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COVID-19: The competitive landscape for medical product development

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Executive IQ Brief

The pharmaceutical and biopharmaceutical industry is scrambling to put products into development to potentially treat, cure or prevent COVID-19 infections.

Based on a review by AgencyIQ of ClinicalTrials.gov, company announcements and media reports, there are at least 65 candidates in various stages of testing to assess their potential effects against COVID-19 or SARS-CoV-2, the virus which causes the condition. These products are already at various stages of development. Some have already been approved and are being assessed for their potential to treat COVID, while others are being repurposed from other late-stage development pipelines. Others are still in the very early stages of development and have not yet been tested in humans.

Based on evidence from recent studies, the chances of clinical success are low. Of all drugs for infectious diseases that enter Phase 1 testing, just 26.7% go on to obtain approval. Just 31.6% of vaccines that enter Phase 1 testing go on to obtain approval. The size of the development pipeline and interest in COVID-19 may indicate that several of these products will go on to obtain approval, but the safety and efficacy of these products is far from guaranteed. As companies try to bring whatever compounds they have into clinical testing, it's possible that few, if any, of these products will ultimately prove safe or effective.

Highlights

37+	28+	10	15
Therapeutic medical products in development	Vaccines in development	Products already approved for other indications	Products already in clinical development

Therapeutic Development

Company	Drug Name	Product Type	Overview/Highlights	History	Timeline	Current phase of development	Sources
Roche	Baloxavir marboxil	Therapeutic	Baloxavir is an inhibitor of the influenza cap-dependent endonuclease enzyme and is used as therapy of influenza A and B.	Baloxavir marboxil was originally developed by Shionogi Co. and Roche for influenza A and influenza B infections. The drug was initially approved for use in Japan in February 2018. It was approved by the FDA on October 24, 2018, for the treatment of acute uncomplicated influenza in patients 12 years of age or older who have been symptomatic for no more than 48 hours.	Previously approved under another indication.	Approved for another indication.	Reported in media / PubChem
Eli Lilly	Baricitinib	Therapeutic	Baricitinib is a selective and reversible Janus kinase 1 (JAK1) and 2 (JAK2) inhibitor. Janus kinases belong to the tyrosine protein kinase family and play an important role in the proinflammatory pathway signaling that is frequently over-activated in autoimmune disorders such as rheumatoid arthritis. By blocking the actions of JAK1/2, baricitinib disrupts the activation of downstream signaling molecules and proinflammatory mediators.	Eli Lilly received approval in 2018 to treat arthritis under the brand name Olumiant. Baricitinib was also approved in the EU in February 2017 as a second-line orally administered treatment for moderate to severe active rheumatoid arthritis in adults, either as a monotherapy or when combined with methotrexate.	Approved in the US and EU in 2018 under separate indication.	Approved for another indication.	Reported in media / PubChem

Sanofi	Chloroquine	Therapeutic	Chloroquine is a 4-aminoquinoline with antimalarial, anti-inflammatory, and potential chemosensitization and radiosensitization activities. Although the mechanism is not well understood, chloroquine is shown to inhibit the parasitic enzyme heme polymerase that converts the toxic heme into non-toxic hemazoin, thereby resulting in the accumulation of toxic heme within the parasite.	Chloroquine is an aminoquinolone derivative first developed in the 1940s for the treatment of malaria. Chloroquine was granted FDA approval on October 31, 1949. Sanofi received this approval under the product name Aralen. Since then, other companies have also had NDAs or ANDAs approved for this drug.	Approved in 1949 under separate indication.	Approved for another indication.	Reported in media / DrugBank
Johnson & Johnson (HIV) Gilead (testing for COVID-19), Janssen (testing for COVID-19)	Darunavir	Therapeutic	Darunavir is an antiretroviral protease inhibitor that is used in the treatment of human immunodeficiency virus (HIV) and prevention of acquired immunodeficiency syndrome (AIDS).	Johnson & Johnson received approval in 2006 for treatment of HIV under the name Prezista. With the recent SARS-CoV-2 outbreak of 2019 that causes coronavirus disease, darunavir is being studied as a possible treatment for SARS-CoV-2 due to in vitro evidence supporting its ability to combat this infection. Clinical trials are underway and are expected to conclude in August 2020.	Approved in 2006 under separate indication. Clinical trials started in 2020 for treatment of Coronavirus, which are set to conclude in August.	Approved for another indication; in clinical testing.	Company Announcement / Nature
Fujifilm	Favipiravir	Therapeutic	Favipiravir is a pyrazinecarboxamide derivative with activity against RNA viruses. Favipiravir is converted to the ribofuranosyltri-phosphate derivative by host enzymes and selectively inhibits the influenza viral RNA-	Discovered by Toyama Chemical Co., Ltd., in Japan, favipiravir is a modified pyrazine analog that was initially approved for therapeutic use in resistant cases of influenza.	Previously approved in Japan.	Not yet in clinical testing.	Reported in media / DrugBank

			dependent RNA polymerase.				
BioCryst	Galidesivir	Therapeutic	Galidesivir is an adenosine analogue that has been investigated for use against Zaire ebolavirus. In animal studies, galidesivir was effective in increasing the survival rates from infections caused by various pathogens, including Ebola, Marburg, Yellow Fever and Zika viruses. In vitro, it displayed broad-spectrum antiviral activity against various negative- and positive-sense RNA viruses, including coronaviruses, filoviruses, and arenaviruses.	BioCryst developed this drug and Phase 1 clinical trials have begun to determine the safety of this drug in humans. Because of its activity against other coronaviruses, it may be studied as a potential therapy for COVID-19.	While testing has been done previously against some infectious diseases, no approvals have been received.	In clinical testing.	Company announcement / DrugBank
Abbott (HIV approval) AbbVie (investigating for COVID-19)	Lopinavir	Therapeutic	Lopinavir is an antiretroviral protease inhibitor used in combination with other antiretrovirals in the treatment of HIV-1 infection. Lopinavir is marketed and administered exclusively in combination with ritonavir.	Abbott Laboratories received approval in 2000 to treat HIV using the combination of lopinavir and ritonavir under the brand name Kaletra. Lopinavir is currently under investigation in combination with ritonavir for the treatment of COVID-19 caused by SARS-CoV-2.	Approved in 2000 in combination with ritonavir to treat HIV. Currently under investigation in combination with ritonavir for the treatment of COVID-19	Approved for another indication.	Company announcement / DrugBank

Romark	Nitazoxanide	Therapeutic	Nitazoxanide is a synthetic benzamide with antiprotozoal activity. Nitazoxanide exerts its antiprotozoal activity by interfering with the pyruvate ferredoxin/flavodoxin oxidoreductase dependent electron transfer reaction, which is essential to anaerobic energy metabolism. PFOR enzyme reduces nitazoxanide, thereby impairing the energy metabolism.	Romark Pharmaceuticals received approval in 2005 to treat parasitic infections under the drug name Alinia. Recently, this drug has been studied as a broad-spectrum antiviral agent due to its ability to inhibit the replication of several RNA and DNA viruses.	Approved in 2005 for treatment of parasitic infections.	Approved for another indication.	Reported in media / DrugBank
Mylan	Penciclovir	Therapeutic	Penciclovir is a synthetic acyclic guanine derivative with antiviral activity, mainly used to treat infections from herpes simplex virus (HSV) types 1 and 2. In HSV infected cells, penciclovir is phosphorylated by viral thymidine kinase and subsequently converted by cellular kinases into the active metabolite, penciclovir triphosphate, which competitively inhibits viral HSV polymerase by blocking deoxyguanosine triphosphate substrate binding. As a result, herpes viral DNA synthesis and replication are selectively inhibited.	Mylan received approval in 1996 to treat HSV under drug name Denavir.	Approved in 1996 for HSV.	Approved for another indication.	Reported in media / PubChem

Johnson & Johnson	Pimodivir	Therapeutic	Pimodivir is an orally bioavailable non-nucleoside inhibitor of the polymerase basic protein 2 (PB2) subunit of the influenza A virus polymerase complex with potential antiviral activity. Upon administration, pimodivir occupies the 7-methyl GTP (m7GTP) binding site of PB2, thereby blocking the cap-snatching activity of the influenza polymerase complex and inhibiting the synthesis of viral mRNA.	Pimodivir is under investigation in clinical trial NCT02658825 by Johnson & Johnson.	Extensive testing has been done already for influenza.	In clinical testing.	Reported in media / PubChem
Gilead Sciences	Remdesivir	Therapeutic	Remdesivir, or GS-5734, is an adenosine triphosphate analog first described in the literature in 2016 as a potential treatment for Ebola.	Remdesivir is being researched as a potential treatment to SARS-CoV2, the coronavirus responsible for COVID-19. Gilead Sciences performed the testing to treat Ebola and is in Phase III clinical trials in the US and China for COVID-19.	No approvals, previous tests had taken place for Ebola, for which the drug has also not received approval, current tests are taking place in tandem in the US and China for COVID-19.	In clinical testing.	Company announcement / DrugBank / Clinical Trial
Valeant (Bausch) Merck	Ribavirin	Therapeutic	Ribavirin is a synthetic nucleoside analog of ribofuranose with activity against hepatitis C virus (HCV) and other RNA viruses. Ribavirin is incorporated into viral RNA, thereby inhibiting viral RNA synthesis, inducing viral genome mutations and inhibiting normal viral replication.	Valeant Pharmaceuticals received approval in 1985 for treatment of respiratory infections in children/babies under the name Virazole. Later, Merck received approval to treat HCV with this drug in combination with interferon alpha 2-b.	Two approvals for separate indications by separate companies were received decades ago. These targeted specific populations for HCV and respiratory illness.	Approved for another indication.	Reported in media / PubChem

Abbott (HIV approval) AbbVie, Ascletis, Pharmstandard, Gilead, Shionogi, Toyama Chemical, Janssen, Biogen, Merck	Ritonavir	Therapeutic	Ritonavir is an L-valine derivative that is an antiretroviral drug from the protease inhibitor class used to treat HIV infection and prevent or treat AIDS. It is often used as a fixed-dose combination with another protease inhibitor, lopinavir. Ritonavir is also used in combination with dasabuvir sodium hydrate, ombitasvir and paritaprevir (under the trade name Viekira Pak) for treatment of chronic hepatitis C virus genotype 1 infection, as well as cirrhosis of the liver.	Abbott received approval for the treatment of HIV in 1996 under the drug name Norvir. Many trials are looking at combinations of ritonavir and other drugs for treatment of COVID-19.	Approved in 1996 for HIV. Currently a piece of many clinical trials for COVID-19 treatments in combination with other drugs.	Approved for another indication; in clinical testing.	Company announcement / PubChem
Pharmstandard	Umifenovir	Therapeutic	Umifenovir is an indole-based, hydrophobic, dual-acting direct antiviral/host-targeting agent used for the treatment and prophylaxis of influenza and other respiratory infections.	It has been in use in Russia for approximately 25 years and in China since 2006. Umifenovir's ability to exert antiviral effects through multiple pathways has resulted in considerable investigation into its use for a variety of enveloped and non-enveloped RNA and DNA viruses, including Flavivirus, Zika virus, foot-and-mouth disease, Lassa virus, Ebola virus, herpes simplex, hepatitis B and C viruses, chikungunya virus, reovirus, Hantaan virus and coxsackie virus B5.	Umifenovir is currently being investigated as a potential treatment and prophylactic agent for COVID-19 caused by SARS-CoV2 infections in combination with both currently available and investigational HIV therapies.	In clinical testing.	Reported in media / PubChem

Takeda Pharmaceutical	TAK-888 (plasma-derived anti-SARS-CoV-2 polyclonal hyperimmune globulin (H-Ig))	Therapeutic - antibody	The TAK-888 antibody is a plasma-derived anti-SARS-CoV-2 polyclonal hyperimmune globulin (H-Ig). Takeda stated they believe they will be able to progress past Phase I safety trials due to the IgG immunoglobin therapies previously proving to be "clinically safe."	At the beginning of March, Takeda started development of TAK-888 to treat high-risk COVID-19 patients.	A spokesperson said the therapy could be available to treat high-risk patients in 9-18 months, though it is unclear whether this would be in a clinical trial or available under and EUA or other mechanism.	Not yet in clinical testing.	Company announcement
Emergent BioSolutions	COVID-HIG, COVID-EIG	Therapeutic - antibody	Emergent Biosolutions is developing two plasma-derived products for COVID-19. These products will utilize the immune response to create protection from the COVID-19 infection.	The company has already generated a hyperimmune platform, which supports other FDA-approved products.	No official timeline, but next steps are to develop the COVID-HIG and COVID-EIG using plasma from humans and horses, respectively.	Not yet in clinical testing.	Company announcement
Harbour BioMed with Mount Sinai	Monoclonal antibodies (mAbs)	Therapeutic - antibody	Created a multi-year partnership to utilize the H2L2 Harbour Mice platform to generate monoclonal antibodies targeting COVID-19. This therapy will be used to prevent the spread of COVID-19 by inhibiting infection of cells.	Both companies bring historical expertise into the partnership. Harbour BioMed brings their antibody generation technology, while Mount Sinai brings translational medical research experience.	Nothing announced; however, the statement from the two organizations notes a commitment to "fast-track innovative research."	Not yet in clinical testing.	Company announcement
ImmunoPrecise Antibodies with EVQLV	PolyTope mAb Therapy	Therapeutic - antibody	The PolyTope mAb Therapy will be used to combine "the benefits of using well-defined and fully characterized monoclonal antibodies with the essential need for a multi-targeting strategy," ImmunoPrecise said in a statement.	The company started their research program for this topic in February.	None stated, but currently in an early research phase.	Not yet in clinical testing.	Company announcement

Regeneron Pharmaceuticals	mAbs generated against SARS-CoV-2 spike on pseudovirus	Therapeutic - antibody	Regeneron aims to discover and develop a mAbs that are effective in both preventing and treating COVID-19.	Regeneron has had prior success in mAbs development for Ebola and MERS. They currently note having 1,000 antibodies in dishes being screened and selected for their COVID-19 efforts.	The CEO has stated that they will know quickly if the mAbs are safe and effective, further noting if this is the case, the company could begin mass production in the late summer of 2020.	Not yet in clinical testing.	Company announcement
Vir Biotechnology WuXi Biologics	mAbs from patients recovered from SARS or another coronavirus	Therapeutic - antibody	Vir and WuXi want to use human monoclonal antibodies to treat COVID-19.	Vir already discovered multiple monoclonal antibodies that can attach to COVID-19.	No stated timeline. The partnership between the groups includes clinical development, manufacturing and commercialization, which will begin at a later time.	Not yet in clinical testing.	Company announcement
Sorrento Therapeutics Celularity	CYNK-001	Therapeutic - cell therapy	The two companies want to expand the use of Celularity's CYNK-001, "an allogeneic, off-the-shelf, placental-derived natural killer (NK) cell therapy" to treat COVID-19.	The NK cells have already been shown to be effective in treating virally effective cells.	None stated, but the groups note they have created capacity at Sorrento's cell therapy manufacturing facility in San Diego.	Not yet in clinical testing.	Company announcement
NanoViricides	Anti-SARS-CoV-2 program	Therapeutic - nanoparticle	Very few details have been released, the program wants to use the companies nanocericide technology.	The company started preparations to test candidates in cell cultures against coronaviruses using the ACE2 receptor.	The group began preparation to test patients in January.	Not yet in clinical testing.	Company announcement
CEL-SCI Corporation	Immunotherapy treatment using LEAPS peptide technology	Therapeutic - peptide	The company statement notes this immunotherapy could reduce COVID-19 viral load and tissue damage due to lung infection.	LEAPS peptides have been tested against H1N1 in partnership with NIAID and were shown to reduce morbidity and mortality in mice.	None, development efforts were initiated on March 9th.	Not yet in clinical testing.	Company announcement

Insilico Medicine	Testing and publishing structures of up to 100 small molecules	Therapeutic - small molecule	The company plans to examine multiple Small molecules that can target COVID-19 protein.	The announcement made Feb 6th noted Insolico will publish structures of small molecules targeting key protein and synthesize and test up to 100 molecules.	None, but the company will continually post updates to their site. It has so far posted 6 small molecules.	Not yet in clinical testing.	Company announcement
Sirnaomics	Developing novel siRNA therapy	Therapeutic - siRNA	Research is taking place in the US and China to develop RNA interference (RNAi)-based prophylactics and therapeutics.	The company has previously used siRNA drugs for treatment of SARS and H5N1 in addition to other viral respiratory infections.	None, but company considers itself "well positioned" to make an impact particularly among patients with unmet medical need.	Not yet in clinical testing.	Company announcement
Vir Biotechnology Alnylam Pharmaceuticals	SARS-CoV-2 targeting human monoclonal antibodies	Therapeutic - siRNA	Utilizing Alnylam's "advances in lung delivery of novel conjugates of siRNA" with Vir's additional capabilities, the partnership will try to create siRNAs to treat COVID-19 and other coronaviruses.	The two groups have already been in partnership for infectious disease treatments and announced on March 4th that they are now expanding their partnership (and their technologies on the side of Vir) to help develop a COVID-19 treatment.	At the beginning of March 2020 the two groups expanded a deal made in 2017 to develop RNAi programs for infectious diseases to include siRNA therapeutics for COVID-19.	Not yet in clinical testing.	Company announcement
Flanders Institute for Biotechnology (VIB) Ghent University	Llama-derived single domain antibodies generated against spike protein domain conserved across SARS-CoV and Sars-COV-2	Therapeutic - antibody	The group will target the SARS-Cov and SARS-CoV-2 spike protein using Llama-derived single domain antibodies (VHHs).	The group has a second pending program using VHH-generated against SARS-CoV-2.	None stated, but the VHH candidate has already been generated.	Not yet in clinical testing.	Reported in media
National Institutes of Health	Remdesivir	Therapeutic - antibody	NIH is testing remdesivir, an investigational antiviral treatment developed by Gilead, on hospitalized adults diagnosed with COVID-19 at University of Nebraska Medical Center.	This treatment was developed by Gilead for Ebola years ago, and is now being tested by various groups across the globe for treatment of COVID-19.	Testing began in February.	In clinical testing.	Company announcement / PubChem / Clinical Trial

Eli Lilly AbCellera	Unknown antibody	Therapeutic-antibody	Eli Lilly entered into an agreement with AbCellera Biologics to develop an experimental therapy for COVID-19.	The agreement between the companies was announced on the March 12, 2020. Previously, AbCellera was awarded a contract from DoD DARPA to create an end-to-end platform for rapid pandemic response in 2018. This tech was tested at the time against MERS-CoV with positive results.	No discussed timeline, however AbCellera technology aims to "quickly screen for potent antibodies and validate potential candidates on tight timelines."	Not yet in clinical testing.	Company announcement
AbbVie	Lopinavir/ ritonavir	Therapeutic	AbbVie will evaluate HIV medicine Kaletra/Aluvia for COVID-19 treatment in partnership with health authorities and institutions to examine efficacy and antiviral activity in the medication.	Company previously received approval for the drugs for the treatment of HIV. AbbVie donated Aluvia to China in January for experimental use against COVID-19, and Chinese media reports have said it is effective.	Previously approved in 2005 and announcement for new exploration came March 11, 2020.	Not yet in clinical testing.	Company announcement / PubChem
Mallinckrodt	Inhaled nitric oxide (ino)	Therapeutic	The company is exploring inhaled nitric oxide (iNO) as a supportive measure for COVID-19, particularly for patients with pulmonary complications.	The company already markets iNO as INOmax in the US to treat term and near-term newborns suffering from hypoxic respiratory failure caused by pulmonary hypertension. Additionally, iNO was used in a study to treat six SARS-CoV patients and showed improvements compared to controls.	Currently working with FDA and other regulatory agencies to explore the treatment possibility.	Approved for another indication.	Company announcement / PubChem

Aim Immunotech Inc. (formerly Hemispherx Biopharma Inc.) GP Pharm SA Goethe University Frankfurt	Rintatolimod	Therapeutic	Rintatolimod is a synthetic derivative of inosinic acid with antiretroviral and immunomodulatory properties. Atvogen acts through a number of pathways to stimulate intracellular antiviral activity of the immune system: it stimulates interferon production; activates the oligoadenylate synthase-RNase L pathway; stimulates natural killer cell activity; and acts as a non-mitogenic stimulator of the immune system. This agent also inhibits replication of HIV in vitro.	Approved for chronic fatigue syndrome in various countries; entered discovery for coronavirus in February 2020.	March 9, 2020 press release indicated testing would soon begin in Japan.	Not yet in clinical testing.	Company announcement / PubChem
Ascletis Pharma, Inc.	ASC-09 + ritonavir	Therapeutic	This works as a fixed-dose combination of two HIV-1 protease inhibitors, ASC-09 and ritonavir, in order to treat HIV and COVID-19.	Ritonavir received approval under name Noravir for treatment of HIV (Abbott) in 1996. Testing this year in China was seen favorably as a COVID-19 treatment	In the US, a timeline is unclear. In China, approval from the Ninth Hospital of Nanchang was received on February 16, 2020.	In clinical testing.	Company announcement / PubChem / Clinical Trials
Beijing Defengrei Biotechnology, Co	BDB-1	Therapeutic	BDB-1 works as an anti-C5a monoclonal antibody.	BDB-1 received approval in February to move forward on clinical trials in China for COVID-19.	Clinical trials should have already began in China.	In clinical testing.	Reported in media
Innovation Pharmaceuticals, Inc.	Brilacidin	Therapeutic	Brilacidin is Innovation Pharmaceuticals' top defensin mimetic drug candidate, which will be tested against SARS-CoV-2.	The companies press release states, "Brilacidin is one of the few drugs targeting COVID-19 that has been tested in human trials for other clinical indications, providing an established safety and efficacy profile, thereby potentially enabling it to rapidly help address the emerging worldwide coronavirus crisis, developed both as an	Testing is scheduled to start the week of March 16, 2020.	In clinical testing.	Company announcement / PubChem

				intravenous medicine and as a vaccine."			
Wuhan Hamilton Biotechnology, Co., Ltd.	Umbilical cord-derived mesenchymal stem cells (intravenous)	Therapeutic	Wuhan Hamilton Biotechnology is investigating "human umbilical cord-derived mesenchymal stem cells for the potential intravenous treatment" of COVID-19.	Clinical trial was planned in China in February 2020.	Clinical trials should have already begun in China.	In clinical testing.	Reported in media
Beroni Group Tianjin University	Novel medication using nanobody technologies	Therapeutic	Developing product for both detection and treatment of COVID-19 using nanobody-based technology.	Beroni Group has previously worked on products for global diseases.	None stated, but Beroni has discussed working with regulatory bodies to advance toward clinical trials.	Not yet in clinical testing.	Company announcement
Sanofi Regeneron Pharmaceuticals	Sarilumab	Therapeutic	Sarilumab is a fully human anti-IL-6R monoclonal IgG1 antibody that binds to both membrane bound and soluble interleukin 6 (IL-6) receptor forms, thus blocking the cis- and trans-inflammatory signaling cascades of IL-6.	Sarilumab was developed by Sanofi and Regeneron Pharmaceuticals, Inc. It was US FDA-approved in May 2017 and followed by EU approval in June 2017 for the treatment of moderate to severe rheumatoid arthritis (RA) in combination with methotrexate.	Press release from the companies states that Phase 2/3 trials will be enrolling patients immediately, starting in New York.	In clinical testing.	Company announcement / DrugBank

Vaccine Development

Company	Drug Name/ Platform	Product Type	Overview/Highlights	History	Timeline	Current phase of development	Sources
Moderna NIAID	mRNA	Vaccine - RNA	Moderna creates mRNA vaccines that use "viral bits" to train the body to recognize them, rather than attenuated viruses. Moderna is a recognized industry leader in the development of mRNA vaccines, but many other companies also use this technology.	Moderna proposed a sequence for an mRNA vaccine in mid-January 2020. This shipped for safety trials at end of February.	First human trials to begin in Seattle at Kaiser Permanente Health Research Institute.	In clinical testing.	Company announcement
CanSino Biologics Beijing Institute of Biotechnology	Ad5-nCoV	Vaccine - non-replicating viral vector	A recombinant novel coronavirus vaccine (adenovirus Type 5 vector).	Company claims its platform has been used to help develop other vaccines, including one against Ebola approved by Chinese regulatory officials.	Entered clinical testing in China on March 17th.	In clinical testing.	Company announcement
Greffex	Ad5 S (GREVAX platform)	Vaccine - non-replicating viral vector	This uses an adenoviral compound without Ad genes and with plasmid packaging.	Greffex is one of the first to move to animal testing.	Market ready by late 2020, currently testing in animals.	In clinical testing.	Company announcement
Protein Sciences, subsidiary of Sanofi Pasteur BARDA	S protein (baculovirus production)	Vaccine - Protein subunit	Sanofi is working on the vaccine and also has projects therapeutics front.	The technology is based on SARS research.	Uncertain of when this would be ready but looking at accelerated timeline approval.	Not yet in clinical testing.	Company announcement
Janssen BARDA	Ad26	Vaccine - non-replicating viral vector	Janssen is in partnership with HHS for this development, using adjuvanted recombinant technology.	Janssen notably created an effective Ebola vaccine and plans to explore existing coronavirus information.	No official timeline announced.	Not yet in clinical testing.	Company announcement

Inovio	DNA plasmid vaccine Electroporation device	Vaccine - DNA	Inovio received $5M from Gates Foundation for research on a smart delivery device dubbed INO-4800. This is one of the only companies developing a vaccine and accompanying medical device.	Began preclinical trials and preparatory research in January.	Set to have human trials beginning in April.	Not yet in clinical testing.	Company announcement
Takis Applied DNA Sciences Evvivax	DNA	Vaccine - DNA	The group designed 4 DNA vaccine candidates.	The four candidates will move to preclinical animal testing.	Scaling up production of candidates this month to send back to Takis for efficacy testing.	Not yet in clinical testing.	Company announcement
Zydus Cadila	DNA plasmid vaccine	Vaccine - DNA	Plasmids are injected carrying DNA sequences that code for the viral antigen.	Zydus is partnered with XOMA.	No official timeline announced, but the company statement speaks to the desire to develop a "speedy solution."	Not yet in clinical testing.	Company announcement
Codagenix Serum Institute of India	Deoptimized live attenuated vaccines	Vaccine - live attenuated virus	This is a US-Indian partnership which will utilize a method that uses a weakened form of a virus to trigger an immune response from the body. Smallpox and measles vaccines use this method of inoculation.	The group claimed to be first to move from the lab to preclinical trials.	Human trials will begin in summer 2020, aiming to be market ready by 2022.	Not yet in clinical testing.	Company announcement
GeoVax BravoVax	MVA encoded VLP	Vaccine - non-replicating viral vector	This is a US-Chinese partnership, where BravoVax will be responsible for manufacturing and testing. This method uses virus like particles to trigger an immune response, rather than live copies of the virus.	GeoVax will use its GV-MVA-VLP vaccine platform.	The company believes their technology will speed up the development process for a vaccine.	Not yet in clinical testing.	Company announcement
University of Oxford Novavax	ChAdOX1	Vaccine - non-replicating viral vector	This technique uses an adenovirus to deliver genetic material into a cell.	ChAdOX1 will use a platform originally developed for malaria.	Expected to go into clinical trials in spring 2020.	Not yet in clinical testing.	Company announcement

Altimmune	Adenovirus-based NasoVAX	Vaccine - non-replicating viral vector	This technique uses an adenovirus to deliver genetic material into a cell. This project builds on technology used in NasoVAX flu treatment.	Altimmune noted on February 28, 2020 that they have finished the design and synthesis of a vaccine and will take steps to test animals.	Clinical testing in August 2020.	Not yet in clinical testing.	Company announcement
Vaxart	Oral vaccine	Vaccine - non-replicating viral vector	Vaxart is a small biotech company specializing in oral vaccine development. They plan to deploy this technology on COVID-19.	Vaxaart already operates a proprietary oral vaccine platform called VAAST, which has had prior success with influenza.	None discussed but the company believe oral vaccines will be essential in a future vaccination campaign.	Not yet in clinical testing.	Company announcement
ExpreS2ion	Drosophilia S2 insect cell expression system VLPs	Vaccine - protein subunit	This method uses insect cells to develop recombinant proteins.	Awarded an EU Horizon 2020 grant for the COVID-19 (SARS-CoV-2) Coronavirus vaccine development program.	Goal for 12-month trial timeline.	Not yet in clinical testing.	Company announcement
WRAIR USAMRIID	S Protein	Vaccine - protein subunit	S protein vaccines target the spike on the on the virus, which is used to break into cells.	Unknown	Unknown	Not yet in clinical testing.	Reported by media
Clover Biopharmaceuticals Inc. GSK	S-Trimer	Vaccine - protein subunit	"Utilizing its patented Trimer-Tag© technology, Clover has produced a S-Trimer subunit vaccine that resembles the native trimeric viral spike via a rapid mammalian cell-culture based expression system." RNA viruses rely on trimerized proteins to form the viral spike.	Clover's previous focus has revolved around "developing novel and transformative biologic therapies."	The company notes that Clover could quickly produce large amounts of the vaccine.	Not yet in clinical testing.	Company announcement
Vaxil Bio	Peptide	Vaccine - protein subunit	Peptide vaccines are unique in their ability to be especially targeted and mitigate unintended reactions.	A vaccine candidate was created using Vaxil's proprietary VAXHit platform.	The company has finished in silico analyses and feels a vaccine candidate has been successfully identified.	Not yet in clinical testing.	Company announcement

Generex EpiVax	li-Key peptide	Vaccine - protein subunit	The two companies will use EpiVax's NuGenerex Immuno-Oncology li-key technology to generate a peptide vaccine.	EpiVax has identified "hotspots" in COVID-19 amino acid sequences.	Plan to send a series of synthetic amino acid peptides to China for testing.	Not yet in clinical testing.	Company announcement
EpiVax	S Protein	Vaccine - protein subunit	S protein vaccines target the spike on the on the virus, which is used to break into cells.	EpiVax will use proprietary in solico tools which showed success with H7N9.	While a COVID-19 sample has been obtained, no further progress has been announced.	Not yet in clinical testing.	Company announcement
University of Queensland GSK	S protein clamp	Vaccine - protein subunit	S protein vaccines target the spike on the on the virus, which is used to break into cells. This would form a molecular clamp around the spike.	This is a culmination of many entities coming together to work on a vaccine, primarily under funding obtained by CEPI.	Thus far, partnerships have been formalized, making way for more progress on the vaccine to begin.	Not yet in clinical testing.	Company announcement
Baylor, NY Blood Center Fudan University	S1 or RBD protein	Vaccine - protein subunit	Targets spike proteins and receptor binding domains, exposing neutralizing epitopes which are vulnerable to attack.	Builds on a technique originally used to target MERS and SARS.	No announced timeline.	Not yet in clinical testing.	Reported by media
iBio CC-Pharming	Subunit protein, plant produced	Vaccine - protein subunit	Will use plant-based expressions systems.	In partnership with DARPA, iBio built their FastPharming Facility to generate rapid delivery of medical countermeasures in the case of a pandemic. The partners have also had previous experience working on MERS.	Both companies are expediting their work.	Not yet in clinical testing.	Company announcement

Institute Pasteur	Measles vector	Vaccine - replicating viral vector	This uses a weakened measles virus as a vector to introduce coding for antigens against a specific virus into the immune system.	The group previously sequenced the entire genome of COVID-19. The Institute now has access to the virus responsible for infection.	No formal timelines, but company says its aim to tackle this as quickly as possible.	Not yet in clinical testing.	Reported by media
Tonix Pharma Southern Research	Horsepox vector	Vaccine - replicating viral vector	Tonix uses a proprietary horsevirus as a vector to introduce vaccines into the immune system.	The group will work from Tonix's proprietary horsepox vaccine platform currently being used for a smallpox vaccine.	Partnership was announced on February 26, 2020.	Not yet in clinical testing.	Company announcement
China CDC Tongji University Stermina	mRNA	Vaccine - RNA	mRNA vaccines use "viral bits" to train the body to recognize them, rather than attenuated viruses.	The group isolated the first new COVID-19 strain on January 24, 2020.	The vaccine has been tested on animals.	In clinical testing.	Reported by media
Arcturus Duke-NUS	mRNA	Vaccine - RNA	mRNA vaccines use "viral bits" to train the body to recognize them, rather than attenuated viruses.	Development will utilize the company's STARR tech platform which may produce a vaccine response at lower doses than traditional mRNA vaccines.	No reported timeline, partnership announced on March 4, 2020.	Not yet in clinical testing.	Company announcement
Imperial College London	saRNA	Vaccine - RNA	This will use self-amplifying RNA to rapidly produce vaccines.	A vaccine candidate was generated, and animal testing began on February 10, 2020.	The company said new methods are much faster.	In clinical testing.	Company announcement
Curevac	mRNA	Vaccine - RNA	Curevac's CEO just left the company after a meeting with the White House. The mRNA vaccines use "viral bits" to train the body to recognize them, rather than attenuated viruses.	The company previously announced successful rabies vaccination results and boasts previous expertise in mRNA-based vaccine manufacturing.	No reported timeline.	Not yet in clinical testing	Company announcement

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