of deals focused on biopharma therapeutics and platform technologies and an additional list for medical technology, diagnostics, and digital health acquisitions were generated according to the largest total announced deal values.

Respiratory disease deals

The DealForma database was used to analyze licensing transactions, M&As, asset purchases, and research partnerships focused on the respiratory space announced between 1 Jan 2019 and 29 Oct 2020. R&D partnerships, M&A, and

product, pipeline and business unit purchases within the respiratory space. Relevant indications were selected from within the broader therapy areas of pulmonary, infectious and inflammatory diseases. Technologies and modalities include therapeutic compounds, discovery technologies, devices, diagnostics and digital health. Excluded from these searches were academic partnerships, government grants and contracts, and manufacturing/supply agreements. Deal financial terms are based on disclosed figures.

Feel free to contact analysts@dealforma.com for any questions.

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