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Dealmaking Quarterly Statistics, Q1 2022

A Look At M&A And Alliance Activity Across The Biopharma, Medical Device And In Vitro Diagnostics Industries, January-March 2022

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During Q1, biopharma merger and acquisition value reached $9.9bn and drew in $51.2bn in potential deal value from alliances. Device company M&A values reached $4.6bn, while in vitro diagnostic firms and research tools players completed M&A activity that totaled $52.5m.

Biopharma merger and acquisition value for the opening quarter of 2022 reached $9.9bn from 27 transactions, 12 of which had disclosed values. Four M&A transactions hit or exceeded the billion-dollar mark during Q1 (*see Exhibit 1*).

Exhibit 1

Top Biopharma M&As, Q1 2022

Date	Acquirer/Acquired (Business)	Terms
Feb. 27	Biocon/Viatris' biosimilars business (including insulins and oncology portfolios and an autoimmune segment with in-licensed products)*	$3.3bn: $2bn in cash, $1bn in Biocon convertible preferred shares, plus a $335m earn-out expected in 2024; 3.43x sales
Jan. 27	Samsung Biologics/Biogen's 49.9% equity stake in Samsung Bioepis (JV to develop biosimilar candidates)	$2.35bn: $1bn in cash up front, $1.3bn in cash to be paid over two years, $50m in earn-outs
Feb. 25	Biohaven/Channel Biosciences (Kv7 ion channel platform for	$1.24bn: $35m in cash, $65m in Biohaven common shares), $1.14bn in earn-outs

	treating epilepsy and other CNS disorders)	
Mar. 1	AbbVie/Syndesi Therapeutics (therapies that modulate synaptic function to relieve the symptoms of cognitive impairment)	$1bn: $130m in cash and $870m in earn-outs
Feb. 14	Collegium/BioDelivery Sciences (therapies for serious and complex chronic pain and neurology conditions)	$604m: $5.60 in cash per share, a 52% premium; 3.62x sales

*Note: At time of publication, this deal had not yet closed.

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At the top, and making up more than a third of the Q1 total was Indian company *Biocon Biologics, with its agreement to acquire Viatris' biosimilars business for up to $3.33bn*. (The deal is expected to close in H2 2022.) [*See also*.] The biosimilars assets of Viatris (which was formed as a result of the *2019 merger of Pfizer's Upjohn unit with Mylan*) consists of a comprehensive insulins portfolio, including rh-insulin, and biosimilar versions of glargine and aspart; an oncology portfolio including biosimilars for trastuzumab, bevacizumab, and pegfilgrastim; and an autoimmune segment with in-licensed products like Hulio, a biosimilar to AbbVie's Humira (adalimumab) (*from Fujifilm Kyowa Kirin Biologics*), and a biosimilar to etanercept (sold by Amgen/Pfizer as Enbrel) under *a 2018 agreement with Lupin*. Viatris' global biosimilars business has estimated revenues of $875m and EBITDA of $200m for the year 2022 and is expected to exceed $1b in

revenue in 2023. Combining Viatris' business with Biocon accelerates the build-out of the latter's commercial capability to become a strong global brand with a direct presence in US, Europe, Canada, Japan, Australia, and New Zealand. The deal also boosts Biocon's current range of commercialized biosimilars as well as several others currently under development, and the vaccines portfolio gained through its June 2021 partnership with Serum Institute Life Sciences. [*See also*.]

In another large biosimilars deal, *Samsung BioLogics acquired, for up to $2.35bn, Biogen's 49.9% equity stake in Samsung Bioepis*, a joint venture *established in 2011* between Samsung and Biogen aimed at advancing a broad pipeline of biosimilar candidates that cover various therapeutic areas, including immunology, oncology and ophthalmology. [*See also*.] As a result of the current transaction, Samsung Bioepis is now a wholly owned subsidiary of Samsung BioLogics. Biogen and Samsung will continue with their exclusive agreements, including the commercialization of their current portfolio. This includes marketed products Benepali (etanercept), a biosimilar referencing Enbrel, Imraldi (adalimumab), a biosimilar referencing Humira, and Flixabi (infliximab), a biosimilar referencing Remicade. Additionally, Biogen will also retain commercial rights for Byooviz (ranibizumab-nuna), an approved biosimilar referencing Lucentis (ranibizumab), as well as an investigational biosimilar candidate in development, SB15 (aflibercept), a proposed biosimilar referencing Eylea. [*See also*.]

The other three top biopharma acquisitions involved neuro-focused targets. Looking to complement its existing capabilities, *Biohaven Pharmaceutical could pay up to $1.2bn to acquire Channel Biosciences*, a subsidiary of privately held Knopp Biosciences, gaining Channel's Kv7 channel targeting platform and adding expertise in ion-channel modulation to Biohaven's current neuroscience portfolio. Lead asset KB-3061, which Biohaven renamed BHV-7000, is a potent activator of voltage-gated Kv7.2/Kv7.3 key potassium channel subunits involved in neuronal signaling and in regulating the hyperexcitable state in epilepsy. Biohaven intends to bring BHV-7000 to the clinic in 2022, with focal epilepsy as the lead indication. In addition to the up-front cash and equity, the earn-out consideration is based on BHV-7000 developmental and regulatory milestones through approvals in epilepsy in the US, EU, and Japan; developmental and regulatory milestones reached for the Kv7 pipeline development in other indications and additional country approvals; and annual sales-based milestones, the total of which will be achieved when annual sales exceed $3bn. Biohaven also agreed to make scaled royalty payments for BHV-7000 and the pipeline programs. Other discovery-stage candidates incorporating the Kv7 platform include neuropathic pain, hearing disorders, and ALS. Concurrently, *Biohaven entered a licensing deal with Bristol Myers Squibb* (BMS), in which Bohaven could pay up to $200m for development and commercialization rights to BMS' taldefgrobep alfa (BMS-986089), a novel, Phase III-ready anti-myostatin adnectin, for spinal muscular atrophy (SMA). [*See also*.]

In the only top M&A transaction by a Big Pharma in Q1, *AbbVie acquired Syndesi Therapeutics for up to $1m*. The company was *spun out of UCB Biopharma in 2018* to further develop novel synaptic

vesicle protein 2A (SV2A) modulators *originally discovered by UCB*. AbbVie gains access to Syndesi's pipeline of SV2A modulators, including its lead compound SDI-118, a small molecule currently under evaluation in Phase Ib studies to target nerve terminals to enhance synaptic efficiency. The mechanism is currently being investigated for the treatment of cognitive impairment and other symptoms associated with a range of neuropsychiatric and neurodegenerative disorders, such as Alzheimer's disease and major depressive disorder.

In Q1's third-largest neuro-focused M&A, *Collegium Pharmaceutical bought publicly traded specialty pharma BioDelivery Sciences (BDSI) for $604m*. Founded in 1997, BDSI has built a portfolio of differentiated pain and neurology products that will double Collegium's commercial-stage assets, expand its pain offerings, and enable it to establish a stronger position in neurology. BDSI's top-selling Belbuca (buprenorphine hydrochloride), a differentiated schedule III opioid for chronic low back pain, is highly complementary to Collegium's pain portfolio. Additional BDSI products include Symproic (naldemedine tosilate), a small-molecule peripherally-acting mu-opioid receptor antagonist for opioid-induced constipation, and Elyxyb (celecoxib), an oral liquid formulation FDA approved in 2020 for the acute treatment of migraine. [*See also*.]

Emerging Drug Developers

During the first quarter of 2022, just three biopharma start-up acquisitions were signed. None of the Q1 M&As had disclosed potential deal values. *Takeda exercised its option to acquire Adaptate Biotherapeutics*. Formed in 2019 as *a spin-out from GammaDelta Therapeutics, with investments from Abingworth and Takeda*, Adaptate is an immunotherapy company developing a portfolio of therapeutic antibodies designed to modulate the activity of a patient's own cytotoxic gamma delta T cells in situ. Through the acquisition, Takeda will obtain Adaptate's antibody-based gamma delta T cell engager platform, including pre-clinical candidate and discovery pipeline programs. Adaptate's gamma delta T cell engagers are designed to specifically modulate gamma delta T cell-mediated immune responses at tumor sites while sparing damage to healthy cells. The planned acquisition of Adaptate follows Takeda's recently exercised option to acquire GammaDelta and is intended to further accelerate the development of innovative gamma delta T cell-based therapies. The acquisition complements Takeda's ongoing efforts to research and develop cell engagers for solid tumor applications, bolstered by the novel T cell engager COBRA platform, which was acquired from Maverick Therapeutics.

Clinical-stage gene therapy firm *Castle Creek Biosciences acquired Novavita Thera*, a private 2019 gene therapy start-up focused on rare liver and metabolic diseases. The acquisition expands Castle Creek's technology platform by adding in vivo capabilities to its existing ex vivo approach and broadens Castle Creek's development pipeline beyond skin and connective tissue disorders to rare liver diseases. Castle Creek will advance the development of LV-FAH, a therapy based on a lentiviral vector containing a functional copy of the human FAH gene that is administered directly to the patient through the portal vein. The therapy is designed to transduce hepatocytes

and deliver the FAH enzyme that is deficient in these cells. Castle Creek plans to submit an IND to the FDA for LV-FAH in hereditary tyrosinemia type 1.

Kriya Therapeutics acquired privately held Warden Bio, which is developing novel adeno-associated virus (AAV)-mediated gene therapies for glycogen storage disorders (GSDs). Through the acquisition, Kriya obtains Warden's five preclinical gene therapy programs for GSDs. This deal serves as the foundation for Kriya's Rare Disease division, focused on the discovery and development of gene therapies for rare diseases. Warden Bio was established with a goal of comprehensively addressing multiple GSDs without approved therapies based on pioneering gene therapy technologies originally developed at Duke University.

Medical Device Acquisitions

The first quarter featured 24 device M&A transactions, ten of which had disclosed values together totaling $4.6bn (*see Exhibit 2*).

Exhibit 2

Top Device M&As, Q1 2022

Date	Acquirer/Acquired (Business)	Terms
Jan. 10	Owens & Minor/Apria (home healthcare equipment)	$1.6bn: $37.50 in cash per share, a 19% premium, and the assumption of debt; 1.4x sales
Jan. 10	Medtronic/Affera (cardiac mapping and navigation systems and catheter-based cardiac ablation technologies)*	$925m in cash, including $250m in contingency payments
Feb. 7	Cooper Companies/Cook Medical's reproductive health business (minimally invasive devices for fertility, ObGyn, IV fertilization and assisted reproductive technology)*	$875m: $675m in cash up front and $200m to be paid in four annual installments; 4.27x sales
Jan. 28	ConvaTec/Triad Life Sciences (wound biologics)	$450m: $125m in cash and $325m in earn-outs
Feb. 28	Altaris Capital Partners/IntriCon (miniature interventional, implantable, and body-worn medical devices)*	$241m: $24.25 in cash per share (a 45% premium); 1.92x sales

*NOTE: AT TIME OF PUBLICATION, THESE DEALS HAD NOT YET CLOSED.

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More than a third of the Q1 total was from *Owens & Minor's $1.6bn acquisition of public home healthcare equipment provider Apria*. Apria offers a comprehensive range of products and services for in-home care and delivery across three core service lines, including home respiratory therapy (home oxygen and non-invasive ventilation services), obstructive sleep apnea treatment (continuous positive airway pressure and bi-level positive airway pressure devices, and patient support services) and negative pressure wound therapy. The acquisition expands Owens' patient-direct platform and broadens its product portfolio.

In the second-largest Q1 device M&A, *Medtronic agreed to acquire privately held Affera for up to $925m* in a transaction anticipated to close the first half of Medtronic's fiscal year 2023. Affera's technologies include the Affera Prism-1 cardiac mapping and navigation platform and Sphere-9 cardiac ablation catheter, investigational technologies designed to enable the creation of detailed maps used by electrophysiologists to diagnose arrhythmias and deliver cardiac ablation therapy, respectively. In December 2021, Affera announced the commencement of the SPHERE PerAF trial, a US FDA investigational device exemption pivotal randomized study, to evaluate the safety and effectiveness of the Affera system for the treatment of persistent atrial fibrillation. Medtronic has been a strategic investor in Affera and currently holds a 3% ownership stake in the company. The Affera offerings will complement Medtronic's existing atrial and ventricular arrhythmia disease management portfolio and support the company's efforts to offer cardiac ablation solutions to improve patient outcomes.

The Cooper Companies (women's health and fertility) signed a letter of intent to buy the entirety of Cook Medical's reproductive health business for consideration up to $875m. Cook's Reproductive Health, within its MedSurg division, develops minimally invasive medical devices for fertility, obstetrics, gynecology, in vitro fertilization, and assisted reproductive technology. For the calendar year 2021, Cook's reproductive health business brought in $158m, 73% of which was in solely reproductive health products and 27% in OB/GYN. After the closing of the transaction (expected in fiscal Q2 2022), Cook will continue to manufacture products for CooperSurgical during a two-year transition period. Cooper believes the addition of Cook's products and staff will allow it to reach more patients, particularly in the Asia-Pacific fertility market. [*See also*.]

In a planned buy-out, an affiliate of investment firm *Altaris Capital Partners entered into a definitive agreement to acquire publicly traded manufacturer IntriCon (designs miniature interventional, implantable, and body-worn medical devices) for approximately $241m*. The transaction is expected to close in Q2 2022. Founded in 1977 as Selas Corp., the company changed its name to IntriCon in 2005 following a reverse merger with the public Selas. It operates in diversified industries. Within the global medical market, IntriCon integrates components and assemblies to advance micro-miniature, micro-electronic, and micro-mechanical technologies across a range of device platforms. The company specializes in devices worn on the body, including cardiac monitoring patches and continuous glucose monitoring systems, as well as electromagnetic micro-coil and sensor integration to enable precise device tip

location. It also produces microcatheters, aspiration catheters, stent delivery systems, and balloon catheters, with applications in cardiovascular, peripheral vascular, neurovascular, structural heart, interventional pulmonology, and electrophysiology. In addition, the company makes hearing aids, which it recently expanded to an OTC pilot program from the previous direct-to-end-consumer business.

In Vitro Diagnostics Acquisitions

Activity by diagnostics and research tools players during Q1 included five M&As, just two of which had disclosed values together totaling $52.5m.

In the larger of the two, *ImmunoPrecise Antibodies (IPA) bought private Belgian biotech BioStrand BV for $41m*. At closing, the company paid a consideration of approximately $21.6m ($4m in cash and $17.6m through the issuance of 4.1m common shares of IPA). There is also a potential earn-out payment based on the profitability of BioStrand, not exceed $13m. IPA also will provide an investment consideration in an aggregate amount of $6.4m over a three-year period. The deal includes BioStrand's bioinformatics subsidiaries BioKey BV and BioClue BV. BioStrand offers an artificial intelligence (AI)-powered methodology for rapidly analyzing and mining a broad range of biological data to identify patterns and variations in multi-omics data and detect structural anchor points, with application in numerous fields, including precision medicine, drug and vaccine development, and target discovery. The acquisition is expected to create short and long-term commercialization opportunities by introducing a novel AI-powered protein-protein interactions prediction platform and fortifying IPA's sequencing with massive throughput capabilities in omics (genomics, transcriptomics, proteomics, and metabolomics) interrogation. The transaction will also enable IPA's subsidiary, Talem Therapeutics, to access new AI technologies to help power each stage of its therapeutic antibody development. The deal merges BioStrand's computer-aided drug discovery capabilities with IPA's best-in-class antibody discovery and development expertise, integrating a next-generation, end-to-end platform for target and therapeutic antibody discovery and development.

The other Q1 M&A transaction with disclosed value was *Sorrento Therapeutics' $11.57m buy of at-home diagnostics company Virex Health*. The up-front consideration was $6.82m (59%) in cash and $4.74m (41%) in shares of Sorrento common stock based on a price per share equal to $3.70. At any time the common shares are issued in respect of a milestone payment, the number of shares will be based on a price per share equal to the volume weighted average closing price per share of the common stock. Spun out of the labs of Professors Mark Grinstaff and Scott Schaus at Boston University, Virex has proprietary technology that utilizes enzymatic and electrochemical amplification to detect picogram level biological analytes, such as SARS-CoV-2 and its variants, Flu A/B, as well as markers for liver cancer, inflammation, and hormone monitoring. This platform has demonstrated high sensitivity for multiple biological analytes, including COVID-19 virus detection and liver cancer blood biomarkers. Sorrento's antibody library is complementary to Virex's enzymatic amplification diagnostic assay. Sorrento is an ideal fit to expand the Virex

platform across a wide range of analytes, including viruses, nucleic acids, proteins, hormones, and other biomarkers.

Medtech Start-Up M&A Activity

Three medtech start-up acquisitions were penned during Q1. As was the case in biopharma start-up M&As during the quarter, none of the medtech transactions had disclosed deal values. *C2Dx acquired fellow privately held medical device company Hemostatix Medical Technologies*, a 2019 start-up focused on surgical instruments. The company's main product, the Hemostatix Thermal Scalpel is used in head and neck surgeries, particularly otolaryngology procedures, and works by sealing blood vessels as they are incised, simultaneously cutting and coagulating. The Hemostatix Thermal Scalpel is C2Dx's third asset, joining theSTIC Intra-Compartmental Pressure Monitor (for quick and continuous readings of compartment pressure) and the T/Pump Localized Temperature Therapy system (provides safe and effective localized warming and cooling therapy with precise temperature control for chronic pain in orthopedic, skin trauma, and other medical conditions).

BioVentrix acquired MateraCor, which is focused on preventing progression of and reversing heart failure through the use of injectable alginate-based hydrogel. Founded in 2018, MateraCor's lead product, the Trans-Catheter Myocardial Restoration (TCMR), consists of an implantable hydrogel and a minimally invasive endocardial delivery system to treat ischemic or non-ischemic heart failure with reduced ejection faction. TCMR is an investigational device not approved for sale. The acquisition reinforces BioVentrix's position to treat left ventricular(LV) heart failure by offering a variety of solutions that will directly impact ventricular remodeling through less invasive LV restoration technologies.

Rounding out Q1 medtech start-up acquisitions, *BigHat Biosciences purchased privately held Frugi Biotechnology*, a 2020 start-up developing cost-effective and high-quality cell-free protein synthesis (CFPS) technology. BigHat plans to integrate Frugi's CFPS technology into its novel AI/ML-enabled drug discovery platform to allow BigHat to rapidly scale to meet the growing demands for its platform from partners and for internal therapeutic programs. With the acquisition, BigHat brings in-house a reliable supply of one key input to its drug discovery platform. Frugi Biotechnology's proprietary, and scalable CFPS technology will facilitate further research to improve CFPS for antibody production.

Biopharma Alliances

During Q1 2022 a total of 279 partnerships were signed, together worth $51.2bn in potential deal value (PDV), for the 72 deals with disclosed values. Of these, 19 reached or surpassed a billion dollars (*see Exhibit 3*).

Exhibit 3

Top Biopharma Alliances, Q1 2022

Date	Licensee/Licenser	Deal Subject(s)	Terms
Mar. 29	Sanofi/IGM Biosciences	Collaboration using IGM's antibody platform to develop, manufacture, and commercialize IgM antibody agonists against three oncology targets and three immunology/inflammation targets: for each oncology program, IGM leads R&D through BLA approval; after first marketing approval, Sanofi leads subsequent development and commercialization; for each immunology/inflammation program, IGM leads R&D through completion of Phase Ifor up to two constructs, after which Sanofi takes over all future development	$6.165bn: $150m up fron milestones for the oncolo ($940m per target), $3.19 immunology/inflammatio ($1.065bn per target), 7-1
Jan. 7	Sanofi/Exscientia	Agreement to develop up to 15 small-molecule candidates across oncology and immunology, leveraging Exscientia's AI-driven platform utilizing actual patient samples: in addition to target discovery, Exscientia will lead small molecule drug design and lead optimization activities up to development candidate nomination; Sanofi assumes responsibility for preclinical and clinical development, manufacturing and commercialization; the collaboration will both discover new drug candidates and yield single-cell translational models that Sanofi will be able to use to stratify patient enrollment in clinical trials	$5.245bn: $100m up fron pre-sales milestones, $2.2 milestones, 7-21% royaltie
Jan.	Bristol Myers Squibb/Century	Collaboration to develop and	$3.09bn: $100m in cash u

10	Therapeutics	commercialize up to four iPSC-derived, engineered natural killer cell and/or T cell programs for hematologic malignancies and solid tumors: the first two subjects include a program in acute myeloid leukemia and multiple myeloma and BMS has the option to add up to two additional programs; Century is responsible for development candidate discovery and preclinical development activities; BMS has the option to exclusively license the candidates and would handle clinical development, commercialization and manufacturing on a worldwide basis; upon option exercise, Century would perform IND-enabling studies to support BMS's submission of an IND and manufacturing of clinical supplies until completion of a proof-of-concept clinical trial	equity investment in Cent in development and regul ($235m per program), $2 milestones ($500m per pr milestones
Mar. 2	Sanofi/Adagene	Agreement to generate masked monoclonal and bispecific antibodies for cancer: Adagene will use its SAFEbody technology to conduct early stage research activities for development of masked versions of Sanofi candidate antibodies; Sanofi is solely responsible for later stage research and all clinical, development and commercialization activities	$2.518bn: $17.5m up fron development, regulatory a milestones, undisclosed r
Feb. 22	Takeda/Code Biotherapeutics	Collaboration and option agreement to design and develop a targeted gene therapy leveraging Code's 3DNA platform for a liver-	Double-digit $m in up-fron milestone, and research f plus future development a milestones and tiered roy

	directed rare disease program, plus conduct additional studies for central nervous system-directed rare disease programs: Takeda and Code will collaborate on research activities up to candidate selection; after option exercise, Takeda will assume responsibility for further development and commercialization	milestones are met for all

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Sanofi was involved in three of the top five Q1 alliances, including the largest, *an exclusive worldwide collaboration agreement with IGM Biosciences worth up to $6.2bn*, involving IgM antibody agonists against three oncology targets and three immunology/inflammation targets. The current deal helps IGM greatly increase its R&D pipeline and also expands upon previous joint research efforts between the partners over the past few years, through which Sanofi was exposed to IGM's antibody platform. The partnership leverages IGM's proprietary IgM antibody technology to develop therapeutics that combine the multi-valency of IgM antibodies possessing ten binding sites compared to conventional IgG antibodies having only two target binding sites. [*See also*.]

In another top deal, *Sanofi established a new research collaboration worth up to $5.3bn with Exscientia to develop AI-driven precision-engineered medicines*. Exscientia's personalized medicine platform, which enables a patient-first approach, integrates patient, disease, and clinically relevant data into decisions on potential new medicine candidates earlier in the drug creation process. The new partnership extends the companies' existing relationship which *began under a 2017 deal* in which Exscientia agreed to use its AI platform to discover new bispecific small-molecule metabolic disease therapies for Sanofi. Sanofi exercised an option in 2019 to license one of the resulting compounds. [*See also*.]

In its third-largest alliance, *Sanofi entered an up to $2.5bn collaboration and exclusive license agreement with Adagene* to generate masked monoclonal and bispecific antibodies for cancer. The deal involves Adagene's SAFEbody technology, which uses a precision masking technology to shield the binding domain of a biologic therapy and only allow antibodies to bind to/activate in a tumor microenvironment, thus sparing healthy cells. [*See also*.] Adagene signed a similar SAFEbody collaboration with Exelixis in February 2021 for the development of ADCs or other biologics against Exelixis-nominated targets. That deal reached its first milestone at the end of last year with the successful nomination of an oncology candidate for further development.

Two of the top-five alliances were centered around gene/cell therapies: *Century Therapeutics and BMS entered a potential $3bn development partnership* for allogenic cell therapies for hematologic malignancies and solid tumors and *Takeda entered an up to $2bn collaboration and option agreement with Code Biotherapeutics* to develop gene therapies for rare disease indications.

Big Pharma penned 61 biopharma alliances in all during Q1 (*see Exhibit 4*), 22% of the overall deal volume. The 27 transactions with disclosed values totaled $39bn, making up 76% of the Q1 dollar value. Johnson & Johnson was the most deal active, with eight partnerships through its Janssen subsidiaries completed during Q1, including two billion-dollar deals: one *with Mersana Therapeutics to advance antibody-drug conjugates* for unspecified indications, and the other *to develop small-molecule therapeutics with Remix Therapeutics*, with Janssen gaining exclusive rights to three specific targets with applications in immunology and oncology. Sanofi came in second, with seven alliances, followed by Eli Lilly with six; Amgen, BMS, Novartis, and Roche had five deals apiece.

Exhibit 4

BY DEAL VOLUME

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Thirteen of the Big Pharma alliances were reverse licensing arrangements, where a biotech in-licensed assets from a Big Pharma; although of those deals, only two had disclosed values. *Ovid Therapeutics could provide up to $215m for the worldwide exclusive rights to AstraZeneca's small molecules targeting the KCC2 transporter* (including OV350) to develop in epilepsies and other neuropathic conditions. The other was Biohaven's potential $200m agreement with BMS for the exclusive global development and commercialization rights to BMS-986089 for SMA.

During Q1, 18 biopharma deals to address SARS-CoV-2, the virus that causes COVID-19, were signed; split evenly between nine each for therapeutic and vaccine indications. No deals had disclosed values. For additional COVID-19 articles and data across Informa's suite of products, see Pharma Intelligence's *COVID-19 dashboard*, which is updated daily.

The most popular therapeutic area for biopharma partnering during Q1 was oncology; that indication was the subject of 105 collaborations and brought in an aggregate $30bn in PDV, with 10 deals meeting or exceeding the billion-dollar mark. Deals around non specified therapy areas were the second-most numerous, with 41 partnerships. There was also noticeable alliance

activity by neurology- and infectious disease-focused companies, which completed 40 and 34 deals, respectively (*see Exhibit 5*).

Exhibit 5

BY DEAL VOLUME

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NOTE: DEALS MAY BE COUNTED MORE THAN ONCE IF MULTIPLE PRODUCTS OR THERAPEUTIC AREAS ARE INVOLVED.

*INCLUDES: ENT/DENTAL; ORTHOPEDICS; OBSTETRICS/GYNECOLOGY; RENAL; RHEUMATOLOGY (NON AUTOIMMUNE); AND UROLOGY CATEGORIES.

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Start-Up Alliances

Seventy partnerships involving biopharma start-ups were signed during the quarter. Topping the list in terms of deal value was the potential $3.1bn deal between Century Therapeutics and BMS for the development and commercialization of up to four induced pluripotent stem cell (iPSC)-derived, engineered natural killer cell (iNK) and or T cell (iT) programs for hematologic malignancies and solid tumors. Century's iPSC-based allogeneic cell platforms are complementary to BMS's existing cell therapy technologies.

During Q1, BMS signed a second $1bn+ alliance; *this one with Volastra Therapeutics*, a 2019 start-up. The collaboration combines BMS's expertise in oncology with Volastra's deep understanding of chromosomal instability (CIN), an approach that relies on synthetic lethality whereby a cancer mutation and drug combine to trigger the death of a cancer cell. Volastra will conduct all research activities for select undisclosed oncology targets through development candidate selection and BMS may take on the responsibilities for all subsequent development, regulatory, and commercialization activities under an exclusive global license. Volastra received a $30m up-front payment and is eligible to receive up to $1.1bn in development, regulatory, and commercial milestones, plus sales royalties. [*See also*.]

The alliance with the second-largest price tag was the potential $2bn collaboration and option agreement between 2021 start-up Code Biotherapeutics and Takeda to design and develop a targeted gene therapy leveraging Code Bio's 3DNA platform for a liver-directed rare disease program, plus conduct additional studies for central nervous system-directed rare disease programs. Code Bio's synthetic multivalent 3DNA delivery platform enables cell specific targeting, the delivery of large genetic payloads, and the potential for re-dosability, and is designed to overcome key limitations of other genetic medicine delivery approaches. Takeda has

the right to exercise options for an exclusive license for four resulting programs. Code Bio will receive double-digit million dollars in up-front, near-term milestone, and research funding payments, plus future development and commercial milestone payments and tiered royalties. Both firms will collaborate on research activities up to candidate selection. After option exercise, Takeda will assume responsibility for further development and commercialization. If milestones for all four programs are met, the deal value could exceed $2bn.

Five other Q1 alliances by start-ups exceeded a potential deal value of $1bn (*see Exhibit 6*).

Exhibit 6

Headline/Potential Deal Value*
Century Therapeutics and Bristol Myers Squibb Enter into a $3bn Strategic Collaboration to Develop iPSC-derived Allogeneic Cell Therapies / $3.1bn
Code Biotherapeutics Announces Collaboration with Takeda to Use Proprietary 3DNA Genetic Medicine Delivery Platform to Design and Develop Gene Therapies for Rare Diseases / $2.0bn
Amgen and Generate Biomedicines Announce Multi-Target, Multi-Modality Research Collaboration / $1.9bn
Curve Therapeutics Announces Collaboration with MSD for Next Generation Drug Discovery Platform / $1.7bn
Volastra Therapeutics Enters Oncology Drug Discovery Collaboration with Bristol Myers Squibb / $1.1bn
Dren Bio and Pfizer to Discover and Advance Multiple Therapeutic Antibodies for the Treatment of Cancer / $1.0bn
Remix Therapeutics Enters Collaboration with Janssen to Advance Small Molecule Therapeutics / $1.0bn
Blueprint Medicines and Proteovant Therapeutics Announce Collaboration to Advance Novel Targeted Protein Degrader Therapies / $652m
Biosion Licenses BSI-060T to Pyxis Oncology / $233m
Sana Biotechnology, IASO Biotherapeutics, and Innovent Biologics Enter Non-Exclusive License Agreement for Clinically Validated BCMA CAR Construct / $204m

*POTENTIAL DEAL VALUE IS THE SUM OF UP-FRONT FEES, PLUS PRE- AND POST-COMMERCIALIZATION MONEY.

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Medtech Company Dealmaking

Device companies signed a total of 21 partnerships during Q1; only six had disclosed financials totaling $83.4m. In the highest-valued deal, *DarioHealth entered into a multi-year agreement with Sanofi worth up to $30m*. The purpose of the deal is to accelerate commercial adoption of Dario's

full suite of digital therapeutics and drive the expansion of digital health offerings on the Dario artificial intelligence (AI)-powered integrated technology platform, which helps patients manage conditions including diabetes, hypertension, weight management, and musculoskeletal and behavioral health. Dario and Sanofi will collaborate on promoting Dario's multi-condition, single digital therapeutic offering. In addition to Dario/Sanofi, four other deals in the digital heath device space were signed during Q1.

Diagnostics and research firms completed 21 alliances during Q1. In the only one with a disclosed value, *SomaLogic entered into an exclusive partnership with Illumina* in which the companies will leverage Illumina's global commercial infrastructure and SomaLogic's platform, which includes its proprietary synthetic aptamer reagents capable of measuring and identifying human proteins, bioinformatics tools and capabilities, and a clinical proteomics database. Illumina will develop and deploy NGS-based protein identification and measurement tools into laboratories worldwide, and facilitate the development and use of high-plex protein pattern recognition tests. SomaLogic grants Illumina rights to use certain of the company's intellectual property to develop the licensed products in exchange for an up-front payment of $30m and certain minimum annual royalty payments.

Eight medtech alliances involving start-ups (five device and three diagnostics players) were signed in the first quarter, two of which had disclosed potential deal values. *Nexstim licensed its NBT technology and related patents to one-year-old Magnus Medical* for use in treatment of neuropsychiatric disorders. The estimated total value of the agreement is $19m, which consists of an up-front payment of $4m and technology royalties of approximately $15m. Nexstim's NBT (Navigated Brain Therapy) system is a non-invasive brain stimulation device for stroke rehabilitation, specifically to address hand and arm movement.

In the second agreement, *NeuroSigma licensed the 2019-founded Ignis Therapeutics exclusive rights in China* (including Hong Kong and Macau) to its Monarch eTNS (external trigeminal nerve stimulation) system to treat attention deficit hyperactivity disorder (ADHD). The device uses non-invasive eTNS to treat neurological and neuropsychiatric indications, including ADHD, depression, and epilepsy. It is the first device-based, non-drug therapy approved by the FDA to treat pediatric ADHD. The license contemplates potential expansion into other indications in China beyond ADHD and Ignis potentially acquiring rights to manufacture the device. NeuroSigma receives a significant up-front payment and up to $10m in milestone payments, in addition to royalties and other compensation.