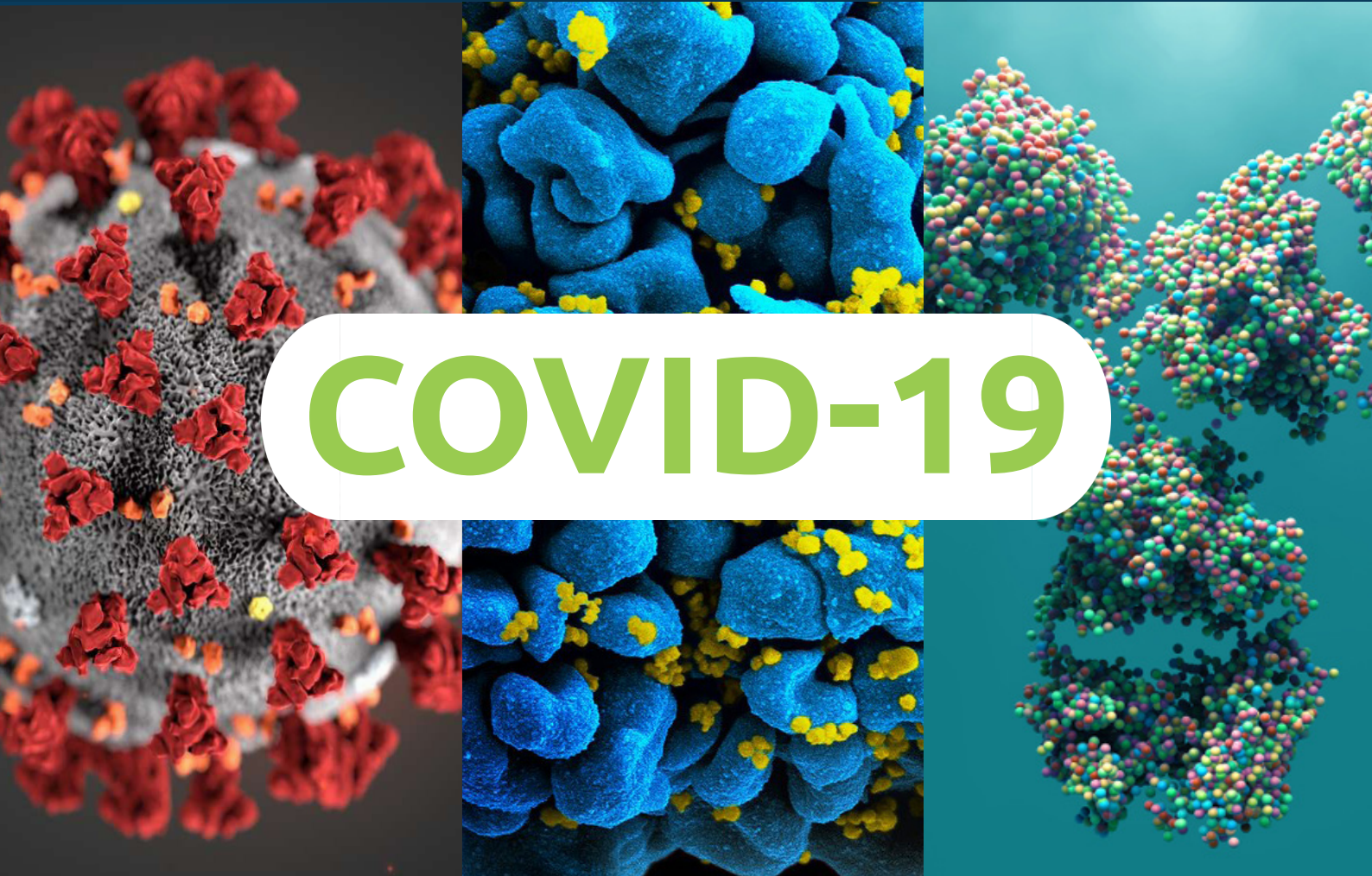




IMMUNOWATCH

SPECIAL EDITION – 3RD UPDATE 07/09/20



COVID-19



MAB DESIGN
THE IMMUNOTHERAPY NETWORK

INTRODUCTION

MabDesign and the COVID-19 pandemic

The French immunotherapy network is facing unprecedented challenges and uncertainties as a result of the COVID-19 pandemic. Now more than ever, there is a need for rapid development of both preventive and curative treatments and facilitated access to information, resources and potential collaborators. Since the beginning of the disease outbreak, MabDesign has been continuously adapting its actions and services to respond to those needs. Our latest and ongoing contribution to the fight against COVID-19 is through this special edition of Immunowatch and its regular updates.

MabDesign's Immunowatch is a one-of-a-kind information monitoring newsletter in the field of immunotherapy which aims at providing members of our association with the most recent and relevant data gathered or generated through the key expertise of MabDesign and its collaborators in scientific research, business intelligence, market analysis and intellectual property. Its original format has been modified to cater for the fast evolution of the response to the COVID-19 pandemic and allow rapid and pertinent updates. Immunowatch is done in collaboration with the MAbMapping Unit of the Ambition Recherche & Développement (ARD) Biomédicaments 2020 Phase II programme, funded by the Centre Val de Loire region.



BIOPHARMACEUTICALS

*Innovation Dynamics in Health
IN REGION CENTRE-VAL DE LOIRE*



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COVID-19: Message from MabDesign president, Francis Carré



Amidst these singular times of health crisis linked to the COVID-19 pandemic, pharmaceutical companies and the scientific community at large were both expected to rapidly rise up to the challenge of providing a timely yet adequate response in terms of research findings on SARS-CoV-2 together with solutions such as diagnostics tools, treatments and vaccines. And the pandemic response was not long in coming. Within weeks of WHO's official statement on the novel coronavirus beginning of 2020, there were already reports of pharmaceutical and biotechnology companies initiating R&D of innovative or repurposed products and services. Despite lockdowns in several countries and other restrictions, we have witnessed an 8-fold increase in the COVID-19 therapy and vaccine pipeline since April combined with an increasing number of diagnostic tools receiving market approval. France's immunotherapy network has significantly contributed to these achievements in the fight against COVID-19. In parallel, a growing number of major collaborations, deals and licensing agreements between companies worldwide, including French ones, is further contributing to finding efficient solutions to the pandemic. Interestingly, these have transcended the pharmaceutical field. We, at MabDesign, have been actively contributing to the COVID-19 response by amending our services and the format of our scientific events and that of our training sessions for our continued commitment towards the French Immunotherapy network despite the current sanitary measures and restrictions. Since May, we have launched, and have regularly updated, the special edition of our information-monitoring letter Immunowatch to provide our network with the most recent and pertinent information on the COVID-19 response. In this third update, we have included new sections on the recently marketed drugs and vaccines and drug-candidates currently undergoing Phase III clinical trials together with the latest updates of the usual sections.



AVAILABLE COVID-19 TREATMENT AND DRUGS*

The COVID-19 outbreak in the city of Wuhan, China was first reported to the World Health Organization in late December 2019. While the disease was reaching pandemic proportions in a matter of weeks, the pharmaceutical industry and the scientific community were already researching and developing treatments and vaccines against SARS-CoV-2. Despite lockdowns in several countries and resulting delays in drug R&D, 5 treatments and vaccines have been made available since August 2020 although on restricted geographic zones (either country or region).

Treatments

Drug name	Company Name	Drug Geography	Target	Mechanism of Action
Remdesivir	Gilead Sciences	UE + Japan	RNA Polymerase	RNA Polymerase Inhibitor
Levilimab	Biocad	Russia	Interleukin 6 Receptor (IL6R)	Interleukin 6 Receptor (IL6R) Antagonist
Olokizumab	R Pharm	Russia	Interleukin 6	Interleukin 6 Inhibitor
Favipiravir	Dr. Reddy's Laboratories Ltd Kromis R-Pharm	Russia + India	RNA Polymerase	RNA Polymerase

Vaccines

Drug name	Company Name	Drug Geography	Vaccine type
Coronavirus Disease 2019 (COVID-19) Vaccine Gam-COVID-Vac	Gamaleya Federal Research Center of Epidemiology and Microbiology	Russia	Recombinant Vector Vaccine

COVID-19 PIPELINE*



KEY FIGURES

903



Companies developing at least one product

1145



Unique molecules in the pipeline

3019



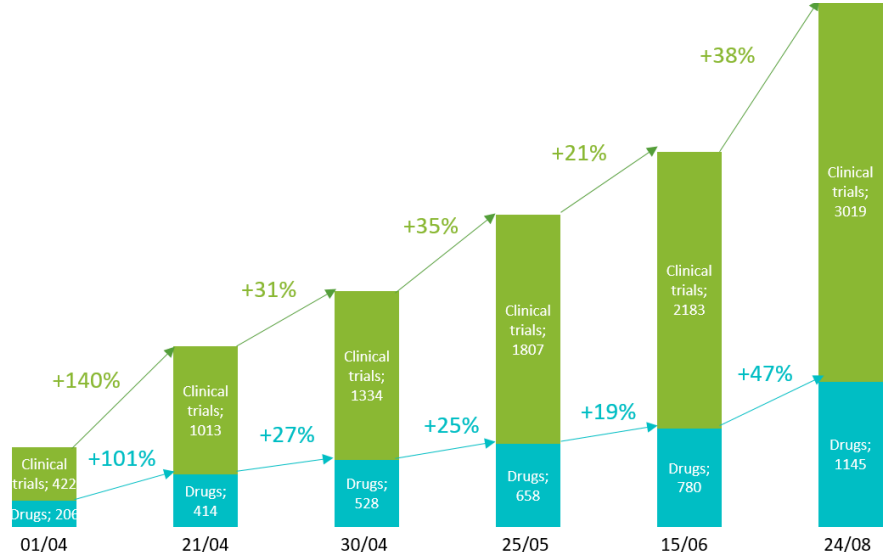
Clinical trials

43%

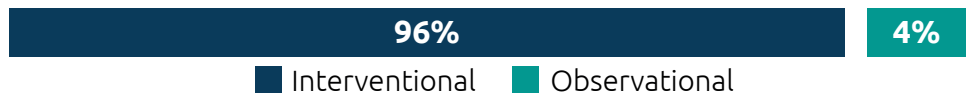


Ongoing trials

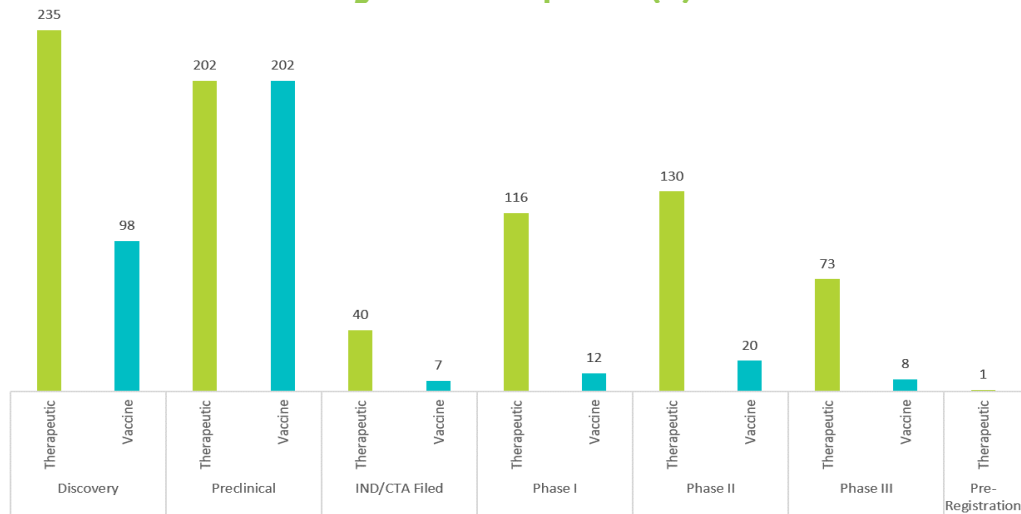
Significant increase in the pipeline



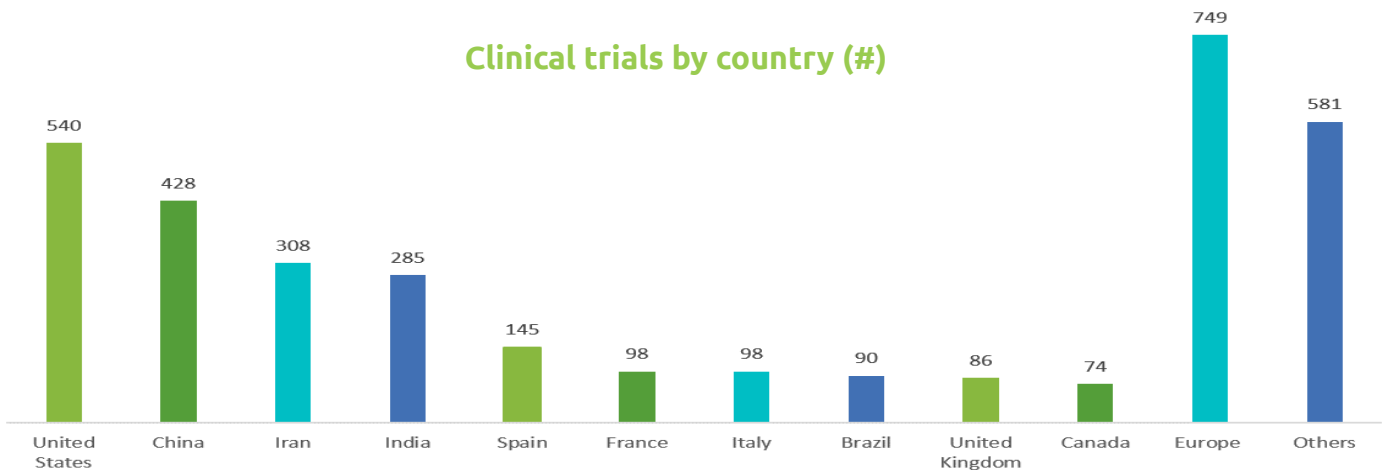
Type of clinical studies



Stage of development (#)



Clinical trials by country (#)



* All data has been generated by MabDesign unless stated otherwise

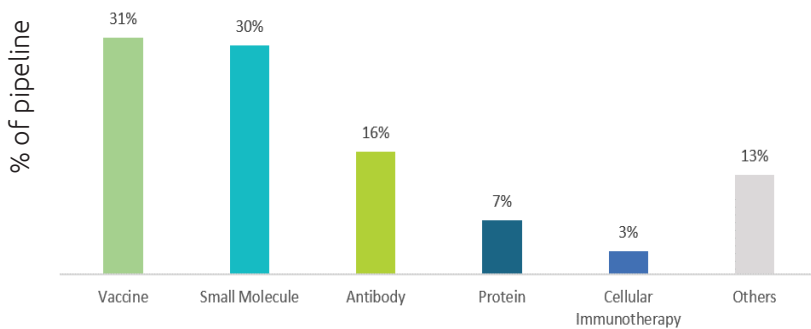


COVID-19 PIPELINE*

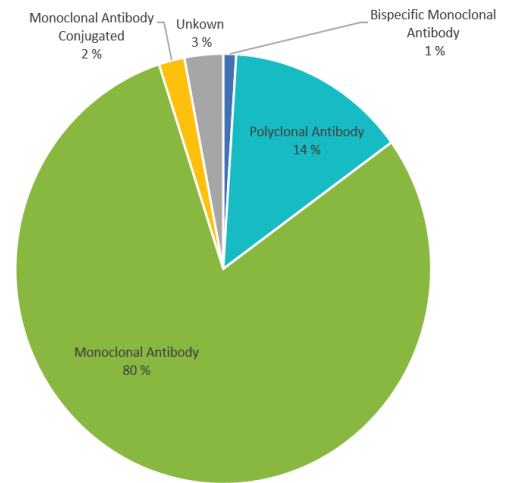
Immunotherapy as frontline treatment for COVID-19

Several types of immunotherapy are being evaluated in the hope of providing solutions to tackle the COVID19 pandemic.

Type of immunotherapy being developed



The antibody pipeline



Vaccine technology used

36%

13%

8%

17%

7%

3%

1%

15%

■ Sub-unit
 ■ mRNA
 ■ DNA
 ■ Recombinant vector
 ■ Inactivated
 ■ Live attenuated
 ■ Conjugate
 ■ Unknown

Majors companies developing: mRNA vaccines- Moderna, CureVac, Translate Bio, BioNtech, ETherNA
 DNA vaccines- Inovio Pharmaceuticals, Linea Rx, AnGes

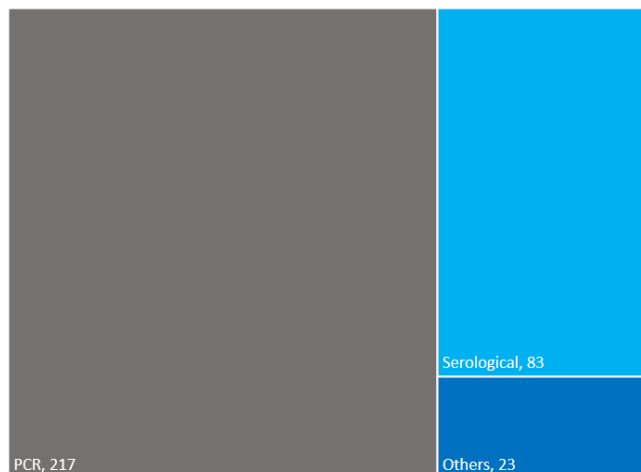
Several COVID-19 diagnostic tools are already available

Tackling the COVID-19 pandemic does not only involve therapeutic or preventive treatments but also rapid and effective diagnostics tools.



Commercially available tests

Type of test¹



* All data has been generated by MabDesign unless stated otherwise
 1. Latest update 16/06/2020 Source : <https://www.360dx.com/coronavirus-test-tracker-launched-covid-19-tests>
 PCR: polymerase chain reaction, direct detection of the virus through amplification of its genetic material
 Serological: Detection of virus-specific antibodies which are produced by the immune system



COVID-19 PIPELINE: FOCUS PHASE 3*

Vaccines in phase 3

Drug name	Company name	Vaccine type
AZD-1222	AstraZeneca Plc	Recombinant Vector Vaccine
BBIBP-CorV	Sinopharm Group Co Ltd	Inactivated Vaccine
BNT-162b2	BioNTech SE	mRNA Vaccine
Coronavirus Disease 2019 (COVID-19) vaccine 2	Sinopharm Group Co Ltd	Inactivated Vaccine
mRNA-1273	Moderna Inc	mRNA Vaccine
MV-130	Inmunotek SL	Inactivated Vaccine
Picovacc	Sinova Biotech Ltd	Inactivated Vaccine
VPM-1002	Serum Institute of India Ltd	Live Attenuated Vaccine

Therapeutic products in phase 3

Companies with products in phase 3, by country (#)

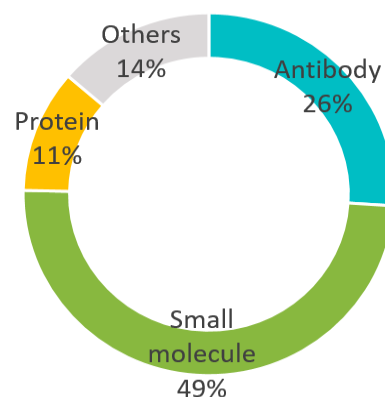


Companies in France with products in phase 3

Drug name	Molecule type
Hydroxychloroquine	Small molecule
Bio-101	Small molecule
ABX-464	Small molecule



Type of products actually in phase 3





GLOBAL COLLABORATION FOR THE FIGHT AGAINST COVID-19



Partnering agreements between healthcare companies



Licensing agreements

Companies all over the world are partnering up during this global health crisis in order to develop a treatment. Such collaborative endeavours go beyond the realms of the healthcare sector and include IT companies offering innovative solutions.

In parallel, we are also witnessing an increasing number of licensing agreements between companies to further COVID19 treatment and vaccine R&D.

Selection of latest major deals related to COVID-19

ANNOUNCED DATE	DEAL DESCRIPTION	TYPE OF PRODUCT
01/09/20	Oxford Biomedica Signs Supply Agreement with AstraZeneca to Expand Manufacturing Support of COVID-19 Vaccine Candidate, AZD1222	Vaccine
19/08/20	Roche Enters into Agreement with Regeneron Pharma to Develop REGN-COV2 Against COVID-19	Antibody
07/08/20	Takeda Pharma Enters into Licensing Agreement with Novavax for COVID-19 Vaccine Candidate	Vaccine
21/07/20	IRBM Enters into Research Agreement with Merck to Develop Peptides Against Coronavirus	Peptide
14/07/20	IQVIA Enters into Collaboration with AstraZeneca for COVID-19 Vaccine	Vaccine
02/07/20	Tesla teams up with CureVac to make 'RNA microfactories' for COVID-19 shot	Vaccine
12/06/20	PeptiDream Enters into Collaboration with Merck for COVID-19 Therapies	Peptide
10/06/20	Catalent Enters into Agreement with Spicona to Develop COVID-19 Vaccine	Vaccine
09/06/20	Twist Bioscience and Serimmune Enter into Collaboration to Identify COVID-19 Therapeutic Antibody Candidates	Antibody
05/06/20	AbbVie Enters into Co-Development Agreement with Harbour BioMed, Utrecht University and Erasmus Medical Center for COVID-19	Antibody
26/05/20	Merck acquires Themis Biosciences and partners with IAVI and Ridgeback Biotherapeutics	Vaccine and antiviral products
08/05/20	Sorrento Therapeutics and Mount Sinai Health System to Enter into Partnership to Develop Antibody for COVID-19	Antibody
30/04/20	AstraZeneca Enters into Co-Development Agreement with University of Oxford for COVID-19 vaccine	Vaccine
27/04/20	Merck and Institute for Systems Biology Enter into Research Collaboration for COVID-19	Vaccine and therapeutic
23/04/20	ReiThera Enters into Agreement with LEUKOCARE and Univercells for COVID-19 Vaccine	Vaccine
22/04/20	Precision For Medicine Enters into Partnership with Karyopharm Therapeutics for COVID-19	Small molecule

Source: GlobalData



GLOBAL COLLABORATION FOR THE FIGHT AGAINST COVID-19

Selection of latest major deals involving French companies

ANNOUNCED DATE	DEAL DESCRIPTION	TYPE OF PRODUCT
15/06/20	Novasep will produce AstraZeneca's vaccine in Europe	Vaccine
08/06/20	Cynbiose and the academic laboratory Virpath have partnered up in a R&D collaborative project linked to the COVID-19 pandemic	Unknown
13/05/20	Eurobio Scientific SA, an in vitro medical diagnostics company, has partnered with Hospices Civils de Lyon (HCL), to develop a library of anti-SARS CoV-2 antibodies	Antibody
11/05/20	ABL applies its expertise in custom manufacturing virus-based therapeutics to accelerate the Institut Pasteur and Themis' coalition COVID-19 vaccine development	Vaccine
24/04/20	To fight the Covid-19 pandemic, Owkin launches the Covid-19 Open AI Consortium (COIA), to bring innovative discoveries and concrete results to medical research.	Others
22/04/20	Valneva and Dynavax Technologies Enter into Collaboration to Advance Vaccine Development for COVID-19	Vaccine
15/04/20	LFB and the biotech company Xenothera sign an agreement for the production of the first clinical batch of a drug candidate	Antibody
14/04/20	Sanofi and GlaxoSmithKline to Enter into Co-Development Agreement for Covid-19	Vaccine
06/04/20	CSL Behring Enters into Co Development Agreement with Takeda Pharma, Biotest, Bio Products Laboratory, LFB and Octapharma for Treatment of COVID-19	Antibody
27/03/20	Sanofi Pasteur Enters into Co-Development Agreement with Translate Bio to Develop Novel mRNA Vaccine Candidate Against COVID-19	Vaccine
20/03/20	Smart-Bioscience has been selected by the American company Ligandal as a European partner of its peptide-based vaccine program against Coronavirus SARS-Cov2 (Covid-19)	Vaccine
16/03/20	Sanofi and Regeneron to Enter into Collaboration for COVID-19	Antibody

Source: GlobalData



THE FRENCH RESPONSE TO COVID-19

The French immunotherapy network

Since the beginning of the outbreak in France, MabDesign has been making an inventory of its members from the French immunotherapy network involved directly in the fight against COVID-19 to showcase their expertise and/or help them identify new collaborators. Below is the latest update of this inventory. The latter and the corresponding database (see below) is updated weekly.

Companies involved directly in the COVID19 response



Companies providing solutions and collaborations



MabDesign has also created an online database summarizing the involvement and expertise of every entity listed above. The database can be accessed [here](#) together with the contact list [here](#).



THE FRENCH RESPONSE TO COVID-19

In France, there has been a rapid mobilization of key actors of the pharmaceutical and healthcare sectors to join this combat against COVID-19 by initiating, pursuing or enhancing their activities to provide innovative solutions and develop efficient treatments. MabDesign has been monitoring and communicating regularly on this pertinent information to our network. We here summarized these latest activities pertaining to the development of therapeutic products and/or diagnostics tools.

Companies developing diagnostic tests

New BioMerieux : The company have developped 2 diagnostic tests

- ARGENE SARS-CoV-2 R-GENE® test uses RT-PCR technology to detect specifically SARS-CoV-2 virus.
- BIOFIRE® FILMARRAY® test integrates SARS-CoV-2 virus, in addition of 21 pathogenic agents the most frequently responsible for respiratory infections and detects in 45min.

New NG Biotech, a Breton start-up, prepare a salivary test, after developping and marketing a serological test, NG-Test® COVID-19.

Skigenics is providing their expertise in transcriptomic analysis for the development of a blood signature for COVID19.

Innobiochips has received support from the Ministry of Defense to develop COVID19 serological test.

Kelindi, in patnership with Pasteur Institute, Docapost and Allianz, has launched the maladiecoronavirus.fr platform for self-evaluation of COVID19 symptoms and eventual orientation to health services.

Mobidiag, in partnership with Autobio Diagnostics, chinese leader of clinical diagnostic, is now providing rapid anti-SARS CoV-2 tests to detect coronavirus infections from serum, plasma or blood samples in less than 15min.

CLEAN CELLS is currently developing its own COVID-19 detection tests pour biological products (raw material or end products) in line with regulatory bodies.

IDvet has launched a new serological test to detect antibodies against COVID-19 with a specificity of 99.9%, significantly lowering the rate of false positive results. More than a million tests have already been produced.

AAZ has developed COVID-PRESTO®, a rapid serological test to identify immunization (apparently protective) against COVID-19.

Poly-Dtech has launched several serological tests to identify individuals immunised or not against COVID-19.



THE FRENCH RESPONSE TO COVID-19

Companies developing diagnostic tests

Eurobio Scientific has announced the CE marking for its EBX 041 SARS CoV2 proprietary test, developed specifically for the clinical diagnosis of COVID-19. This is a multiplex kit with three targets: two for identifying the virus and one target for a control integrated into each patient test.

BioSpeedia (spin-off from Institut Pasteur) has developed a one step rapid test for Novel Coronavirus SARS-CoV-2 IgM/IgG in serum, plasma, fingertip blood or whole blood samples of pneumonitis patients or suspected cases.

Theravectys is developing a serological test to identify immunized people among the general population.

Biosynex is currently working on three diagnostics solutions for COVID-19 based on PCR and immunochromatography technologies.

Bforcure has developed a machine powered by FASTGENE™ technology which is able to detect the presence of pathogens, including the novel coronavirus, within minutes.

Novacyt has teamed up with the UK contract manufacturing company Yourgene Health to support the production of the test, developed by Novacyt's molecular diagnostics UK division Primerdesign.

C4Diagnostics has launched its C4Services as a solution to companies and institutions to test for the presence of the COVID-19 virus on their premises.

BioMérieux has announced that its subsidiary, BioFire Defense, has received Emergency Use Authorization by the U.S. Food and Drug Administration of its BIOFIRE® COVID-19 test for use in CLIA moderate and high complexity clinical laboratories to detect SARS-CoV-2

SKILLCELL and **SYS2DIAG** (a **CNRS/ALCEDIAG** joint laboratory) are developing EasyCOV, a fast-acting saliva-based screening test for Covid-19, with support from the PMB and TRONICO teams.

RD-Biotech has partnered with the Belgian company Coris BioConcept for the production of its new IVD rapid test COVID-19 Ag Respi-Strip.

Eurofins has developed several testing and service offering to support healthcare practitioners and authorities around the world as well as the biopharmaceutical industry respond to the COVID-19 crisis.



THE FRENCH RESPONSE AGAINST COVID-19

Companies developing treatments or vaccines

New CEA and **INSERM** collaborate to develop a vaccine against COVID 19, from technology Lipidots® of CEA-Leti. (synthetic lipidic nanoparticles)

New Fab'entech launch a program to develop immunotherapy treatment by using polyclonal antibodies against COVID-19

New Inotrem has received regulatory clearance to conduct a Phase IIa clinical trial of nangibotide in Covid-19. Nangibotide is a TREM-1 pathway inhibitor

Vaxinano is starting collaborations on the rapid development of an anti-Covid-19 vaccine.

AIOVA, the young biotech from Grenoble, has published results of their vaccine technology and is providing its ADN vaccine platform for the development of innovative solutions to protect humans and animals against viral emergences.

Aqemia is providing screening services for the 3000 drugs on the market which have already been tested in humans and are easily available in sufficient quantities, in hope of repurposing some of them as a COVID19 treatment.

OSE Immunotherapeutics has announced a new COVID-19 prophylactic vaccine program.

Eukarÿs is making the C3P3 system available to any academic research team working on the biology of the SARS-CoV-2 virus in support of the scientific community mobilized against the 2019 coronavirus pandemic.

Abivax receives ANSM and Ethics Committee clearance to test its development candidate ABX464 in 1,034 Covid-19 patients in randomized Phase 2b/3 clinical trial.

Pasteur Institute is currently working on three different COVID19 vaccine R&D projects.

RevImmune COVID-19 program is proposing the use of IL-7 (CYT107) to prevent patients who are in the hospital for COVID-19 from progressing to having to be treated in the ICU or progressing to needing more than 4L/minute of supplemental oxygen.

AB Science has been granted authorization by ANSM to initiate Phase 2 study evaluating masitinib in combination with isoquercetin for the treatment of COVID-19.

OSIVAX is currently working on a large spectrum vaccine against coronaviruses.

Plate-Forme CHEM-Symbiose has joined the multidisciplinary, large-scale virtual screening project to look at 1.5 billion small molecules in order to identify candidate compounds that are likely to inhibit the SARS-CoV-2 virus.

Our team will be communicating regularly on all the French companies and institutions involved directly or indirectly in the pandemic response. To join the inventory, please fill in the online questionnaire [here](#) or send your latest news to our communication department (laure.delhon@mabdesign.fr)



THE FRENCH RESPONSE AGAINST COVID-19

Companies developing treatments or vaccines

Pharnext and the University Hospital Institute Méditerranée Infection announce a joint effort to evaluate repurposed drugs for potential use against the covid-19 virus.

Apteus has decided to share its unique collection of molecules TEE Library®, with several research teams from the Institut Pasteur de Lille are currently working on Covid19 to explore the opportunities for drug repositioning to fight corona viruses.

Signia Therapeutics is using its SIGNATURA® platform to repurpose drugs in view of finding new therapeutic solutions against COVID-19.

Medesis Pharma is applying its patented technology, originally developed to treat radiation-induced pulmonary lesions, to treat COVID-19 patients with similar lesions

MedinCell is evaluating the efficacy of its 'BEPO' technology and the use of Ivermectine (a long-acting anti-malarial drug) as a treatment for COVID-19

Xenothéra is applying its innovating technology of polyclonal humanized antibodies to target SARS-CoV-2, the causative agent of the COVID-19 pandemic

Genoscience Pharma is working on a chloroquine analog as a COVID-19 treatment
Biophytis has initiated clinical testing of its Sarconeos treatment for patients with COVID-19-associated acute respiratory distress syndrome (ARDS)

Sanofi has announced that it is currently involved in vaccine and antibody development against COVID-19. The company is also going to produce batches of Hydroxychloroquine for clinical trials

Valneva is leveraging its technical and platform capabilities to develop an inactivated, whole virus vaccine candidate against the current coronavirus threat

Iltoo Pharma is developing an IL2R agonist to stimulate T cell response against COVID-19

Innate Pharma is conducting Phase II clinical trial, evaluating the safety and efficacy of its antiC5aR antibody, avdoralimab (IPH5401), in COVID-19 patients with severe pneumonia.

Hemarina is evaluating the efficacy of its M101 molecule, a universal oxygen transporter derived from marine worms, to treat ARDS in COVID-19 patients.

Theravectys is currently working on an antibody vaccine against COVID-19 & A multivalent and universal T-cell vaccine to address all current and previous coronavirus strains as well as future mutated coronaviruses and new variants.

Our team will be communicating regularly on all the French companies and institutions involved directly or indirectly in the pandemic response. To join the inventory, please fill in the online questionnaire [here](#) or send your latest news to our communication department (laure.delhon@mabdesign.fr)



FUNDING AND AID FOR THE COVID-19 RESPONSE

Funding schemes

International

National Institutes of Health (NIH) R34 Clinical Trial Planning Grants - Deadline: 07/09/2020

<https://www.niams.nih.gov/grants-funding/conducting-clinical-research/grants/planning-grants>

Research Grant for pandemic preparedness by MERCK - Deadline: none

<https://www.merckgroup.com/en/research/open-innovation/2020-research-grants.html>

European

Coronavirus research and innovation Deadline: 01/09/2020

https://ec.europa.eu/info/research-and-innovation/research-area/health-research-and-innovation/coronavirus-research-and-innovation_en

AI and robotics solutions for the COVID-19 crisis. Deadline: 31/12/2020

<https://ec.europa.eu/eusurvey/runner/15e8809f-a702-fff6-b68d-9b69f98cdc2b>

AMable Call for Solution Ideas to COVID-19 challenges. Deadline: 01/10/2020

<https://www.amable.eu/calls/call-for-proposals>

PRACE support to mitigate impact of COVID-19 pandemic. Deadline: not specified

<https://prace-ri.eu/>

Space Based Services-Applications Addressing COVID-19 Outbreak.
Deadline: 15/11/2020

<https://business.esa.int/funding/invitation-to-tender/space-based-services-applications-addressing-covid-19-outbreak>



FUNDING AND AID FOR THE COVID-19 RESPONSE

Funding schemes

French

Programme d'investissements d'avenir (PIA) : appel à projets pour développer des solutions thérapeutiques préventives ou curatives contre le Covid-19. Deadline : 30/09/2020

<https://www.gouvernement.fr/programme-d-investissements-d-avenir-un-appel-a-projets-pour-developper-des-solutions-therapeutiques>

RAPID (régime d'appui à l'innovation duale). Deadline : none

<https://www.defense.gouv.fr/aid/deposer-vos-projets/subventions/rapid>

Appel à Projets Structurants Pour la Compétitivité spécifique à la crise sanitaire COVID-19. Deadline : 30/09/2020

<https://www.bpifrance.fr/A-la-une/Appels-a-projets-concours/PSPC-COVID-19-49161>

Appel à projets thématique Covid-19 - Accélérateur 21 La Croix Rouge

<https://21-croix-rouge.fr/programme-entrepreneuriat/>

Appel à projets Recherche-Action sur COVID-19 (coronavirus disease 2019) RA-COVID-19. Deadline : 28/10/2020

<https://anr.fr/fr/detail/call/appel-a-projets-ra-covid-19/>

L'appel à projet TOUS UNIS CONTRE LE VIRUS de Fondation France. Deadline : not specified

<https://www.fondationdefrance.org/fr/tous-unis-contre-le-virus-la-fondation-de-france-lap-hp-et-linstitut-pasteur-lacent-un-appel-la>



FUNDING AND AID FOR THE COVID-19 RESPONSE

Funding schemes

Regional (More information on the websites of the various French health clusters)

DIM ELICIT projets mettant en œuvre des technologies ou des méthodes innovantes en lien avec l'analyse, le diagnostic et/ou le traitement pour combattre le SARS-CoV2 en Ile de France. Deadline : 31 décembre 2020.

<https://www.defense.gouv.fr/aid/deposer-vos-projets/subventions/rapid>

Results of previous funding schemes

37 projects has been selected following the call for proposal launched by the Ministry of the Armed Forces to fight against COVID-19

<https://www.defense.gouv.fr/aid/actualites/pres-de-quarante-projets-selectionnees-dans-le-cadre-de-l-appel-a-projets-lance-par-le-ministere-des-armees-pour-lutter-contre-le-covid-19>

National mapping of the different initiatives linked to the French response to COVID-19

The **six French Health Clusters** namely, Atlanpole Biotherapies, BioValley France, Eurobiomed, Lyonbiopôle, Medicen and Clubster NSL have joined forces to create this national mapping. Read the press release [here](#) and access the mapping [here](#).



SCIENTIFIC LITERATURE ON COVID-19

As of going to press, more than 7000¹ scientific articles on the current COVID19 pandemic have been published in 2020 worldwide. The aim of this section is obviously not to cite all of them but rather to provide an overview of the translational nature of the research work being conducted on the virus and the outbreak.

A high-throughput neutralizing antibody assay for COVID-19 diagnosis and vaccine evaluation.

Muruato, A.E., Fontes-Garfias, C.R., Ren, P. et al. Nat Communication 2020, doi:10.1038/s41467-020-17892-0

In vitro screening of a FDA approved chemical library reveals potential inhibitors of SARS-CoV-2 replication.

Touret, F., Gilles, M., Barral, K. et al. Scientific Reports 2020, doi:10.1038/s41598-020-70143-6

Robust T cell immunity in convalescent individuals with asymptomatic or mild COVID-19

Takuya Sekine T., Perez-Potti A., Rivera-Ballesteros O. et al. Cell 2020 doi:10.1016/j.cell.2020.08.017

Deep immune profiling of COVID-19 patients reveals distinct immunotypes with therapeutic implications

Divij Mathew D., Giles J.R., Amy E. Baxter A.E et al. Science 2020, doi:10.1126/science.abc8511

Computationally Optimized SARS-CoV-2 MHC Class I and II Vaccine Formulations Predicted to Target Human Haplotype Distributions

Liu G., Carter B., Bricken T. et al. Cell Systems 2020, doi:10.1016/j.cels.2020.06.009

Discovery of SARS-CoV-2 antiviral drugs through large-scale compound repurposing.

Riva, L., Yuan, S., Yin, X. et al. Nature 2020, doi:10.1038/s41586-020-2577-1

Effect of low-pathogenic human coronavirus-specific antibodies on SARS-CoV-2

Jiang S., Du L, Trends in Immunology 2020, doi:10.1016/j.it.2020.08.003

The COVID-19 Drug and Gene Set Library

Maxim M.V., Stein D.J., Clarke D.J.B. et al. Patterns 2020, doi:10.1016/j.patter.2020.100090

1. Keyword search on Pubmed.gov on 26/04/20 for 'COVID19' OR 'Sars Cov 2' OR '219-nCOV' OR 'novel coronavirus' with 2020 as year of publication



SCIENTIFIC LITERATURE ON COVID19

Fruitful Neutralizing Antibody Pipeline Brings Hope To Defeat SARS-Cov-2

Alex Renn A., Fu Y., Hu X. et al. Trends in Pharmacological Sciences 2020, doi: 10.1016/j.tips.2020.07.004

Potent neutralizing antibodies against multiple epitopes on SARS-CoV-2 spike.

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COVID-19 AND INTELLECTUAL PROPERTY

Both innovative and routine approaches are being used in this global involvement of developing effective diagnostics tools and treatment for COVID-19. These rely partly or solely on proprietary technologies, expertise, scientific know-how and molecules whether serving their intended use or having being repurposed. In parallel, we are already observing the appearance of a COVID19-specific patent landscape within months only of the outbreak at its epicenter in Wuhan. We here provide a summary of these patent applications.

TITLE	TECHNOLOGY DOMAINS	PATENT NUMBER	APPLICATION DATE
Sensor circuit for lung vital signs	Medical technology	IN202041031487	2020-07-23
Antiviral Air Diffusion Device	Medical technology Thermal processes and apparatus	AU2020101012	2020-07-16
An ai-based social distancing solution (sdad)	IT methods for management	IN202041029583	2020-07-12
Kit for detecting nucleic acid of respiratory tract pathogen, detection method and application	Biotechnology	CN111534643	2020-07-10
Paired antigen for novel coronavirus antibody double-antigen sandwich detection, detection test paper and preparation method thereof	Analysis of biological materials Biotechnology	CN111518176	2020-07-06
Application of NK cell exosome and related miRNA in preparation of COVID-19 virus inhibitor	Pharmaceuticals	CN111494416	2020-07-01
Automated screening system of covid-19 infected persons by measurement of respiratory data through deep facial recognition	Computer technology Medical technology	AU2020101210	2020-06-30
Application of K L-6 in children neocoronary pneumonia	Analysis of biological materials	CN111487419	2020-06-24
Application of nitazoxanide in preparing medicine for preventing and treating interstitial lung disease	Pharmaceuticals	CN111544431	2020-06-23
Mobile detection device for immediately detecting new coronavirus in air	Biotechnology	CN111518688	2020-06-23
Anti new coronavirus protective mask of nose and eye integral type	Other consumer goods	CN211211558	2020-06-22
Adml-covid19 protected room: automatic disinfecting room air using machine learning system	Computer technology	IN202041025600	2020-06-18



COVID-19 and Intellectual Property

TITLE	TECHNOLOGY DOMAINS	PATENT NUMBER	APPLICATION DATE
Multi-RT-qPCR kit for coronavirus typing detection, primer probe composition and using method thereof	Biotechnology	CN111518960	2020-06-16
Polypeptide of targeting novel coronavirus COVID-19 and application thereof	Analysis of biological materials Pharmaceuticals	CN111499692	2020-06-16
Corrosion-resistant anti novel coronavirus protective clothing	Other consumer goods	CN211153950	2020-06-16
Polypeptide or combination thereof for detecting novel coronavirus	Analysis of biological materials Biotechnology	CN111423496	2020-06-15
Covid preventive automated entry point (copaep)	Control IT methods for management	IN202011024968	2020-06-14
Ambulance with function of immediately detecting new coronavirus in air	Biotechnology Medical technology	CN111529225	2020-06-12
Corona virus diagnostic reagents treatment kits and share the patient real time location, condition using deep learning programming	Pharmaceuticals	IN202011024811	2020-06-12
Novel coronavirus in human vaccine formulation and process to prepare thereof	Pharmaceuticals	IN202011024660	2020-06-12
Novel coronavirus detection kit	Biotechnology	CN111500792	2020-06-11
Novel coronavirus detection test strip and preparation method and application thereof	Analysis of biological materials	CN111426840	2020-06-11
Coronavirus protected room: disinfecting room air using iot and machine learning programming	Computer technology	IN202041024608	2020-06-11
Test strip and kit for detecting novel human coronavirus IgM antibody and preparation method thereof	Analysis of biological materials	CN111537748	2020-06-10
Test strip and kit for detecting novel human coronavirus IgG antibody and preparation method thereof	Analysis of biological materials	CN111537747	2020-06-10
Kit and method for detecting new coronavirus	Biotechnology	CN111500789	2020-06-09
Method for simultaneously detecting SARS-CoV-2 virus and other pathogens in plasma of convalescent coronary pneumonia convalescent patient	Biotechnology	CN111549183	2020-06-08
Digital PCR detection method and kit for novel coronavirus	Biotechnology	CN111518959	2020-06-05



COVID-19 and Intellectual Property

TITLE	TECHNOLOGY DOMAINS	PATENT NUMBER	APPLICATION DATE
Kit for detecting novel coronavirus with high sensitivity and high throughput and application thereof	Biotechnology	CN111471804	2020-06-05
Air filtering device for blocking novel coronavirus	Environmental technology Medical technology	CN211159017	2020-06-04
New use of rutin as coronavirus broad-spectrum inhibitor	Pharmaceuticals	CN111544442	2020-06-02
2019-nCoV novel coronavirus detection chromatography test strip, detection card and kit	Analysis of biological materials	CN111474354	2020-06-02
Intelligent virus detection biochip	Computer technology	IN202041023019	2020-06-02
Disposable high-protection type oronasal mask	Other consumer goods	CN111466657	2020-06-01
Respiratory tract infection pathogen nucleic acid joint detection kit	Biotechnology	CN111378789	2020-06-01
Novel coronavirus COVID-19-N protein expression and purification method	Biotechnology	CN111499699	2020-05-31
Novel coronavirus COVID-19 infection detection kit	Biotechnology	CN111471803	2020-05-29
Novel coronavirus antibody and ELISA detection kit for same	Analysis of biological materials Biotechnology	CN111518202	2020-05-27
Kit for detecting novel coronavirus	Analysis of biological materials Biotechnology	CN111518203	2020-05-27
Antibodies against novel coronaviruses for immunodetection	Analysis of biological materials Biotechnology	CN111518204	2020-05-27
Nucleic acid composition for detecting novel coronavirus COVID-19 and application	Biotechnology	CN111363860	2020-05-27
Novel real-time fluorescent quantitative PCR (polymerase chain reaction) rapid detection kit for coronavirus	Biotechnology	CN111548910	2020-05-26
Probe and kit for detecting SARS-CoV-2	Biotechnology	CN111549182	2020-05-26
Kit for detecting novel coronavirus and amplification primer composition thereof	Biotechnology	CN111471800	2020-05-26



COVID-19 and Intellectual Property

TITLE	TECHNOLOGY DOMAINS	PATENT NUMBER	APPLICATION DATE
Method for detecting nucleic acid by using double real-time fluorescent isothermal amplification technology"	Biotechnology	CN111394431	2020-05-26
Novel coronavirus S gene detection nucleic acid composition, kit and production method"	Biotechnology	CN111363858	2020-05-26
Nucleic acid composition for 2019-nCoV detection, kit and production method thereof	Biotechnology	CN111363859	2020-05-26
SARS-CoV-2 new coronavirus antibody detection reagent kit	Analysis of biological materials	CN111537743	2020-05-25
Detection kit for detecting neutralizing antibody of novel coronavirus	Analysis of biological materials	CN111537742	2020-05-25
Preparation method of novel coronavirus 2019-nCoV IgM/IgG antibody combined detection kit	Analysis of biological materials	CN111537720	2020-05-25
Production method of novel coronavirus 2019-nCoV antibody spectrum detection kit	Analysis of biological materials	CN111505316	2020-05-22
High-flux detection kit for SARS-CoV-2	Biotechnology	CN111455114	2020-05-22
Antibody for resisting novel coronavirus, preparation method and application thereof	Pharmaceuticals	CN111548413	2020-05-21
Virus detection kit: kit for testing corona virus and display real time location using iot	Medical technology Pharmaceuticals	IN202011021314	2020-05-21
Application of Letermovir in preparation of SARS-CoV-2 novel coronavirus inhibitor	Pharmaceuticals	CN111514148	2020-05-20
Novel medical protective helmet for coronavirus	Other consumer goods	CN111450440	2020-05-20
A kit for rna extraction to detect covid-19 by rt-q pcr and methods thereof	Analysis of biological materials Mechanical elements Pharmaceuticals	IN202011020968	2020-05-19
Novel enzyme-linked immunosorbent assay detection kit for coronavirus IgM antibody	Analysis of biological materials	CN111551715	2020-05-18
A Chinese medicinal composition for treating common cold, fever, pharyngolaryngitis, and tonsillitis	Pharmaceuticals	CN111544484	2020-05-18



COVID-19 and Intellectual Property

TITLE	TECHNOLOGY DOMAINS	PATENT NUMBER	APPLICATION DATE
Novel coronavirus IgM antibody fluorescence immunoassay detection kit	Analysis of biological materials	CN111551714	2020-05-18
Enzyme-labeled antigen for novel coronavirus detection, preparation method, kit and application	Analysis of biological materials	CN111474340	2020-05-18
Novel coronavirus IgM/IgG colloidal gold detection kit	Analysis of biological materials	CN111413495	2020-05-18
Novel coronavirus IgM/IgG antibody chemiluminescence method detection kit	Analysis of biological materials	CN111413496	2020-05-18
Synthetic polypeptide composition for novel coronavirus immunodetection and application	Analysis of biological materials Biotechnology	CN111337673	2020-05-18
Novel coronavirus IgM/IgG magnetic particle chemiluminescence immunoassay kit	Analysis of biological materials	CN111337682	2020-05-18
Novel enzyme-linked immunosorbent assay detection kit for coronavirus IgG antibody	Analysis of biological materials	CN111337672	2020-05-18
COVID-19 virus antibody detection microsphere, preparation method thereof and kit containing microsphere	Analysis of biological materials	CN111551713	2020-05-15
Amplification primer group for detecting SARS-CoV-2 by mNGS and application thereof	Biotechnology	CN111500781	2020-05-15
Preparation for producing novel coronavirus antibody after oral administration and preparation method thereof	Pharmaceuticals	CN111529701	2020-05-14
2019 novel coronavirus antigen detection reagent and preparation method thereof	Analysis of biological materials	CN111521805	2020-05-12
siRNA interfering expression of novel coronavirus COVID-19 gene and application thereof	Pharmaceuticals	CN111518809	2020-05-12
Device and method for collecting respiratory tract gas	Measurement Medical technology	CN111436974	2020-05-12
SARS-COV-2 antigen polypeptide and its recombinant adeno-associated virus and application in preparing vaccine	Pharmaceuticals	CN111518175	2020-05-11
New coronavirus nucleic acid preparation and PCR detection integrated device	Biotechnology	CN111454839	2020-05-11
Novel use of non-ionic surfactant for the treatment of covid-19	Basic materials chemistry Pharmaceuticals Textile and paper machines	IN202041019785	2020-05-11



COVID-19 and Intellectual Property

TITLE	TECHNOLOGY DOMAINS	PATENT NUMBER	APPLICATION DATE
Mosaic strategy-based coronavirus antigen construction method and application thereof	Pharmaceuticals	CN111533790	2020-05-09
CAR-T cell for resisting novel coronavirus S protein, preparation method and application thereof	Pharmaceuticals	CN111518773	2020-05-09
Two-photon fluorescence labeling probe, synthetic method thereof and application of new coronavirus diagnosis	Basic materials chemistry Measurement Organic fine chemistry	CN111499555	2020-05-09
Kit for rapidly and accurately detecting novel coronavirus IgM antibody and preparation method thereof	Analysis of biological materials	CN111551743	2020-05-08
Air-jet epidemic prevention mask capable of blocking new coronavirus transmission	Other consumer goods	CN111481852	2020-05-08
Indoor fresh air system helpful for preventing and controlling new coronary pneumonia	Audio-visual technology Other consumer goods Thermal processes and apparatus	CN111486524	2020-05-08
Fresh air supply equipment capable of recovering heat energy and preventing indoor propagation of respiratory viruses	Thermal processes and apparatus	CN111486539	2020-05-08
Novel test strip and kit for quickly detecting coronavirus IgM/IgG two-in-one and preparation method of test strip and kit	Analysis of biological materials	CN111551712	2020-05-07
Kit for nucleic acid-antibody dual detection of novel coronavirus and preparation method thereof	Analysis of biological materials Biotechnology	CN111518952	2020-05-07
Novel combined detection kit for coronavirus antibody and application thereof	Analysis of biological materials	CN111505314	2020-05-07
Kit for detecting novel coronavirus and preparation method thereof	Biotechnology	CN111500780	2020-05-07
Use of interferon in preparing medicine for preventing coronavirus infection or preventing diseases caused by coronavirus infection	Pharmaceuticals	CN111346219	2020-05-07

Source: Orbit patent database. Keyword search for 'novel coronavirus' Or 'COVID19' or 'SARS-CoV-2' under independent claims, title or abstract. Patents were then analysed individually for pertinence. Patents with no abstract or description were excluded. **Only the latest patents are shown (See previous updates for less recent patents)**



MABDESIGN UPCOMING EVENTS ON COVID-19



In Virtual Format



Informations and Registrations: WWW.I4ID.ORG

The **4th Edition of the Immunotherapies & Innovations for Infectious Diseases Congress** (I4ID2020) will be held **in virtual format** on **December 9-10, 2020** and will largely address the current COVID-19 pandemic as well as other infectious diseases. The I4ID2020 will include keynote lectures, pitch talks of new innovative projects, industrial talks from pharmaceutical companies and poster presentations. Moreover, there will be several opportunities for networking, companies to showcase their new products and technologies as well as dedicated time for business partnering, through an online B2B platform. So go to the website or contact us (laure.delhon@mabdesign.fr) to subscribe or to know more about the event and the sponsoring offers.

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MABDESIGN'S REPOSENSE DURING THE COVID19 PANDEMIC

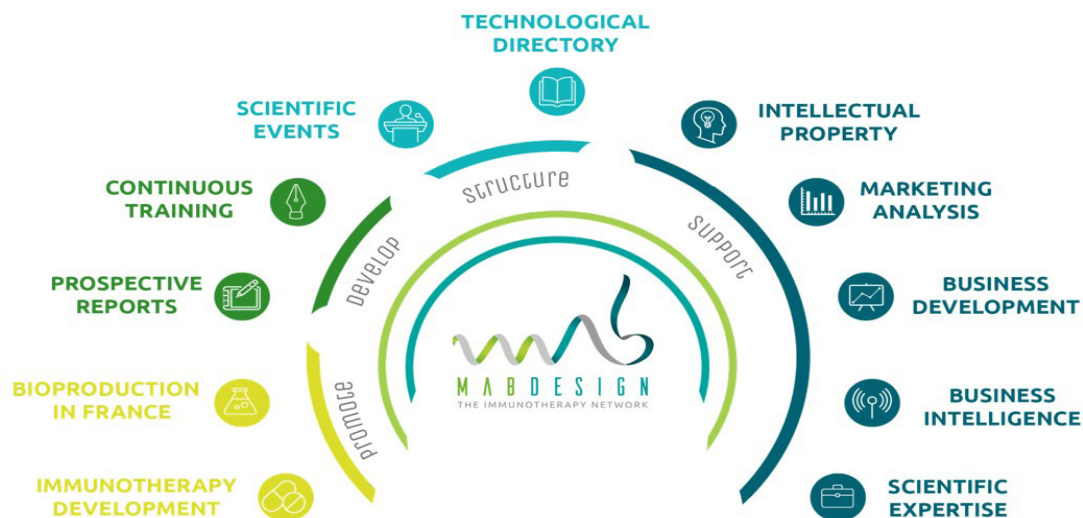
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Our different departments will be providing regular updates of the COVID-19 pipeline, the inventory of companies involved in the response, the latest French news and the patent landscape through our newsletter. Register [here](#).

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