TRENDS-in-MEDICINE

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by Lynne Peterson

Quick Takes

…Highlights from this week's news relating to drugs and devices in development that are not covered in other *Trends-in-Medicine* reports…

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Top news of the week (*read details in other sections of* ***Quick Takes***). The **Covid-19 Update** starts on Page 3, and there is some interesting industry news in it.

- ✓ **BIOGEN and EISAI's aducanumab** – ICER was skeptical of the benefits in Alzheimer's disease, suggesting a price of $2,500-$8,300/year if it is approved.
- ✓ **CHEMOCENTRYX's avacopan** – An FDA advisory cmmittee was split on this C5 inhibitor in ANCA vasculitis.
- ✓ **Covid-19 vaccines** – The Biden administration supports waiving international patent protections for all Covid-19 vaccines.
- ✓ **Positive trial news:**
  - **ALNYLAM PHARMACEUTICALS' Oxlumo** (lumasiran) – in primary hyperoxaluria type 1 (PH1).
  - **ASTRAZENECA's Imfinzi (durvalumab) + tremelimumab** – in NSCLC.
  - **BRISTOL-MYERS SQUIBB's Zeposia** (ozanimod) – vs. Sanofi's Aubagio in MS.
  - **MOTUS GI's Pure-Vu System** – in bowel prep cost-effectiveness.
  - **SAREPTA THERAPEUTICS' SRP-5051** – in Duchenne muscular dystrophy.
  - **ZEALAND PHARMA's Zegalogue** (dasiglucagon) – in Type 1 diabetes hypoglycemia.
- ✓ **Negative trial news:** **ORPHAZYME's arimoclomol** – in ALS.

SHORT TAKES

- **ACERAGEN** bought the worldwide rights to an investigational enzyme replacement therapy for Farber disease, **Enzyvant's RVT-801**, and renamed it ACG-801.
- **ALNYLAM PHARMACEUTICALS' Oxlumo (lumasiran)** – New 12-month results on 24 patients from the Phase III ILLUMINATE-A trial of this HAO1-targeting RNAi therapy in primary hyperoxaluria type 1 (PH1), presented at the American Society of Pediatric Nephrology virtual meeting, showed improvements in nephrocalcinosis in one or both kidneys vs. baseline in 46% of those patients and stability in 17%.
- **ALTASCIENCES**, a contract research organization (CRO), bought another CRO, **Calvert Laboratories**.
- **AMRYT PHARMA** bought **Chiasma**, which gives it Mycapssa (oral octreotide) for acromegaly.
- **ASTELLAS** ended its collaboration with **Cytokinetics** on skeletal sarcomere activators.

- ATHENEX bought **Kuur Therapeutics**, which develops off-the-shelf CAR-NKT cell immunotherapies for use in oncology.

- BECTON DICKINSON is going to spin off its diabetes care business into a standalone public company.

- BIOGEN and EISAI's aducanumab (BIIB-037) – The Institute for Clinical and Economic Review (ICER) was not convinced by the data on this IgG1 antibody in Alzheimer's disease, suggesting that the positive data could simply be due to chance and recommending that, if it is approved, it should be priced at $2,500-$8,300/year. ICER will have a public meeting on aducanumab on July 15, 2021.

- BRISTOL-MYERS SQUIBB's Zeposia (ozanimod) – A study of two oral therapies for relapsing multiple sclerosis, published in the journal ***Multiple Sclerosis and Related Disorders***, found that this S1P receptor modulator significantly reduced the risk of relapse in relapsing multiple sclerosis patients – and had a better safety profile – vs. Sanofi's Aubagio (teriflunomide), a pyrimidine synthesis inhibitor.

- CANBRIDGE PHARMACEUTICALS and **LogicBio Therapeutics** are collaborating on development of gene therapies for Fabry and Pompe diseases using LogicBio's AAV sL65 capsid.

- CERAPEDICS' P-15L, a bone graft for use in treating degenerative disc disease, was granted breakthrough device status by the FDA.

- CHEMOCENTRYX's avacopan – The FDA's Arthritis Advisory Committee, meeting virtually, was split on this complement C5a receptor inhibitor in anti-neutrophil cytoplasmic antibody-associated vasculitis, voting 10-8 that the benefits outweigh the risks. The panel voted 9-9 on efficacy and 10-8 that it is safe. *Remember, a split vote is a neutral vote, so none of these votes was a win for ChemoCentryx.*

- CLOVIS ONCOLOGY's lucitanib – Saying the results in an ongoing Phase Ib/II trial of this VEGFR 1-3/PDGFRα-β/FGFR 1-3 inhibitor with nivolumab (Bristol-Myers Squibb's Opdivo) in non-clear-cell ovarian cancer were "underwhelming," development of lucitanib was halted in this indication. Expect details at the American Society of Clinical Oncology (ASCO) virtual meeting in June 2021.

- Ebola – The February 2021 Ebola outbreak in the Democratic Republic of the Congo (DRC) was declared over, with no new cases for 42 days.

- GALAPAGOS ended development of GLPG-1205, a GPR84 antagonist, in idiopathic pulmonary fibrosis and GLPG-4059 in metabolic diseases.

- GE HEALTHCARE bought **Zionexa**, which will give it Cerianna (fluoroestradiol F-18), a PET imaging agent.

- LABCORP is buying some assets from **Myriad Genetics**, including Vectra, a rheumatoid arthritis assay.

- LILLY signed smart insulin pen deals with Roche, Dexcom, Glooko, and myDiabby Healthcare.

- MICRO MEDICAL SYSTEMS' MicroStent, a vascular stent, was granted breakthrough device status by the FDA.

- MOTUS GI's Pure-Vu System – A cost-effectiveness study, published in the ***Journal of Cost Effectiveness and Resource Allocation***, found that use of this bowel prep system would result in a lifetime savings of $833-$992 per patient vs. standard of care for outpatient colorectal cancer screening and surveillance colonoscopy.

- NEOGENOMICS is buying **Inivata**, which will become a separate liquid biopsy division.

- NKARTA is collaborating with **CRISPR Therapeutics** on development of gene-edited cell therapies for cancer.

- ORPHAZYME's arimoclomol – In top-line data from the pivotal ORARIALS-01 trial in amyotrophic lateral sclerosis (ALS), this heat shock protein amplifier missed the primary and secondary endpoints.

- PANCRYOS' PANINSULA – The company licensed **Takara Bio**'s embryonic stem cell lines for use in developing this cell therapy for Type 1 diabetes.

- POLYPEPTIDE THERAPEUTIC SOLUTIONS was bought by **Arcline Investment Management**, a private equity group.

- ROCKLEY PHOTONICS will supply **Apple** with sensors for measuring glucose levels, blood pressure, and blood alcohol via the Apple Watch, but Apple Watches with the feature probably will not be available until at least next year.

- SAREPTA THERAPEUTICS' SRP-5051 – In Part A of the Phase II MOMENTUM trial in Duchenne muscular dystrophy patients amenable to exon 51 skipping, this next-generation PPMO treatment, dosed at 30 mg/kg monthly, resulted in 18 times more exon skipping and 8 times more dystrophin production vs. eteplirsen (Exondys 51) dosed weekly for 24 weeks. SRP-5051 did cause some hypomagnesemia, but the company believes this is monitorable and manageable.

- SERVIER's Tibsovo (ivosidenib) – The FDA accepted a supplemental new drug application (sNDA) for this IDH1 inhibitor in previously-treated IDH1-mutated cholangiocarcinoma and granted it priority review. That puts the PDUFA date in early November 2021.

- **VIOME's mRNA analysis technology**, combined with its next-generation artifical intelligence platform, was granted breakthrough device status by the FDA for use in screening patients for oral and throat cancer.

- **WALMART HEALTH** is expanding in telemedicine with the acquisition of **MeMD**, a virtual care provider.

- **ZEALAND PHARMA's Zegalogue (dasiglucagon)** – A 59-patient study, published in ***Diabetes Care***, found this glucagon analog is an effective, fast, and reliable treatment for restoring plasma glucose levels in children and adolescents with Type 1 diabetes after insulin-induced hypoglycemia.

NEWS IN BRIEF

ASTRAZENECA

- Is collaborating with **Alchemab** on a proof-of-concept study, using Alchemab's drug discovery platform as a diagnostic tool, to improve understanding of the biology of prostate cancer.

- **Imfinzi (durvalumab) + tremelimumab.** This PD-L1/CTLA4 inhibitor combination (+ chemotherapy) showed a significant overall survival benefit vs. chemotherapy alone in the Phase III POSEIDON trial in metastatic non-small cell lung cancer (NSCLC). The combination also improved progression-free survival (PFS).

PFIZER

- **Elranatamab (PF-06863135).** Enrollment was paused in the pivotal Phase II MagnetisMM-3 trial of this anti-BCMA/CD3 bispecific in relapsed/refractory multiple myeloma after three cases of peripheral neuropathy occurred in an ongoing Phase I trial.

- **Fordadistrogene movaparvovec (PF-06939926).** The start of the Phase III CIFFREO trial of this gene therapy for boys with Duchenne muscular dystrophy was delayed due to FDA questions about potency tests.

- Discontinued development of Phase II trials of:
  - **Dekavil (PF-06687234)**, an F8/IL-10, in ulcerative colitis.
  - **Ritlecitinib (PF-06651600)**, a JAK3/TEC inhibitor, in rheumatoid arthritis.

COVID-19 UPDATE

- **Numbers**
  - **Globally**, there have been 157,819,236 cases and 3,285,756 deaths, a mortality rate of 4.3 per 100,000 people or ~1 in every 25,000 people.
  - In the **U.S.**, there have been 32,696,162 cases, with 581,651 deaths (18% of the worldwide total), a mortality rate of 177 per 100,000 people or 1 in every 564 people. The U.S. continues to be the country with the highest number of total deaths but *not* the highest death *rate* in the world.
  - **Vaccinations.** As of May 9, 114.3 million people in the U.S. have been fully vaccinated (34.3% of the population or 44.3% of people age ≥16). Worldwide, 310 million people have been fully vaccinated (4% of the world population).
  - **India** reported 22,296,414 cases, with 242,362 deaths, a mortality rate of 18 per 100,000, but the accuracy of these statistics is questionable, with undercounting very likely.

- **Cruise Lines** – The Centers for Disease Control and Prevention (CDC) issued new guidelines that require cruise lines to conduct test voyages with volunteers at each port from which they sail, rejecting Norwegian Cruise Line's proposal to allow cruises to resume if all staff and passengers are vaccinated.

- **India** – The surge in Covid-19 cases is continuing.
  - The U.S. okayed export to India of materials for vaccines, treatments, testing supplies, ventilators, etc.
  - The U.S. restricted travel from India.
  - **GILEAD SCIENCES' remdesivir** – Gilead is sending nearly a half million vials of this antibody to India and licensed the antibody to seven companies in India.
  - **MERCK MSD's molnupiravir** – Merck partnered with five generic drug makers in India to boost production of this antibody.

- **Testing** – The CDC has authorized use of 369 tests and sample collection devices under emergency use authorizations (EUAs), including 270 molecular tests, 76 antibody/immune response tests, and 23 antigen tests.

- **Treatment**
  - **ADAGIO THERAPEUTICS' ADG-20** – The Phase I EVADE trial of this antibody suggested it could provide up to 12 months of protection against Covid-SARS-CoV-2 infection with pre- or post-exposure. Where would this fit? Likely as pre-exposure prophylaxis (PrEP) for people unable to

be vaccinated but also as a treatment for unvaccinated people exposed to Covid-19.

- **LILLY and ABCELLERA's LY-CoV1404** – Preclinical data showed this antibody is effective against all known Covid-19 variants and may be effective against future variants. It will now be tested in patients with mild-to-moderate Covid-19.
- **ROCHE's casirivimab + imdevimab** – The results of a Phase III trial showed that this subcutaneous antibody cocktail reduced the risk of Covid-19 infections by 81%, and those who did have symptoms cleared the virus faster, with shorter symptom duration.

Vaccines

- **Missed doses** – As much as 8% of the people in the U.S. who got a first dose of the Pfizer/BioNTech or Moderna vaccine missed the second dose.
- **Patents** – U.S. Trade Representative Katherine Tai said the Biden administration supports waiving international patent protections for all Covid-19 vaccines because "extraordinary circumstances…call for extraordinary measures." However, there was no immediate action. Industry is in an uproar, and German Chancellor Angela Merkel is opposed to the idea.
- **U.S. distribution** – The Biden administration said it will change how it distributes Covid-19 vaccines, sending more doses to states where vaccine demand exceeds supply. Doses allocated to – but not ordered by – states will go into a federal vaccine bank and will be made available to states that need them.
- **U.S. goal** – President Biden's new goal is for 70% of the U.S. to have at least one vaccine dose – and 160 million Americans to be fully vaccinated – by July 4, 2021.
- **ASTRAZENECA's AZD-1222** – The U.K.'s Joint Committee on Vaccination and Immunisation recommended that use of this vaccine in women be restricted to those age >40 because of concern about the blood clot risk.
- **MEDICAGO and GLAXOSMITHKLINE** started a rolling submission to Health Canada for their plant-derived recombinant Covid-19 vaccine.
- **PFIZER and BIONTECH's BNT162b2**
  - ✓ Canada approved use in adolescents.
  - ✓ Pfizer and BioNTech applied to the FDA for full approval of this Covid-19 vaccine.
  - ✓ Pfizer and BioNTech submitted an application to the European Medicines Agency (EMA) for use in adolescents age 12-15.
  - ✓ **Heart inflammation**
    - The EMA's Pharmacovigilance Risk Assessment Committee (PRAC) asked Pfizer for more information relating to reports of heart inflammation with this vaccine, though the head of PRAC said, "There is no indication that these cases are due to the vaccine."
    - Israel's Health Ministry also is examining a small number of cases.
- **SINOVAC's CoronaVac**, a Chinese vaccine
  - ✓ The World Health Organization (WHO) authorized emergency use.
  - ✓ The EMA started a rolling review. However, some EU countries (e.g., Hungary) have already started emergency use.
  - ✓ The Seychelles may be the most vaccinated country with 62.2% of the population vaccinated (more than half with CoronaVac and the rest with AstraZeneca's AZD-1222), but it is still having a surge of infections. It is still unclear whether it is lack of efficacy of CoronaVac or lack of either vaccine working well against the South Africa variant B.1.351 which has been identified there.
- **Sputnik V**
  - Despite facing a truly serious Covid-19 outbreak, regulators (ANVISA) in Brazil rejected authorization of this Russian vaccine over concerns that (a) one of the doses includes adenovirus vectors capable of replicating in human cells and (2) that the efficacy claims may be based on flawed data.
  - Mexico struck a deal that allows it immediately to start producing this vaccine which is already approved there.
- **Walter Reed** Army Institute of Research is developing its own vaccine, one that laboratory tests suggest may be protective against newer variants.

Variants

- **CELLTRION's regdanvimab (CT-P59)** – In preclinical data, this antibody neutralized the South Africa variant B.1.351. The company is now running a 1,300-person Phase III global trial.
- **MODERNA's mRNA-1273** – The company said a study in healthy volunteers showed its vaccine booster, given 6-8 months after a second vaccine dose, increased protection against the South Africa variant B.1.351 and the Brazil variant P.1. And the booster was more effective than a third shot of the original vaccine.
- **NOVAVAX's NVX-CoV2373** – The company reported 51% efficacy against the South Africa variant B.1.351, but only 43% in HIV+ people.

The industry perspective

In another extremely unusual zoom conference with reporters, sponsored by the International Federation of Pharmaceutical Manufacturers & Associations (IFPMA), the heads of several pharmaceutical/biotech companies offered their thoughts on the vaccination situation. Among the key points they made were:

1. **Technology transfer in vaccines is not easy or quick**.
2. **Waiving patent rights would not have any immediate benefit and could be detrimental to vaccine supply**.
3. The **U.S. should lift its restrictions on the export of single-use items/materials** needed for vaccine production because those restrictions have become an "impediment" to worldwide vaccine production and currently are a "bottleneck."

- **Thomas Cueni, Director General of IFPMA**, predicted, "The world could reach herd immunity by next year."
  - ✓ He cautioned that "many people underestimate the complexity of manufacturing" and added, "We do have problems in terms of **bottleneck of raw materials**…A simple breakdown in the supply of bioreactor plastic bags can set back output by weeks or even months."
  - ✓ "Let's not underestimate the complexity of mRNA technology…It is technology that has the potential of much easier scale up…but not for this pandemic in the short term…It is really for mid- and longer-term in my view."
- **Roger Connor, president/Global Vaccines at GlaxoSmithKline** – and a member of COVAX – said the current degree of industry collaboration is something he's "never seen before." He said the vaccine CEOs get together every two weeks to see how they can share.
  - ✓ "At the moment we are focused on the components we need to manufacture the next batch."
  - ✓ "The term 'tech transfer' sounds easy, but we have all been through many in our careers, and they are difficult…New equipment doesn't behave the same, scale up isn't the same, etc…We are all operating making products that are sterile…which means they have to be at the highest standard…Sterile experience and sterile process understanding is not something you can train overnight… Everyone has to be trained, and that takes weeks."
- **Sai Prasad, executive director for Quality Operations at Bharat Biotech** – and president of the 40-member Developing Countries Vaccine Manufacturers' Network (DCVMN) – said:
  - ✓ Technology transfer is "a very, very important tool, but we first **need to match innovators and manufacturers**…It has to be with people who have experience in vaccines. Some [vaccines] take 150-200 components from different parts of the world…This can't be transferred over a 3-6-12 month period."
  - ✓ "As an industry, we need to encourage partnerships between innovators and vaccine makers…And there are more than 200-250 partnerships already…We **have to be careful when we transfer the technology**."
  - ✓ "If the receiving company can't comprehend our technology or manufacture the way we do, we would waste time to transfer that technology…We are willing to transfer technology…but vaccine manufacturing needs expertise, trade secrets."
- **Stéphane Bancel, CEO of Moderna**, said his team has been working 7 days a week for the last 15 months, and everyone is doing as much as they can to increase capacity, but "it is a very complex manufacturing process."
  - ✓ He added that Moderna is "increasing capacity for next year because getting **quick action on variants is going to be key**…If we distract the team of engineers we have for tech transfer now, the impact on 2021 will be very large."
  - ✓ "All the IP [intellectual property] is on the web…Today, our teams work seven days a week to do tech transfer with all our partners…If I took them away to do other transfers, we would not be able to do that…and then by next year, there would be too much capacity in the world… [And] they would need new equipment, which is not on the shelves and would need to be custom-made."
- **Rajinder Suri, CEO of DCVMN**, said:
  - ✓ "The biggest bottleneck is not, as expected, facility-related, manpower-related, or technology…All those have been surmounted by the vaccine industry." Rather, "the immediate bottleneck" is **access to single-use components**, "like cell culture medium, single use plastic bags…It is a complete chain, and if any of the components is missing, the entire chain comes to a grinding halt. That will be the biggest bottleneck if it is not resolved. Most of these materials are coming from the U.S…and they have the DPA [Defense Production Act]…If the DPA is not handled properly, then the supply chain will get impacted and the…global capacity will get adversely impacted."

    Suri cited a second issue: **Sustained funding**.

    And a third challenge: **Variants**.

- **Michelle McMurry-Heath, MD, PhD, president/ CEO of Biotechnology Innovation Organization (BIO)**:
  - ✓ She also called the U.S. **DPA a barrier**, "[It] was well intentioned…[but is] misguided at this stage…The U.S. has to take a hard look and see if they have the ability to lift the DPA."
  - ✓ "The **rate-limiting step** is not intellectual property; it is manufacturing know-how and capacity."
  - ✓ "Vaccine manufacturing really needs experienced, **seasoned workers**."
  - ✓ **"We are in a race against the variants…We need a solution that doesn't make things worse**…Trying to defuse the limited raw materials across more manufacturers that don't have experience with vaccines could jeopardize the progress we are on track to meet."
  - ✓ **"There are only a handful of manufacturers across the globe that have the expertise**, and we need to focus on getting them the materials they need."

REGULATORY NEWS

Regulatory tidbits

- **CMS** – The Centers for Medicare and Medicaid Services extended by 3 years the Comprehensive Care for Joint Replacement (CJR) model.
- **FDA**
  - The FDA's Center for Drug Evaluation and Research (CDER) said it successfully used its machine learning model to predict pharmacodynamic responses of individuals given dosing regimens different from the input data from which a model was constructed.
  - The FDA revoked a Trump administration policy that would have required the Agency to report redundant information related to new drug applications (NDAs) and abbreviated new drug applications (ANDAs) for review by the FDA that have already been published on the FDA website or in a report to Congress.
  - The FDA expanded its collaboration with **CN Bio** to include investigating a lung-on-a-chip model for inhaled drug evaluation applications using CN Bio's PhysioMimix MPS platform.

FDA approvals/clearances

- **CHIESI GLOBAL RARE DISEASES' Ferriprox (deferiprone)** was approved for treatment of transfusional iron overload caused by sickle cell disease and other anemias in patients age ≥3.
- **GENESIS SOFTWARE INNOVATIONS' PreView 3D** shoulder arthroplasty planning software was granted 510(k) clearance.
- **INTEGRA LIFESCIENCES' CereLink ICP**, an intra-cranial pressure monitor, was granted 510(k) clearance.
- **LIFE SPINE's ProLift lateral HELO fixation system**, an expandable spacer for use in lateral lumbar interbody fusion, was cleared for use.
- **MERCK MSD's Keytruda (pembrolizumab)**, a PD-1 inhibitor, was granted accelerated approval for use in combination with trastuzumab (Roche's Herceptin), fluoropyrimidine-, and platinum-containing chemotherapy for first-line treatment of locally advanced/unresectable/metastatic HER2+ gastric or gastroesophageal junction (GEJ) adenocarcinoma.
- **MOTUS GI's Pure-Vu System**, a colon cleansing system, was granted 510(k) clearance for expanded use with gastroscopes during upper gastrointestinal (GI) endoscopy procedures to remove blood, blood clots, and debris in order to improve visualization.
- **SURGICAL INFORMATION SCIENCES' deep brain stimulation-targeting software** was cleared for use.

FDA recalls/warnings

- **ACELLA PHARMACEUTICALS' NP Thyroid liothyronine/levothyroxine** – Thirty-eight lots were recalled due to subpotency. *Remember, there were two prior recalls related to potency, one for superpotency and another for subpotency.*
- **COVID-19** – The FDA issued a warning letter to Disinfect & Shield for sale of an unapproved product with fraudulent Covid-19 claims.
- **PFIZER/HOSPIRA**
  - **Bupivacaine hydrochloride injection 0.5%** – One lot was recalled due to mislabeling.
  - **Lidocaine** – One lot was recalled due to mislabeling.
  - **Sterile water** – One lot was recalled due to visible particulates.

European Regulatory News

- **ADVICENNE's Sibnayal (ADV-7103)** was approved by the European Commission to treat distal renal tubular acidosis (dRTA).
- **ALGODX's NAVOY Sepsis**, an algorithm for predicting the risk of sepsis in adults in the intensive care unit, was granted a CE Mark.
- **ASTELLAS' Xtandi (enzalutamide)** was approved by the European Commission to treat metastatic hormone-sensitive prostate cancer.
- **BIOBEAT**'s artificial intelligence-powered remote patient monitoring platform with wearable wrist and chest patch devices with a one-lead electrocardiogram was granted a CE Mark.
- **EPITOPOIETIC RESEARCH's Gliovac (ERC-1671)** – An inspection of the company's gene therapy facility in Schaijk, Netherlands, found 13 deficiencies related to production of this immunotherapy for glioblastoma which combines autologous cells and cells from donor gliomas. Regulators suspended distribution of Gliovac.
- **EXINI DIAGNOSTICS' aPROMISE**, artificial intelligence-powered software that performs quantitative assessments of prostate-specific membrane and CT scans, was granted a CE Mark.
- **IVASCULAR's iCover**, a balloon-expanding covered stent for treating peripheral lesions, was granted a CE Mark.
- **PERFUZE's Millipede 088**, a clot aspiration catheter, was granted a CE Mark for treating stroke patients.
- **PURIGEN BIOSYSTEMS' Ionic Purification System**, a benchtop nucleic acid extraction system, was granted a CE Mark.
- **ROCHE's Tecentriq (atezolizumab)** was granted expanded approval by the European Commission for use as a first-line monotherapy for PD-L1-high metastatic NSCLC.

U.K.'s National Institute for Health and Care Excellence (NICE) News

- **PFIZER and MERCK KGAA's Bavencio (avelumab)** – NICE rejected use of this PD-L1 inhibitor as maintenance therapy of urothelial cancer after platinum-based chemotherapy.

2021 FDA Advisory Committees and Other Regulatory Dates of Interest *RED are new since last week*		
Date	**Topic**	**Committee/Event**
Missed PDUFA dates with no new date		
November 25	**Revance Therapeutics' daxibotulinumtoxinA** for glabellar lines	PDUFA date *Delayed by FDA No new date announced*
December tba	**Pfizer and Lilly's tanezumab** to treat moderate-to-severe osteoarthritis pain	PDUFA date missed *No decision announced yet*
January 28	**Amgen's Nplate** (romiplostim) – expanded approval to treat hematopoietic syndrome of acute radiation syndrome	PDUFA date *No decision announced yet*
February 2	**Mallinckrodt's StrataGraft**, a regenerative skin tissue therapy	PDUFA date *Decision delayed due to Covid-19*
April 12	**Fortress Biotech/Avenue Therapeutics' IV tramadol**	PDUFA date April 12 *No decision announced yet*
2021 Events		
May tba	**Roche's Esbriet** (pirfenidone) – expanded approval to treat unclassifiable interstitial lung disease	PDUFA date
May 11	Implementation of the **patient-reported outcomes tool** (PRO-CTCAE)	FDA's Pediatric Oncology Subcommittee of the Oncologic Drugs Advisory Committee (ODAC) virtual meeting
May 11-12	Review of **ongoing research**	Science Advisory Board to the National Center for Toxicological Research *Meeting closed to the public*
May 12	Discussion of the use of **real-world evidence** in pediatric trials	FDA's Pediatric Oncology Subcommittee of the Oncologic Drugs Advisory Committee (ODAC) virtual meeting
May 13	**Project Orbis:** Global Collaborative Oncology Review Program	FDA webcast
May 14	**Apellis Pharmaceuticals and SOBI's pegcetacoplan** for treating PNH	PDUFA date
May 14	Regional **International Council for Harmonisation (ICH)** of technical requirements for pharmaceuticals	FDA and Health Canada joint virtual public meeting
May 18	**Sanofi's avalglucosidase alfa** for Pompe disease	PDUFA date *Postponed by FDA by 3 months to August 18*
May 18	**AbbVie's Humira** (adalimumab) vs. generics – AbbVie's CEO Richard Gonzalez grilled	House Oversight Committee
May 18-19	Progress update on **ICH E6 guideline** for good clinical practice	FDA public web conference
May 18-19	Potential **medical error risks** with investigational drug container labels	FDA virtual public meeting
May 21	FDA study data **technical rejection criteria**	FDA webinar
May 26-27	**2021 FDA Science Forum**	FDA virtual meeting
May 27	**Provention Bio's teplizumab** to treat Type 1 diabetes	FDA's Endocrinologic and Metabolic Drugs Advisory Committee virtual meeting
May 30	**Kadmon's belumosudil** for chronic graft-versus-host disease after hematopoietic stem cell transplant	PDUFA date *Extended 3 months by FDA to August 30*
May 30	**Bristol-Myers Squibb's Zeposia** (ozanimod) for ulcerative colitis	PDUFA date
June 1	**Scynexis' Brexafemme** (ibrexafungerp) for vulvovaginal candidiasis	PDUFA date
June 7	**Biogen and Eisai's aducanumab** for Alzheimer's disease	PDUFA date *Extended 3 months by FDA from March 7*
June 7-8	**Morphine milligram equivalents** – current applications and knowledge gaps	FDA Center for Drug Evaluation and Research (CDER) virtual public workshop
June 9	Review of **non-prescription drug** labeling	FDA virtual public workshop
June 9	Discussion of four bulk substances for inclusion on the **503A Bulks List**: choline chloride, oxitriptan, melatonin, and methylcobalamin	FDA's Pharmacy Compounding Advisory Committee virtual meeting
June 10	**Orthopedic device** postmarket review	FDA virtual public workshop
June 17	**Conversations on Cancer:** National Black Family Cancer Awareness Week	FDA's Oncology Center of Excellence webcast
June 21	**Incyte's topical ruxolitinib** to treat atopic dermatitis	PDUFA date
June 22	Assessment of long-term benefit of **osteoarthritis drugs**	FDA and Arthritis Foundation virtual workshop
June 23	Discussion of a variety of medical device regulatory issues	FDA's Office of Medical Device and Radiological Health Operations virtual conference
June 23	**FY2021 generic drug** science and research initiatives	FDA virtual public workshop
June 30	**Lupin Pharmaceuticals' Solosec** (secnidazole) – expanded approval to treat trichomoniasis	PDUFA date
July tba	**Bayer's finerenone** (BAY-94-8862) for Type 2 diabetes patients with CKD	PDUFA date
July tba	**AbbVie's Rinvoq** (upadacitinib) – expanded use to treat moderate-to-severe atopic dermatitis	PDUFA date
July 2	**Provention Bio's teplizumab** (PRV-031) for preventing/delaying clinical Type 1 diabetes	PDUFA date
July 7	**ChemoCentryx's avacopan** to treat anti-neutrophil cytoplasmic antibody-associated vasculitis	PDUFA date

2021 FDA Advisory Committees and Other Regulatory Dates of Interest *RED are new since last week*		
Date	**Topic**	**Committee/Event**
July 15	**FibroGen's roxadustat** for anemia of CKD in dialysis and non-dialysis patients	FDA's Cardiovascular and Renal Drugs Advisory Committee virtual meeting
July 15	**Biogen and Eisai's aducanumab** for Alzheimer's disease	Institute for Clinical and Economic Review (ICER) review
July 18	**Merck MSD's V114**, a 15-valent pneumococcal conjugate vaccine	PDUFA date
July 20	**Albireo Pharma's odevixibat** (A-4250) to treat pruritus in patients with progressive familial intrahepatic cholestasis (PFIC)	PDUFA date
July 21	**Gastroenterology regulatory endpoints** in eosinophillic gastrointestinal disorders	FDA virtual public workshop
July 22	**Gastroenterology regulatory endpoints** in celiac disease	FDA virtual public workshop
July 25	**Iterum Therapeutics' sulopenem etzadroxil/probenecid** for uncomplicated urinary tract infections	PDUFA date
July 29	**Ardelyx Pharmaceuticals' tenapanor** for hyperphosphatemia in CKD patients on dialysis	PDUFA date *Extended from April 29 by the FDA*
August tba	**Pfizer's TicoVac** for tick-borne encephalitis	PDUFA date
August 12	**Jazz Pharmaceuticals' Xywav** (calcium, magnesium, potassium, + sodium oxybates) – expanded use to treat adult idiopathic hypersomnia	PDUFA date
August 16	**Amgen's sotorasib** for KRAS G12C-mutated NSCLC	PDUFA date
August 17	**Astellas and Seagen's Padcev** (enfortumab vedotin-ejfv) for metastatic/locally-advanced urothelial cancer including patients ineligible for cisplatin and who previously received a PD-1/L1 inhibitor	PDUFA date
August 18	**Sensen Bio's vicineum** for non-muscle invasive bladder cancer	PDUFA date
August 18	**Sanofi's avalglucosidase alfa** for Pompe disease	PDUFA date *Extended by FDA by 3 months from May 18*
August 23	**Cara Therapeutics' Korsuva** (difelikefalin, CR-845), a kappa opioid receptor agonist for pruritus in chronic kidney disease patients on dialysis	PDUFA date
August 30	**Kadmon's belumosudil** for chronic graft-versus-host disease after hematopoietic stem cell transplant	PDUFA date *Extended from May 30 by the FDA*
September 15	**Merck MSD's belzutifan** (MK-6482) to treat von Hippel-Lindau disease-associated renal cell carcinoma	PDUFA date
October tba	**Pfizer and OPKO Health's somatrogon** for growth hormone deficiency	PDUFA date
October 10	**Seagen and Genmab's tisotumab vedotin** to treat recurrent/metastatic cervical cancer	PDUFA date
October 18	**BeiGene's Brukinsa** (zanubrutinib) – expanded approval to treat Waldenström's macroglobulinemia	PDUFA date
December 21	**Merck MSD's gefapixant** for refractory chronic cough	PDUFA date
2022 Events		
January 28, 2022	**Bristol-Myers Squibb/MyoKardia's mavacamten** for symptomatic obstructive hypertrophic cardiomyopathy	PDUFA date