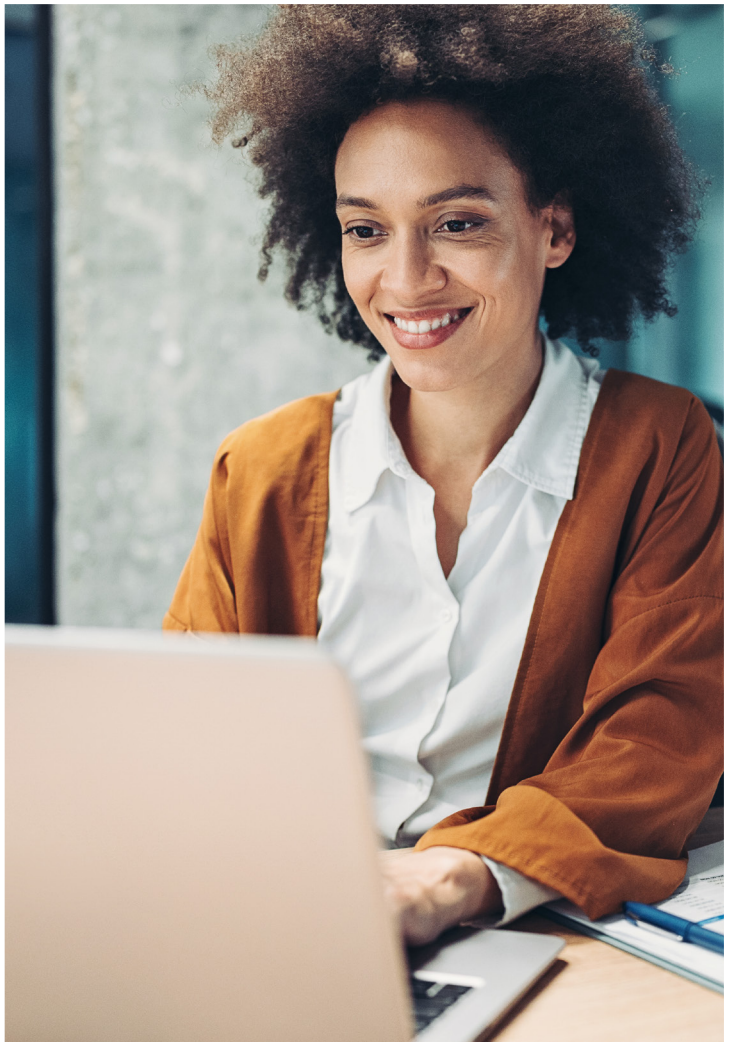
Pipeline Report

AUGUST 2022

IN THIS ISSUE:

- EUA granted for Novavax COVID-19 vaccine and expanded EUAs for Pfizer and Moderna vaccines
- Expanded and new indications for Breyanzi and Kymriah
- Gene therapy development for inherited anemias (thalassemia) and Duchenne muscular dystrophy (DMD)



This quarterly publication is developed by our Clinical Pharmacy Drug Information team to increase your understanding of the drug pipeline, ensuring that you are equipped with insights to prepare for shifts in prescription drug management.

AcariaHealth™
Specialty Pharmacy

Table of Contents

Progress continues to be made on the COVID-19 vaccine front. A fourth vaccine has now been granted an Emergency Use Authorization (EUA) – the **Novavax adjuvanted vaccine** – for use in adults as a two-shot primary series. The **Pfizer COVID-19 vaccine** and the **Moderna COVID-19 vaccine** both received expanded EUAs for COVID-19 prevention in people as young as six months of age. The Pfizer product has further had its EUA for COVID-19 prevention for people ≥ 12 years of age converted into a full-fledged FDA approval. And finally, **bebtelovimab** began being sold commercially in mid-August, shifting away from government subsidization of the cost of that therapy. Furthermore, we have learned that the government will also stop purchasing COVID vaccines, treatments, and tests as early as this fall.

In addition, developments have been made on the CAR T-cell therapy front, with two therapies receiving expanded or new indications for use. **Breyanzi** had its indication for the treatment of adults with large B-cell lymphoma expanded from use as a third-line agent to use as a second-line agent. **Kymriah** received a new indication altogether for the treatment of follicular lymphoma.

The biggest news this quarter, however, lies with **Zynteglo** (betibeglogene autotemcel), the first gene therapy to be FDA-approved for the treatment of transfusion-dependent beta-thalassemia. Bluebird Bio is marketing this genetically modified cell therapy at a cost of $2.8 million per one-time treatment. This distinguishes Zynteglo as the highest cost, single-dose agent.

Other notable gene therapy candidates are on the horizon. On August 24, 2022, Biomarin announced that the European Commission (EC) had granted conditional marketing authorization (CMA) to **Roctavian**™ (valoctocogene roxaparvovec) gene therapy for the treatment of severe hemophilia A (congenital Factor VIII deficiency) in adult patients. The EC also endorsed EMA's recommendation for Roctavian to maintain orphan drug designation, thereby granting a 10-year period of market exclusivity. CSL-Behring is marketing Uniqure's hemophilia B gene therapy, **EntranaDez** (formerly called AMT-061). This agent is currently under FDA review for potential FDA-approval in November of this yea. In the field of DMD, Sarepta Therapeutics is preparing to market the first potential gene therapy, **SRP-9001.** They recently announced plans for an accelerated approval submission to FDA by the fall of this year.

The era of gene therapies seems to be upon us. Our teams will continue to monitor market activity closely as we learn how to best incorporate these novel therapies into evolving best practices.

Our pipeline report is just one of many ways we are committed to providing helpful tools and resources to our clients and partners. We look forward to sharing more updates with you in the months ahead.

Ross Hoffman, MD
Chief Medical Officer

To provide comments, feedback or requests for report enhancements, please email us at Communications@EnvolveHealth.com.

 | Data is current as of 08/22/2022

Available at: A AcariaHealth # Other

Drug Name	Manufacturer(s)	Indication(s)	FDA Approval Date	Comments	Cost (WAC)
HEMATOLOGY					
4 **Zynteglo** *betibeglogene autotemcel* intravenous infusion	bluebird bio	Transfusion-dependent beta-thalassemia (TDT)	8/17/2022	· Approved for the treatment of patients with beta-thalassemia who require regular blood transfusions · Demonstrated ability to dramatically decrease or terminate the need for chronic blood transfusions · Twenty-five of 29 patients (86%) in a Phase 3 trial demonstrated transfusion independence (TI) after treatment, with a median ongoing TI duration of 26.3 months (min-max: 13.1 – 39.4) · Projected impact: new cost with eventual anticipated cost recoupment from decreased need for blood transfusions	$2.8 million/ one-time treatment
NEUROLOGY					
1 **Evrysdi** *risdiplam* powder for oral solution	Roche	Spinal muscular atrophy (SMA)	5/27/2022	· NEW INDICATION FOR AN EXISTING ANTI-SMA THERAPY · Now approved for the treatment of pre-symptomatic infants < 2 months of age with SMA · Previously the Evrysdi label supported use only in patients ≥ 2 months of age with symptomatic SMA · Projected impact: low incremental cost increase	$107,000/year
2 3 **Amvuttra** *vutrisiran* subcutaneous injection	Alnylam	Hereditary transthyretin-mediated (hATTR) amyloidosis	6/13/2022	· Approved for the treatment of polyneuropathy of hATTR amyloidosis in adults · Will compete with Onpattro (IV infusions every three weeks) and Tegsedi (weekly subcutaneous injections) for the same indication, with quarterly subcutaneous infusions · Projected impact: cost replacement of existing therapies	$463,500/year

[1]Accredo, [2]Orsini, [3]US Bioservices, [4]Hospital Administration

 | Data is current as of 08/22/2022

CONTINUED

Available at: A AcariaHealth # Other

Drug Name	Manufacturer(s)	Indication(s)	FDA Approval Date	Comments	Cost (WAC)
ONCOLOGY					
4 **Kymriah** *tisagenlecleucel* intravenous infusion	Novartis	Follicular lymphoma (FL)	5/27/2022	· NEW INDICATION FOR AN EXISTING CAR T-CELL THERAPY · Approved for the treatment of adults with relapsed or refractory FL after two prior lines of systemic therapy · In the pivotal Phase II ELARA trial, 66% achieved a complete response and the overall response rate was 86% in heavily pretreated patients; no patients experienced grade 3 or higher cytokine release syndrome related to Kymriah within the first eight weeks following infusion · Will compete with Yescarta, another CAR T-cell therapy that is FDA-approved as third-line treatment for relapsed or refractory FL · Projected impact: cost replacement of existing therapies	$399,110 per one-time treatment
4 **Breyanzi** *lisocabtagene maraleucel* intravenous infusion	Bristol Myers Squibb	Large B-cell lymphoma (LBCL)	6/24/2022	· NEW INDICATION FOR AN EXISTING CAR T-CELL THERAPY · Approved for the treatment of adults with LBCL who have: · Refractory disease to first-line chemoimmunotherapy or relapse within 12 months of first-line chemoimmunotherapy, or · Refractory disease to first-line chemoimmunotherapy or relapse after first-line chemoimmunotherapy, and are not eligible for hematopoietic stem cell transplantation (HSCT) due to comorbidities or age · Was previously FDA-approved for use in relapsed/refractory LBCL in the third-line or later setting · Yescarta is approved for a similar indication, but lacks the approval for those who are HSCT-ineligible · In the Phase 3 TRANSFORM trial, Breyanzi demonstrated significant improvements in event-free survival, complete responses, and progression-free survival in patients with LBCL whose disease was primary refractory or relapsed within 12 months after first-line therapy, compared to standard of care · Projected impact: cost replacement of existing therapies	$410,300 per one-time treatment

[4]Hospital Administration

 | Data is current as of 08/22/2022

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
COAGULATION DISORDERS						
EntranaDez (formerly called AMT-061)* *etranacogene dezaparvovec* intravenous infusion	Uniqure/ CSL Behring	Hemophilia B	Gene therapy	• Proposed for the treatment of adults with severe disease (~40% of the total hemophilia B population) • Current standard of care is factor IX replacement therapy • Recent data from the Phase III HOPE-B study showed continued durable, sustained increases in factor IX activity at 18 months post-infusion with a mean factor IX activity of 36.9% of normal, compared to mean factor IX activity of 39.0% at six months post-infusion • The ABR (annualized bleeding rate) for all bleeds after stable factor IX expression, assessed at 18 months, was 1.51 compared with the ABR of 4.19 for the six-month lead-in period • AMT-061 was generally well-tolerated with over 80% of adverse events considered mild; a serious adverse event of hepatocellular carcinoma (HCC) was identified in one patient • Independent molecular characterization and vector integration analysis of the HCC and adjacent tissue supported the conclusion that the HCC was unrelated to treatment with AMT-061 • No inhibitors to factor IX were reported • FDA accepted the BLA for Priority Review	$3.5 million per one-time treatment	4Q2022

***Expected to cost ≥ $500,000 per member.**

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
Roctavian* *valoctocogene roxaparvovec* intravenous infusion	BioMarin	Hemophilia A	Gene therapy	• Proposed for the treatment of adults with severe disease (~60% of the total hemophilia A population) • Current standard of care is factor VIII replacement therapy or Hemlibra • On 8/19/2020, BioMarin received a Complete Response Letter for its BLA for valoctocogene roxaparvovec, citing the need for longer-term durability data • In January 2022, two-year follow-up data for annualized bleeding rate (ABR) from the Phase III GENEr8-1 trial were reported: • The mean ABR fell from its baseline of 4.8 to 0.9 at one year, then to 0.7 at two years • The mean endogenous factor VIII activity level was 23.0 IU/dL at two years, after a mean value of 42.9 at one year • An analysis of a subset of 17 patients with three years of follow-up suggests that the downward trend may continue, with the three-year mean being 16.8, although the three-year mean ABR remained steady at 0.6, relative to the two-year mean • BLA resubmission is anticipated by the end of September 2022	$2-3 million per one-time treatment	1H2023

***Expected to cost ≥ $500,000 per member.**

 | Data is current as of 08/22/2022

CONTINUED

AcariaHealth™ Specialty Pharmacy

Pipeline Report

August 2022

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
SPK-8011* intravenous infusion	Spark/ Roche	Hemophilia A	Gene therapy	• Proposed for the treatment of adults with severe disease (~60% of the total hemophilia A population) • Current standard of care is factor VIII replacement therapy or Hemlibra • In the ongoing Phase I/II trial, factor VIII expression was sustained in 16 of 18 participants with up to four years of follow-up • Across all dose cohorts, there was a 91.2% reduction in ABR • There were no deaths and no FVIII inhibitor development in the four years	$1-2 million per one-time treatment	2023
SB-525* *giroctocogene fitelparvovec* intravenous infusion	Sangamo BioSciences, Inc/ Pfizer	Hemophilia A	Gene therapy	• For the treatment of adults with severe disease (~60% of the total hemophilia A population) • Current standard of care is factor VIII replacement therapy or Hemlibra • SB-525 was being studied in the Phase III AFFINE trial, which has been voluntarily paused by the manufacturers to address the observation that some patients had factor VIII activity of 150% or more, potentially raising their risk of blood clots; a study protocol amendment is pending • Meanwhile, updated results from the Phase I/II Alta trial showed that, among five patients receiving the highest dose of SB-525, mean factor VIII levels were 25.4% at two years; during year two, one patient had eight bleeds, while another had one	$1-2 million per one-time treatment	2023

***Expected to cost ≥ $500,000 per member.**

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
PF-06838435/SPK-9001* *fidanacogene elaparvovec* intravenous infusion	Pfizer/ Spark	Hemophilia B	Gene therapy	· Interim analysis of the Phase III Benegene-2 trial results has been delayed to 1Q2023	$1-2 million per one-time treatment	2024
DERMATOLOGY						
BI 655130 *spesolimab* intravenous infusion	Boehringer Ingelheim	Psoriasis	IL-36 receptor antibody	· Proposed for the treatment of generalized pustular psoriasis (GPP) flares · GPP flares are rare and potentially serious, requiring emergency medical care; they begin with dry, red, and tender skin, and within hours widespread pus-filled blisters appear · Current off-label therapies include oral retinoids and biologic disease-modifying anti-rheumatic drug (DMARD) therapies	$60,000/year	8/15/2022
BMS-986165 *deucravacitinib* oral therapy	Bristol Myers Squibb	Psoriasis	Tyrosine kinase 2 inhibitor	· Proposed for the treatment of adults with moderate to severe plaque psoriasis · In two pivotal trials, deucravacitinib demonstrated significant improvements in skin clearance, symptom burden, and quality of life measures compared to placebo and Otezla	$50,000/year	9/10/2022
Vyjuvek *beremagene geperpavec* topical therapy	Krystal Biotech	Epidermolysis bullosa	Gene therapy	· Proposed for the treatment of dystrophic epidermolysis bullosa (DEB) · Once weekly topical therapy applied until wound closure · There are no other therapies available; current standard of care is limited to palliative treatments · The estimated prevalence of DEB is up to 3.26 per one million people	$350,000/ year	2/7/2023

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 | Data is current as of 08/22/2022

CONTINUED

AcariaHealth™ Specialty Pharmacy

Pipeline Report

August 2022

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
ENDOCRINOLOGY						
AT-GAA* *cipaglucosidase alfa/ miglustat* intravenous infusion plus oral therapy	Amicus Therapeutics	Pompe disease	Cipaglucosidase alfa: recombinant human acid alpha-glucosidase enzyme replacement therapy (ERT) Miglustat: pharmacological chaperone	· Proposed for the treatment of late-onset Pompe disease · Estimated U.S prevalence of Pompe disease: ~1 in 40,000 people · Lumizyme and Nexviazyme are available FDA approved ERT alternatives (Nexviazyme for late-onset disease)	$500,000/ year	8/29/2022 10/29/2022
GZ402665 *olipudase alfa* intravenous infusion	sanofi	Acid sphingomyelinase deficiency (ASMD)	Enzyme replacement therapy	· Proposed for the treatment of patients with non-neurological manifestations of ASMD · Would be the first approved treatment for ASMD, which is estimated to affect ~1 in 250,000 individuals	$400,000/ year	10/3/2022
PRV-031 *teplizumab* intravenous infusion	Provention Bio	Delay of type I diabetes	Anti-CD3 monoclonal antibody	· Proposed for the delay of clinical type I diabetes in patients at high-risk of developing the disease · Would be the first-ever agent to delay onset of DM for patients at-risk of advancing to clinical type 1 diabetes · Administered as a single course of therapy consisting of daily intravenous infusions for 14 days	$100,000 for a 14-day course of therapy	11/17/2022
HEMATOLOGY						
Rolontis *eflapegrastim* subcutaneous injection	Spectrum Pharmaceuticals	Chemotherapy-induced neutropenia	Colony stimulating factor	· Dosed once every three weeks · Would compete with Neulasta, Fulphila, and Udenyca	$5,000 per dose	9/9/2022

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 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
omidubicel intravenous infusion	Gamida Cell Ltd	Bone marrow transplant	Allogeneic stem cell product	• Would potentially be the first advanced cell therapy product for allogeneic stem cell transplant, and an alternative to umbilical cord transplants • it is estimated that ≥ 40% of eligible patients in the U.S. do not receive a transplant for various reasons, including the lack of a matched donor	$25,000 per one-time treatment	1/30/2023
INFECTIOUS DISEASE						
Myrcludex B *bulevirtide* subcutaneous injection	Myr Pharmaceuticals	Hepatitis delta virus (HDV) infection	Viral entry inhibitor	• Proposed for the treatment of chronic HDV in adults with compensated liver disease • Would be the first FDA-approved agent for this indication; pegylated interferon products have been used off-label • Daily subcutaneous injection	$150,000/ year	4Q2022
MUSCULOSKELETAL CONDITIONS						
palovarotene* oral capsules	Ipsen	Fibrodysplasia ossificans progressiva (FOP)	Retinoic acid receptor gamma (RAR-γ) agonist	• Proposed for the prevention and treatment of heterotopic ossification (HO) associated with flare up symptoms in patients with FOP • The estimated U.S. prevalence of FOP has been reported as 0.88 per million individuals; there are currently no approved therapies, although glucocorticoids, celecoxib, and NSAIDs are used off-label for treatment of acute flares	$750,000/ year	12/29/2022

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 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
SRP-9001* *delandistrogene moxeparvovec* intravenous infusion	Sarepta Therapeutics	Duchenne muscular dystrophy (DMD)	Gene therapy	• Targets exons 18 through 58 (~60-75% of DMD patients have mutations in these exons) • In October 2021, the global pivotal Phase III EMBARK trial was initiated • Results from Study SRP-9001-101 (n=4, 4-7 years of age) found that participants improved 8.6 points on the North Star Ambulatory Assessment (NSAA) compared to a matched natural history cohort three years following a single administration of SRP-9001 ($p<0.0001$) • In Study SRP-9001-102, SRP-9001-treated participants 6-7 years of age (n=12) had a positive 2.9-point difference on NSAA change from baseline compared to a matched natural history control ($p=0.0129$) • The first functional results were presented from Study SRP-9001-103 (ENDEAVOR), which uses commercially representative SRP-9001 material • Results from the first 11 participants in Cohort 1, 4-7 years of age, demonstrated a 3.0-point improvement from baseline on NSAA six months after treatment • In Part II of SRP-9001-102, participants from the placebo crossover group (n=20, 5-8 years of age) scored 2.0 points higher on the mean NSAA 48 weeks after treatment with SRP-9001 compared to pre-specified matched external control cohort • Sarepta intends to submit an accelerated approval BLA for ambulatory patients during fall 2022, which could mean an accelerated FDA approval by mid-2023	$1-2 million per one-time treatment	Mid-2023

***Expected to cost ≥ $500,000 per member.**

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
SGT-001* intravenous infusion	Solid Biosciences	DMD	Gene therapy	• Two-year interim efficacy and safety data from the first three patients in the high dose (2E14 vg/kg) cohort suggest durable benefit 24-months post-administration of SGT-001, when compared to natural history • Additionally, data from the next three treated patients suggest improved motor function at two years post-infusion, as assessed by 6-Minute Walk Test and NSAA, against expected natural history declines • The data also suggest improved pulmonary function, as measured by forced vital capacity and peak expiratory flow when compared to both baseline and natural history • No new drug-related safety findings have been identified in any of the first nine treated patients in post-dosing periods of 90 days to approximately four years	$1-2 million per one-time treatment	2024

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 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
PF-06939926* *fordadistrogene movaparvovec* intravenous infusion	Pfizer	DMD	Gene therapy	· One-time treatment · Three serious adverse effects were identified in the Phase III CIFFREO trial, muscle weakness including two cases of myocarditis, attributed to the gene therapy · The study protocol was amended to exclude patients with any mutation (exon deletion, exon duplication, insertion, or point mutation) affecting exons 9-13, inclusive, or a deletion that affects both exon 29 and exon 30; these mutations are estimated to represent ~15% of patients with DMD · The FDA's clinical hold on the CIFFREO trial has recently been lifted · There are indications that the muscle-related adverse effects associated with specific exon gene mutations may be a class effect across DMD gene therapies	$1-2 million per one-time treatment	2025
GALGT2* *AAVrh74.MHCK.GALGT2* intra-arterial injection	Sarepta Therapeutics	DMD	Gene therapy	· Would compete with SRP-9001 gene therapy for those with mutations between exons 18 and 58 · SRP-9001 is further along in the pipeline process, but comparative safety and efficacy are undetermined	$1-2 million per one-time treatment	2025
NEPHROLOGY						
sparsentan oral therapy	Travere Therapeutics	IgA nephropathy (IgAN)	Dual endothelin-angiotensin receptor antagonist	· IgAN is the most common type of primary glomerulonephritis worldwide and a leading cause of end-stage kidney disease; IgAN is estimated to affect ≥ 100,000 people in the U.S. · Would compete with Tarpeyo (budesonide) for the same indication	$150,000/ year	11/17/2022

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 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
NEUROLOGY						
Lenti-D* *elivaldogene autotemcel* intravenous infusion	bluebird bio	Cerebral adrenoleukodystrophy (cALD)	Gene therapy	• Currently, the only therapeutic option for patients with cALD is allogeneic hematopoietic stem cell transplant (HSCT); beneficial effect has been reported if performed early in the course of cALD progression • On 8/9/2021, bluebird bio announced that one patient in the ALD-104 clinical trial had developed myelodysplastic syndrome, and that it was likely related to Lenti-D therapy; the ALD-104 trial has been placed on clinical hold pending further investigation into this case • In the U.S., newborn screening for ALD has been added to the Recommended Universal Screening Panel and is currently active in 27 states and Washington, D.C., accounting for ≥ 60% of U.S. newborns • The worldwide incidence of ALD is ~1 in 5,000 to 1 in 17,000 newborns (both male and female), and ~1 in 20,000 to 1 in 30,000 newborn males; cALD develops in approximately 40% of affected boys and in a smaller number of adult men • In June 2022, an FDA Advisory Committee voted unanimously (15-0) that the benefits of Lenti-D outweigh its risks	$1.75 million per one-time treatment	9/16/2022

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 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
AMX0035 *sodium phenylbutyrate/ taurursodiol* oral therapy	Amylyx Pharmaceuticals	Amyotrophic lateral sclerosis (ALS)	Sodium phenylbutyrate: histone deacetylase inhibitor Taurursodiol: cellular apoptosis inhibitor	• In an interim survival analysis of the Phase II CENTAUR trial participants who were followed for up to three years, those who started on AMX0035 showed a 44% lower risk of death compared to those who started on placebo • Median survival duration was 25 months in the AMX0035 group vs. 18.5 months in the placebo group • Subsequently, Amylyx applied a rank-preserving structural failure time model (RPSFTM) to the survival data from the CENTAUR study, resulting in a median survival duration for those originally given AMX0035 of 25.8 months, and an estimated survival on placebo of 15.2 months — a difference of 10.6 months, which translates to a 61% lower risk of death • A second FDA Advisory Committee meeting has been scheduled for 9/7/2022	$170,000/ year	9/29/2022
RTA 408 *omaveloxolone* oral capsules	Reata Pharmaceuticals	Friedreich's ataxia (FA)	Nrf2 activator	• FA is an inherited, debilitating, and degenerative neuromuscular disorder that is typically diagnosed during adolescence and can ultimately lead to early death • Patients with FA experience progressive loss of coordination, muscle weakness, and fatigue, which commonly progresses to motor incapacitation and wheelchair reliance • FA affects approximately 5,000 children and adults in the U.S. • Currently, there are no FDA-approved treatments	$300,000/ year	2/28/2023

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 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
TG-1101 *ublituximab* intravenous infusion	TG Therapeutics	Multiple sclerosis (MS)	Anti-CD20 monoclonal antibody	• Proposed for the treatment of patients with relapsing forms of MS • Loading doses administered on Day 1 and Day 15, then dosed every six months • Has the same mechanism of action as, and would compete with, Ocrevus, Kesimpta, and Rituxan in the treatment of MS	$75,000/year	12/28/2022
BAN2401 *lecanemab* intravenous infusion	Eisai/ Biogen	Early Alzheimer's disease (AD)	Anti-amyloid-beta monoclonal antibody	• Proposed for the treatment of mild cognitive impairment due to AD and mild AD, with confirmed presence of amyloid pathology in the brain • Accelerated approval was requested based on the use of biomarker data measuring brain amyloid levels • Dependent upon the results of the Clarity AD clinical trial, a request for traditional approval will be submitted to the FDA by 3/31/2023	$30,000/year	1/6/2023

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
BIIB067 *tofersen* intrathecal injection	Biogen	ALS	Antisense oligonucleotide	• Proposed for the treatment of superoxide dismutase 1 (SOD1) ALS • Accelerated approval was requested, based on the use of neurofilament as a surrogate biomarker that is reasonably likely to predict clinical benefit • The Phase III VALOR randomized trial did not meet the primary endpoint of change from baseline to Week 28 in the Revised Amyotrophic Lateral Sclerosis Functional Rating Scale (ALSFRS-R) • However, trends of reduced disease progression across multiple secondary and exploratory endpoints were observed • The 12-month integrated data showed that earlier initiation of tofersen led to sustained reductions in neurofilament and slowed decline across multiple efficacy endpoints • SOD1-ALS is a rare genetic form of ALS that affects approximately 330 people in the U.S.	$250,000/ year	1/25/2023
LY3002813 *donanemab* intravenous infusion	Eli Lilly	Early AD	Anti-amyloid-beta monoclonal antibody	• Proposed for the treatment of early symptomatic AD • A BLA was submitted for accelerated approval application based on the use of biomarker data measuring brain amyloid levels. Data also suggested a cognitive and functional benefit to treatment, which Lilly is seeking to confirm with a larger Phase 3 study that is now ongoing.	$30,000/year	2/5/2023

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
PTC-AADC* *eladocagene exuparvovec* intraputamenal injection	PTC Therapeutics	Aromatic L-amino acid decarboxylase (AADC) deficiency	Gene therapy	• There are no approved therapies for the treatment of AADC deficiency, which is an ultra-rare enzyme deficiency disorder • Estimated prevalence: ~5,000 patients worldwide, with a live-birth incidence of approximately 1 in 40,000 worldwide • Five-year follow-up results from a clinical trial show that motor function improvements after PTC-AADC therapy were sustained, demonstrating that the treatment effect is durable • Across three clinical trials, improvements in motor development were recorded in all children from as early as three months • Cognitive and language skills were also reported to improve significantly from baseline, as measured by Bayley-III scores, with children able to understand their caregivers and express themselves • The rate of respiratory infection declined from an average of 2.4 episodes per year at 12 months to 0.6 episodes per year at two years and 0.3 episodes per year at five years • Almost all treated children went from a baseline weight below the third percentile to making age-appropriate weight gains by 12 months following treatment • Planned BLA submission in 3Q2022	$1-2 million per one-time treatment	2023

***Expected to cost ≥ $500,000 per member.**

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
ONCOLOGY						
BGB-A317 *tislelizumab* intravenous infusion	BeiGene/ Novartis	Esophageal carcinoma	Humanized IgG4 anti-PD-1 monoclonal antibody	• Proposed for the treatment of patients with unresectable recurrent locally advanced or metastatic esophageal squamous cell carcinoma after prior systemic therapy	$175,000/year	9/12/2022
Pedmark *sodium thiosulfate* intravenous infusion	Fennec Pharmaceuticals	Chemotherapy-induced ototoxicity	Platinum complex inactivator	• Proposed for the prevention of ototoxicity induced by cisplatin chemotherapy in patients 1 month to < 18 years of age with localized, non-metastatic, solid tumors	$20,000/year	9/23/2022
TAS-120 *futibatinib* oral therapy	Taiho Oncology	Cholangiocarcinoma	FGFR inhibitor	• Proposed for the treatment of previously treated locally advanced or metastatic cholangiocarcinoma with FGFR2 gene rearrangements, including gene fusions • Would be third to market for this indication, after Pemazyre and Truseltiq	$275,000/ year	9/30/2022
HM78136B *poziotinib* oral tablet	Spectrum Pharmaceuticals	Non-small cell lung cancer (NSCLC)	Tyrosine kinase inhibitor	• Proposed for the treatment of previously treated locally advanced or metastatic NSCLC with HER2 exon 20 insertion mutations • Insertion mutations in exon 20 of HER2 are detected in 2%-5% of NSCLCs and are associated with never-smoker status, female sex, and adenocarcinoma histology	$200,000/ year	11/24/2022
IMGN853 *mirvetuximab soravtansine* intravenous infusion	ImmunoGen	Ovarian cancer	Folate receptor-α (FRα) antagonist	• Proposed for treatment as monotherapy of FRα-high, platinum-resistant ovarian cancer in patients who have been previously treated with 1-3 prior systemic treatments	$200,000/ year	11/28/2022

 | Data is current as of 08/22/2022

CONTINUED

AcariaHealth™ Specialty Pharmacy

Pipeline Report

August 2022

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
Omblastys *omburtamab* intracerebroventricular infusion	Y-mAbs	Neuroblastoma	Monoclonal antibody targeting B7-H3	• Proposed for the treatment of pediatric patients with CNS/leptomeningeal metastases from neuroblastoma • Neuroblastoma affects ~9.7 per million children under 15 years of age • The overall incidence of brain metastasis in neuroblastoma after treatment ranges from 1.7% to 11.7%	$350,000 for complete course of therapy	11/30/2022
MRTX849 *adagrasib* oral therapy	Mirati Therapeutics	NSCLC	KRASG12C inhibitor	• Proposed for the treatment of patients with NSCLC who harbor the KRASG12C mutation following at least one prior systemic therapy • Would compete with Lumakras for the population with locally advanced or metastatic disease	$200,000/ year	12/14/2022
JS001 *toripalimab* intravenous infusion	Junshi Biosciences/ Coherus	Nasopharyngeal carcinoma (NPC)	Anti-PD-1 monoclonal antibody	• Proposed for use in combination with gemcitabine and cisplatin for first-line treatment for patients with advanced recurrent or metastatic NPC and as monotherapy for second-line or above treatment of recurrent or metastatic NPC after platinum-containing chemotherapy • About 80% of people with NPC have entered the middle and advanced stage when clinically diagnosed, with lymph node metastasis or distant metastasis • After development of distant metastasis, the five-year survival rate is less than 50%	$200,000/ year	12/23/2022
Lunsumio *mosunetuzumab* subcutaneous or intravenous injection	Roche	Follicular lymphoma (FL)	CD20xCD3 T-cell engaging bispecific antibody	• Proposed for the treatment of adult patients with relapsed or refractory FL who have received at least two prior systemic therapies • Potential competitor to CAR T-cell therapies as third-line therapy for FL	$250,000/ year	12/29/2022

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Indication(s)	Mechanism(s) of Action	Comments	Anticipated Cost	Anticipated Approval Date
MEDI4736 *tremelimumab + durvalumab* intravenous infusion	AstraZeneca	Hepatocellular carcinoma (HCC)	Cytotoxic T-lymphocyte antigen (CTLA) 4 inhibitor + programmed death-ligand 1 (PD-L1) inhibitor	· Proposed for the treatment of unresectable HCC	$300,000/ year	4Q2022
LOXO-305 *pirtobrutinib* oral therapy	Eli Lilly	Mantle cell lymphoma	Non-covalent Bruton's tyrosine kinase (BTK) inhibitor	· Proposed for the treatment of relapsed or refractory mantle cell lymphoma in patients previously treated with a BTK inhibitor	$200,000/ year	2/4/2023
RAD1901 *elacestrant* oral therapy	Radius Health	Breast cancer	Selective estrogen receptor down-regulator/ degrader (SERD)	· Proposed for the treatment of women with ER+/ HER2- advanced or metastatic breast cancer (third-line therapy)	$200,000/ year	2/17/2023
N-803 *nogapendekin alfa inbakicept* intravenous infusion	ImmunityBio	Non-muscle invasive bladder cancer (NMIBC)	IL-15 superagonist complex	· Proposed for use in combination with Bacillus Calmette-Guerin (BCG), for the treatment of patients with BCG-unresponsive NMIBC carcinoma in situ	$200,000/ year	5/23/2023
CYT387 *momelotinib* oral capsule	GlaxoSmithKline	Myelofibrosis	JAK1, JAK2 inhibitor	· Proposed for the treatment of patients with myelofibrosis who have previously received a JAK inhibitor	$200,000/ year	6/16/2023
OPHTHALMOLOGY						
APL-2 *pegcetacoplan* intravitreal injection	Apellis	Geographic atrophy (GA)	Complement inhibitor	· Proposed for the treatment of GA associated with dry age-related macular degeneration (AMD) · GA is an advanced form of AMD, and is a chronic, progressive condition that leads to central blind spots and permanent loss of vision · Approximately one million people in the U.S. have GA, for which there are currently no approved treatments	$25,000/year	11/26/2022

 | Data is current as of 08/22/2022

Drug Name	Manufacturer(s)	Biosimilar Reference Drug	Indication(s)	Status/Estimated Approval	Biosimilar Currently Launched?	Comments
HEMATOLOGY						
Fylnetra *pegfilgrastim-pbbk* subcutaneous injection	Amnea/ Kashiv	Neulasta	Neutropenia	FDA-approved: 5/26/2022	Yes - Fulphila, Udenyca, Ziextenzo	· Another biosimilar to Neulasta, after Fulphila, Udenyca, and Ziextenzo
Lupifil-P *pegfilgrastim* subcutaneous injection	Lupin Pharmaceuticals	Neulasta	Neutropenia	BLA is under FDA review (BsUFA date: 3Q2022)	Yes - Fulphila, Udenyca, Ziextenzo	· Another biosimilar to Neulasta, after Fulphila, Udenyca, and Ziextenzo
MSB11455 *pegfilgrastim* subcutaneous injection	Fresenius Kabi	Neulasta	Neutropenia	BLA is under FDA review (BsUFA date: 3Q2022)	Yes - Fulphila, Udenyca, Ziextenzo	· Another biosimilar to Neulasta, after Fulphila, Udenyca, and Ziextenzo · Completion of the FDA review is contingent upon completion of a pre-approval inspection
IMMUNOLOGY						
AVT02 *adalimumab* subcutaneous injection	Alvotech	Humira	Rheumatoid arthritis	BLA is under FDA review (BsUFA date: Dec 2022)	No	· FDA is now reviewing the BLA, including the request for interchangeability with Humira · AVT02 would be another biosimilar to Humira, after Abrilada, Amjevita, Cyltezo, Hadlima, Hulio, and Hyrimoz
Abrilada, interchangeability status *adalimumab-afzb* subcutaneous injection	Pfizer	Humira	Rheumatoid arthritis	BLA is under FDA review (BsUFA date: 12/23/2022)	No	· Previously approved biosimilar agent; currently proposed for interchangeability with Humira

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Biosimilar Reference Drug	Indication(s)	Status/Estimated Approval	Biosimilar Currently Launched?	Comments
Hyrimoz HCF *adalimumab-adaz* subcutaneous injection	Sandoz	Humira	Rheumatoid arthritis	BLA is under FDA review (BsUFA date: 5/21/2023)	No	· Citrate-free, high concentration formulation of 100 mg/mL
MSB11456 *tocilizumab* subcutaneous injection and intravenous infusion	Fresenius Kabi	Actemra	Rheumatoid arthritis, giant cell arteritis, polyarticular juvenile idiopathic arthritis, and systemic juvenile idiopathic arthritis	BLA is under FDA review (BsUFA date: 2Q2023)	No	· Would be the first approved Actemra biosimilar product
NEUROLOGY						
PB006 *natalizumab* intravenous infusion	Sandoz	Tysabri	Relapsing forms of multiple sclerosis	BLA is under FDA review (BsUFA date: 5/25/2023)	No	· Would be the first approved Tysabri biosimilar product
ONCOLOGY						
BAT1706 *bevacizumab* intravenous infusion	Bio-Thera Solutions, Inc.	Avastin	Colorectal, non-small cell lung, cervical cancers, glioblastoma, renal cell carcinoma	BLA is under FDA review (BsUFA date: 8/28/2022)	Yes - Mvasi, Zirabev	· Another biosimilar to Avastin, after Mvasi and Zirabev
MYL-1402O *bevacizumab* intravenous infusion	Mylan/ Biocon	Avastin	Breast cancer	BLA is under FDA review (BsUFA date: 8/22/2022)	Yes - Mvasi, Zirabev	· Another biosimilar to Avastin, after Mvasi and Zirabev · BLA is pending an FDA inspection of a manufacturing facility

 | Data is current as of 08/22/2022

Drug Name	Manufacturer(s)	Biosimilar Reference Drug	Indication(s)	Status/Estimated Approval	Biosimilar Currently Launched?	Comments
OPHTHALMOLOGY						
Cimerli *ranibizumab-eqrn* intraocular injection	Formycon AG/ Bioeq/Coherus	Lucentis	Neovascular (wet) age-related macular degeneration, macular edema following retinal vein occlusion, diabetic macular edema, diabetic retinopathy, myopic choroidal neovascularization	FDA-approved: 8/2/2022	No	• Another Lucentis biosimilar after Byooviz • Is the only biosimilar to have interchangeable status with Lucentis • Anticipated launch: October 2022, with one year of interchangeable exclusivity from the time of first commercial marketing

 | Data is current as of 08/22/2022

Recent Approvals			
GENERIC NAME	**BRAND NAME**	**MANUFACTURER(S)**	**MARKET LAUNCH DATE**
bortezomib	Velcade	Fresenius Kabi	5/2/2022
pirfenidone	Esbriet (tablet)	Sandoz	5/4/2022
pemetrexed	Alimta (100 mg, 500 mg)	Athenex	5/23/2022
bexarotene	Targretin (gel)	Amneal	5/24/2022
sorafenib tosylate	Nexavar	Mylan	6/1/2022
Pipeline Agents*			
GENERIC NAME	**BRAND NAME**	**MANUFACTURER(S)**	**ANTICIPATED LAUNCH DATE**
gefitinib	Iressa	Apotex; Cipla; Natco Pharma; Qilu Pharmaceutical Co.; Synthon	3Q2022
pralatrexate	Folotyn	Dr. Reddy's; Fresenius; Sandoz; Teva	11/15/2022
bendamustine hydrochloride	Treanda (powder, solution)	Accord; Breckenridge/Natco Pharma; Dr. Reddy's; Glenmark; Hospira/Pfizer; InnoPharma/Pfizer; Mylan/Viatris; Actavis/ Teva; Hetero; Sandoz; Sun	12/7/2022
prednisone	Rayos	Actavis/Teva	12/23/2022
sodium oxybate	Xyrem	Hikma	2H2022
lenalidomide	Revlimid (2.5, 20 mg)	Dr. Reddy's	2022
pirfenidone	Esbriet (capsule)	Accord, Amneal, Laurus, Sandoz	2022
ritonavir	Norvir (capsule)	Mylan/Viatris	2022
teriflunomide	Aubagio	Accord; Alembic; Breckenridge; Glenmark; Sandoz; Alvogen	3/12/2023
teduglutide recombinant	Gattex	Par/Endo	3/19/2023
plerixafor	Mozobil	Sandoz	7/22/2023
darunavir ethanolate	Prezista (75 mg, 150 mg, 300 mg, 400 mg, 600 mg, 800 mg)	Cipla; Hetero; Lupin; Dr. Reddy's; Aurobindo; Teva; Zydus	2022-2023

***Includes generic agents with ≥ 50% launch probability**

 | Data is current as of 08/22/2022

CONTINUED

FDA-APPROVED AGENTS					
Drug Name	**Manufacturer(s)**	**FDA Approval Date**	**Therapeutic Class**	**Comments**	**Cost (WAC)**
Comirnaty *Pfizer COVID-19 vaccine* intramuscular injection	Pfizer	Full FDA approval: 8/23/2021 Original EUA: 12/11/2020 Revised EUA: 6/17/2022, 7/8/2022	Vaccine	· 7/8/2022: Comirnaty gained full FDA approval for use in adolescents 12-15 years of age for active immunization to prevent COVID-19 caused by SARS-CoV2; Comirnaty has already been available under an emergency use authorization for this age group since May 2021 · 6/17/2022: The EUA was expanded to include prevention of COVID-19 in children ≥ 6 months of age · Pfizer's vaccine was previously authorized only for patients ≥ 5 years of age · The CDC Advisory Committee on Immunization Practices(ACIP) unanimously recommended COVID-19 vaccines for children ≥ 6 months of age • **No cost to patients**	$19.50 per dose ^
Spikevax *Moderna COVID-19 Vaccine, mRNA* intramuscular injection	Moderna	Full FDA approval: 1/31/2022 Original EUA: 12/18/2020 Revised EUA: 6/17/2022	Vaccine	· 6/17/2022: The EUA was expanded to include prevention of COVID-19 in children ≥ 6 months of age · Moderna's vaccine was previously authorized only for adult patients · The CDC ACIP unanimously recommended COVID-19 vaccines for children ≥ 6 months of age • **No cost to patients**	$32-$37 per dose ^
Veklury *remdesivir* intravenous infusion	Gilead	FDA Approval: 10/22/2020 Pediatric EUA replaced with full FDA approval: 4/25/2022	Treatment - antiviral	· 4/25/2022: The FDA expanded the approval of the COVID-19 treatment Veklury (remdesivir) to include pediatric patients ≥ 28 days of age weighing ≥ 3 kg with positive results of direct SARS-CoV-2 viral testing, who are: · Hospitalized, or · Not hospitalized and have mild-to-moderate COVID-19 and are at high risk for progression to severe COVID-19, including hospitalization or death	$520 for a 100 mg single-dose vial $2,340 for a 5-day course $5,720 for a 10-day course

^Federal government will initially supply vaccine or treatment at no cost

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	FDA Approval Date	Therapeutic Class	Comments	Cost (WAC)
Olumiant *baricitinib* oral tablet	Eli Lilly	FDA approval: 5/10/2022 Original EUA: 11/19/2020	Treatment - ARDS Janus kinase (JAK) inhibitor	• 5/10/2022: Olumiant gained FDA approval for the treatment of COVID-19 in hospitalized adults requiring supplemental oxygen, non-invasive or invasive mechanical ventilation, or extracorporeal membrane oxygenation (ECMO) • Olumiant remains under EUA status for hospitalized pediatric patients 2 to < 18 years of age requiring supplemental oxygen, non-invasive or invasive mechanical ventilation, or ECMO	$2,553 for a 14-day course $91.17 per 2 mg tablet
AGENTS GRANTED FDA EMERGENCY USE AUTHORIZATION (EUA)					
Drug Name	**Manufacturer(s)**	**EUA Approval Date**	**Therapeutic Class**	**Comments**	**Cost (WAC)**
Ad26.COV2-S intramuscular injection	J&J; Janssen	Original: 2/27/2021	Vaccine	• 5/5/2022: The FDA limited the authorized use of the Janssen COVID-19 vaccine to: • Individuals ≥ 18 years of age for whom other authorized or approved COVID-19 vaccines are not accessible or clinically appropriate, and • Individuals ≥ 18 years of age who elect to receive the Janssen COVID-19 Vaccine because they would otherwise not receive a COVID-19 vaccine • The FDA determined that the risk of thrombosis with thrombocytopenia syndrome, with the onset of symptoms approximately one to two weeks following administration of the Janssen COVID-19 Vaccine, warrants limiting the authorized use of the vaccine • **No cost to patients**	$10 per dose ^

^Federal government will initially supply vaccine or treatment at no cost

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	EUA Approval Date	Therapeutic Class	Comments	Cost (WAC)
Novavax COVID-19 Vaccine, Adjuvanted *NVX-CoV2373* intramuscular injection	Novavax	7/13/2022	Vaccine	· 8/19/2022: The FDA issued an EUA expansion for the prevention of COVID-19 caused by SARS-CoV-2 in adolescents aged 12-17 years · 8/15/2022: Novavax submitted an EUA application to the FDA for active immunization to prevent COVID-19 caused by SARS-CoV-2 as a homologous and heterologous booster in adults aged 18 and older · 7/13/22: The FDA issued an EUA for the prevention of COVID-19 caused by SARS-CoV-2 in individuals 18 years of age or older. On July 19, 2022, the CDC's Advisory Committee on Immunization Practices (ACIP) voted unanimously to recommend the use of the Novavax COVID-19 Vaccine • **No cost to patients**	$16 per dose^
Paxlovid *nirmatrelvir and ritonavir* oral tablets	Pfizer	Original: 12/22/2021 Revised: 7/6/2022	Antiviral protease inhibitor	· 7/6/2022: The FDA revised the EUA for Paxlovid, to authorize state-licensed pharmacists to prescribe Paxlovid to eligible patients, with certain limitations to ensure appropriate patient assessment and prescribing of Paxlovid · 6/30/2022: Pfizer submitted NDA for Paxlovid for the treatment of patients who are at high risk for progression to severe illness from COVID-19 • **No cost to patients**	$530 per course ^
Lagevrio *molnupiravir* oral capsules	Merck/ Ridgeback	Original: 12/23/2021	Antiviral nucleoside analog	· As of 4/1/2022, the NIH COVID-19 Guidelines recommend molnupiravir as an alternative therapy (with the preferred being Paxlovid and Veklury) for non-hospitalized patients with mild to moderate COVID-19 who are at high risk of disease progression • **No cost to patients**	$700 for complete course^

^Federal government will initially supply vaccine or treatment at no cost

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	EUA Approval Date	Therapeutic Class	Comments	Cost (WAC)
Evusheld *tixagevimab and cilgavimab* intramuscular injections	AstraZeneca	Original: 12/8/2021 Revised: 6/29/2022	Treatment - monoclonal antibody	· 6/29/2022: The FDA revised the Evusheld Fact Sheet for Healthcare Providers to recommend repeat dosing every six months with a dose of 300 mg of tixagevimab and 300 mg of cilgavimab if patients need ongoing protection · This is due to nonclinical data and pharmacokinetic modeling that suggest activity against the circulating Omicron subvariants may be retained for six months at drug concentrations achieved following an Evusheld dose of 300 mg of tixagevimab and 300 mg of cilgavimab • **No cost to patients**	No projected pricing yet ^
bebtelovimab intravenous infusion	Eli Lilly	Original: 2/11/2022	Treatment - monoclonal antibody	· As of 4/1/2022, the NIH COVID-19 Guidelines recommend bebtelovimab as an alternative therapy (with the preferred being Paxlovid and Veklury) for non-hospitalized patients with mild to moderate COVID-19 who are at high risk of disease progression • **No cost to patients**	$2,100 per single dose infusion
REGEN-COV *casirivimab + imdevimab* intravenous infusion	Regeneron	Original: 11/21/2020 Revised: 1/24/2022	Treatment - monoclonal antibody	· 8/1/2022: The review for BLA approval is ongoing for the treatment of COVID-19 in non-hospitalized patients and as prophylaxis in certain individuals · In April 2022, the FDA extended the BLA review by three months to review additional data on prophylaxis use for a PDUFA date of 7/13/2022 · The FDA initially delayed the PDUFA for REGEN-COV by three months to 7/13/2022, however, it appears that the goal date was not met; the EUA is still currently not authorized for treatment due to the dominant Omicron variant	$1,500 per single-dose infusion plus $450 administration cost

^Federal government will initially supply vaccine or treatment at no cost

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	EUA Approval Date	Therapeutic Class	Comments	Cost (WAC)
LY-CoV555 + LY-CoV016 *bamlanivimab + etesevimab* intravenous infusion	Eli Lilly	Original: 2/9/2021 Revised: 1/24/2022	Treatment - monoclonal antibody	• 4/29/2022: The National Institute of Health (NIH) COVID-19 guidelines (as of 4/29/2022) continue to recommend against using bamlanivimab plus etesevimab for the treatment of COVID-19 because Omicron has become the dominant variant in the U.S. • **Outpatient only - no cost to patients, although healthcare facilities may charge fees related to administration**	Not applicable
sotrovimab intravenous infusion	GlaxoSmithKline/ Vir	EUA: 5/26/2021 Revised EUA: 2/23/2022	Treatment - monoclonal antibody	• 4/5/2022: Sotrovimab is not authorized in any U.S. state or territory at this time because Omicron has become the dominant variant in the U.S.	$2,100 per single-dose infusion
Actemra *tocilizumab* intravenous infusion	Roche/ Genentech	Original: 6/24/2021	Treatment - IL-6 receptor antagonist	• 4/4/2022: The FDA has accepted the company's supplemental BLA for Priority Review for the treatment of COVID-19 in hospitalized adults who are receiving systemic corticosteroids and require supplemental oxygen, mechanical ventilation, or extracorporeal membrane oxygenation • A decision on FDA approval is expected in 2H2022 • 8-12 mg/kg single-dose infusion; one additional infusion may be administered	$3,228 per single-dose infusion for a 70 kg patient
PIPELINE AGENTS					
Sanofi-GSK vaccine intramuscular injection	Sanofi/ GSK	Currently unknown	Vaccine	• 2/23/2022: Sanofi and GlaxoSmithKline announced they will seek regulatory approval for their COVID-19 vaccine to be administered as a two-dose primary series (given three weeks apart) as well as for use as a booster dose • In the Phase III VAT08 clinical study, the Sanofi-GSK vaccine demonstrated 100% efficacy against severe COVID-19 disease and hospitalizations, and 75% efficacy against moderate or severe COVID-19 • Noting that the trial predominantly included patients infected with SARS-CoV-2 variants of concern, the companies reported 57.9% efficacy against symptomatic COVID-19 • Sanofi/GSK vaccine is a recombinant protein vaccine that uses the SARS-CoV-2 virus spike protein as the vaccine antigen	No projected pricing yet

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Anticipated Date of EUA or FDA Approval	Therapeutic Class	Comments	Cost (WAC)
VERU-111 *sabizabulin* oral therapy	Veru	2H2022	Antiviral, Anti-inflammatory cytoskeleton disruptor	• 6/7/2022: Veru submitted an EUA application to the FDA for its sabizabulin treatment of moderate to severe hospitalized COVID-19 patients at high risk for developing acute respiratory distress syndrome (ARDS) • The EUA submission is based on a Phase III study of approximately 204 hospitalized COVID-19 patients with moderate to severe COVID at high risk for ARDS and death; the primary efficacy endpoint was the proportion of deaths by Day 60 • Based on a planned interim analysis of the first 150 patients randomized, the Independent Data Monitoring Committee unanimously halted the study for overwhelming efficacy which showed that a once daily treatment of 9 mg of sabizabulin resulted in a clinically meaningful and statistically significant 55.2% relative reduction in deaths; sabizabulin was well tolerated • Sabizabulin is a cytoskeleton disruptor which blocks microtubule trafficking and has the potential to treat both the SARS-CoV-2 viral infection and the cytokine storm and septic shock that leads to ARDS and the high COVID-19 mortality rates	No projected pricing yet
MP0420 *ensovibep* intravenous infusion	Novartis/ Molecular Partners	2H2022	Antiviral	• 2/10/2022: EUA for the treatment of COVID-19 submitted to FDA based on the positive results of the Phase II portion of the EMPATHY study • Ensovibep is a multi-specific DARPin (Designed Ankyrin Repeat Protein), specifically designed to block the receptor binding domains of SARS-CoV-2 spike protein through highly potent and cooperative binding, making it challenging for escape mutants • Dose: 75 mg infusion	No projected pricing yet

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Anticipated Date of EUA or FDA Approval	Therapeutic Class	Comments	Cost (WAC)
BRII-196 + BRII-198 *amubarvimab + romlusevimab* intravenous infusion	Brii Biosciences	2H2022	Treatment - monoclonal antibody	• 5/9/2022: The EUA submission is currently under review by the FDA; this antibody combination is proposed for the treatment of patients with COVID-19 at high risk of severe disease progression, including hospitalization or death • Data showed that this long-acting COVID-19 neutralizing antibody combination therapy, retains neutralizing activity against the Omicron BA.2 SARS-CoV-2 subvariant • Based on the final results from the U.S. NIH-sponsored ACTIV-2 Phase III clinical trial with 837 enrolled outpatients, the combination demonstrates a statistically significant 80% reduction of hospitalization and death with fewer deaths through 28 days in the treatment arm (0) relative to placebo (9), and improved safety outcome over placebo in non-hospitalized COVID-19 patients at high risk of clinical progression to severe disease. • Similar efficacy rates were observed in participants initiating therapy early (0-5 days) and late (6-10 days), following symptom onset, providing critically needed clinical evidence in COVID-19 patients who were late for treatment • Amubarvimab and romlusevimab are non-competing SARS-CoV-2 monoclonal neutralizing antibodies derived from convalesced COVID-19 patients	No projected pricing yet

 | Data is current as of 08/22/2022

CONTINUED

Drug Name	Manufacturer(s)	Anticipated Date of EUA or FDA Approval	Therapeutic Class	Comments	Cost (WAC)
lenzilumab intravenous infusion	Humanigen, Inc.	Currently unknown	Treatment - monoclonal antibody	• 7/12/2022: Preliminary topline results from the National Institute of Allergy and Infectious Diseases' (NIAID) ACTIV-5/BET-B trial evaluating lenzilumab plus remdesivir versus placebo plus remdesivir in hospitalized COVID-19 patients showed the trial did not achieve statistical significance on the primary endpoint, which was defined as the proportion of patients with baseline CRP < 150 mg/L and < 85 years of age, alive and without mechanical ventilation through Day 29 • The data also showed a non-significant trend toward a reduction in mortality in the overall patient population [HR 0.72] • Lenzilumab is a proprietary first-in-class monoclonal antibody that neutralizes GM-CSF, a cytokine of importance in the hyperinflammatory cascade associated with COVID-19 and other indications	No projected pricing yet
Zyesami *aviptadil* intravenous infusion	NRx Pharmaceuticals	Currently unknown	Synthetic vasoactive intestinal peptide	• 7/1/2022: The FDA declined to grant the EUA based on failure of Zyesami in the ACTIV-3b trial	No projected pricing yet; available overseas

 | Data is current as of 08/22/2022

Term	Definition
AADC	aromatic L-amino acid decarboxylase
ACIP	Advisory Committee on Immunization Practices
AD	Alzheimer's disease
ALS	amyotrophic lateral sclerosis
AMD	age-related macular degeneration
ARDS	acute respiratory distress syndrome
ASMD	acid sphingomyelinase deficiency
BLA	biologics license application
BsUFA	Biosimilar User Fee Act
cALD	cerebral adrenoleukodystrophy
CAR T-cell	chimeric antigen receptor T-cell

Term	Definition
CGRP	calcitonin gene-related peptide
CKD	chronic kidney disease
COVID-19	coronavirus disease 2019
CTLA	cytotoxic T-lymphocyte antigen
DARPin	designed ankyrin repeat protein
DMARD	disease-modifying anti-rheumatic drug
DMD	Duchenne muscular dystrophy
ECMO	extracorporeal membrane oxygenation
EE	erosive esophagitis
ERT	enzyme replacement therapy
EUA	Emergency Use Authorization

Term	Definition
FA	Friedreich's ataxia
FDA	Food and Drug Administration
FL	follicular lymphoma
FOP	fibrodysplasia ossificans progressiva
GA	geographic atrophy
GIP	glucose-dependent insulinotropic polypeptide
GLP-1	glucagon-like peptide-1
GnRH	gonadotropin-releasing hormone
GPP	generalized pustular psoriasis
H. pylori	Helicobacter pylori
hATTR	hereditary transthyretin-mediated

 | Data is current as of 08/22/2022

CONTINUED

Term	Definition
HCC	hepatocellular carcinoma
HDV	hepatitis delta virus
HFrEF	heart failure
HFrEF	heart failure with reduced ejection fraction
HIF	hypoxia-inducible factor
HSCT	hematopoietic stem cell transplant
IgAN	IgA nephropathy
LBCL	large B-cell lymphoma
mCRPC	metastatic castration-resistant prostate cancer
MS	multiple sclerosis
NIAID	National Institute of Allergy and Infectious Diseases

Term	Definition
NIH	National Institute of Health
NMIBC	non-muscle invasive bladder cancer
NPC	nasopharyngeal carcinoma
NSAA	North Star Ambulatory Assessment
NSCLC	non-small cell lung cancer
PDE4	phosphodiesterase type 4
PD-L1	programmed death-ligand 1
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
SMA	spinal muscular atrophy
TDT	transfusion-dependent beta-thalassemia
TI	transfusion independence

Term	Definition
VOC	variant of concern
WAC	Wholesale Acquisition Cost

 | Data is current as of 08/22/2022

AcariaHealth is a national comprehensive specialty pharmacy focused on improving care and outcomes for patients living with complex conditions, such as hepatitis C, multiple sclerosis, oncology, rheumatoid arthritis, hemophilia, cystic fibrosis and other conditions. Offering specialized care management services in these disease states, AcariaHealth is dedicated to enhancing the patient care offering, collaborating with providers and capturing relevant data to measure patient outcomes.

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