



IMMUNOWATCH

SPECIAL EDITION – 6TH UPDATE 16/02/22



COVID-19



MAB DESIGN
THE IMMUNOTHERAPY NETWORK

INTRODUCTION

MabDesign and the COVID-19 pandemic

The COVID-19 pandemic was matched by an unprecedented mobilisation of the French immunotherapy network and the pharmaceutical industry at large. Indeed, at the time of publication, six French companies already have preventive and/or therapeutic candidates currently undergoing Phase III clinical trials. In parallel, several bioprocessing sites across France have secured contracts for the production of both drugs and vaccines against SARS-CoV-2. These tremendous results were made possible through accelerated R&D as well as production and distribution logistics combined with facilitated access to information, resources and potential collaborators. MabDesign has been continuously adapting its actions and services to further support and enhance this nationwide pandemic response. 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 biomedicaments 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, more than 10 treatments and vaccines have been made available since August 2020.

Vaccines

Drug name	Trade Name	Company Name	Vaccine type
Coronavirus Disease 2019 (COVID-19) vaccine	Spikevax	Moderna Inc	mRNA Vaccine
Coronavirus Disease 2019 (COVID-19) vaccine	ZyCov-D	Zydus Healthcare Ltd	DNA Vaccine
Coronavirus Disease 2019 (COVID-19) Vaccine 1	COVID-19 Vaccine	Janssen Inc	Recombinant Vector Vaccine
COVID-19 [adenovirus type 5] Vaccine	Convidecia	CanSino Biologics Inc	Recombinant Vector Vaccine
coronavirus disease 2019 (COVID-19) vaccine	Corbevax	Biological E Ltd	Subunit Vaccine
tozinameran	Comirnaty	Pfizer	mRNA Vaccine
Coronavirus Disease 2019 (COVID-19) vaccine	Vaxzevria	AstraZeneca Ltd	Recombinant Vector Vaccine
Coronavirus Disease 2019 (COVID-19) vaccine	Covid-19 Vaccine	Institute of Medical Biology Chinese Academy of Medical Sciences	Inactivated Vaccine
Coronavirus Disease 2019 (COVID-19) vaccine	Cov2Bio	PT Bio Farma	Inactivated Vaccine
Sputnik Light	Sputnik Light	Gamaleya Federal Research Center of Epidemiology and Microbiology	Recombinant Vector Vaccine
Coronavirus Disease 2019 (COVID-19) vaccine	Zifivax	Chongqing Zhifei Biological Products Co Ltd	Subunit Vaccine
Coronavirus Disease 2019 (COVID-19) (whole virion) vaccine	KoviVac	Federal Research Center for Research and Development of Immunobiological Preparations	Inactivated Vaccine
EpiVacCorona	EpiVacCorona	The State Research Center of Virology and Biotechnology VECTOR	Subunit Vaccine
Sputnik V	Sputnik V	Gamaleya Federal Research Center of Epidemiology and Microbiology	Recombinant Vector Vaccine
Coronavirus Disease 2019 (COVID-19) vaccine 2	COVID-19 Vaccine	Wuhan Institute of Biological Products Co Ltd	Inactivated Vaccine
BBIBP-CorV	BBIBP-CorV	Beijing Institute of Biological Products	Inactivated Vaccine
Covaxin	Covaxin	Bharat Biotech Ltd	Inactivated Vaccine
Coronavirus Disease 2019 (COVID-19) vaccine	Nuvaxovid	Novavax Inc	Subunit Vaccine
Coronavirus Disease 2019 (COVID-19) vaccine	CoronaVac	Sinovac Biotech Ltd	Inactivated Vaccine
Coronavirus Disease 2019 (COVID-19) vaccine	Kconvac	Beijing Minhai Biotechnology Co Ltd	Inactivated Vaccine

* All data has been generated by MabDesign unless stated otherwise
ATU : Autorisation Temporaire d'Utilisation de cohorte



AVAILABLE COVID-19 treatment and drugs*

Treatments

Drug name	Company Name	Target	Mechanism of Action
anakinra	Swedish Orphan Biovitrum AB	Interleukin 1 Receptor Type 1	Interleukin 1 Receptor Type 1 Antagonist
bamlanivimab	Eli Lilly Group Limited	2019 Novel corona Virus Spike Glycoprotein	2019 Novel corona Virus Spike Glycoprotein Inhibitor
baricitinib	Eli Lilly Group Limited	Tyrosine Protein Kinase JAK1/2	Tyrosine Protein Kinase JAK1/2 Inhibitor
canakinumab	Novartis	Interleukin 1 Beta	Interleukin 1 Beta Inhibitor
casirivimab + imdevimab	Roche	2019 Novel corona Virus Spike Glycoprotein	2019 Novel corona Virus Spike Glycoprotein Inhibitor
cilgavimab + tixagevimab	AstraZeneca Pharmaceuticals LP	2019 Novel corona Virus Spike Glycoprotein	2019 Novel corona Virus Spike Glycoprotein Inhibitor
deoxyglucose	NA	NA	NA
dexamethasone sodium phosphate	NA	Glucocorticoid Receptor	Glucocorticoid Receptor Agonist
etesevimab	Eli Lilly Group Limited	2019 Novel corona Virus Spike Glycoprotein	2019 Novel corona Virus Spike Glycoprotein Inhibitor
favipiravir	NA	RNA Directed RNA Polymerase	RNA Directed RNA Polymerase Inhibitor
itolizumab	Biocon Ltd	T Cell Differentiation Antigen CD6	T Cell Differentiation Antigen CD6 Inhibitor
levilimab	Biocad	Interleukin 6 Receptor	Interleukin 6 Receptor Antagonist
molnupiravir	Cipla Ltd	RNA Directed RNA Polymerase	RNA Directed RNA Polymerase Inhibitor
nirmatrelvir + ritonavir	Pfizer Inc	3C Like Proteinase	3C Like Proteinase Inhibitor
olokizumab	R-Pharm	Interleukin 6	Interleukin 6 Inhibitor
peginterferon alfa-2b	Cadila Healthcare Ltd	Interferon Alpha/Beta Receptor 1	Interferon Alpha/Beta Receptor 1 Agonist
regdanvimab	Celltrion Healthcare Hungary Kft	2019 Novel corona Virus Spike Glycoprotein	2019 Novel corona Virus Spike Glycoprotein Inhibitor
remdesivir	Gilead Sciences SL	RNA Directed RNA Polymerase	RNA Directed RNA Polymerase Inhibitor
ribavirin	Meda Pharma LLC	Inosine Monophosphate Dehydrogenase	Inosine Monophosphate Dehydrogenase Inhibitor
ruxolitinib phosphate	Novartis	Tyrosine Protein Kinase JAK1/2	Tyrosine Protein Kinase JAK1/2 Inhibitor
solnatide	Apeptico Forschung und Entwicklung GmbH	Epithelial Sodium Channel	Epithelial Sodium Channel Activator
sotrovimab	GlaxoSmithKline Inc	2019 Novel corona Virus Spike Glycoprotein	2019 Novel corona Virus Spike Glycoprotein Inhibitor
tocilizumab	Roche Products (NZ) Ltd	Interleukin 6 Receptor	Interleukin 6 Receptor Antagonist

COVID-19 PIPELINE*



KEY FIGURES



Companies developing at least one product



Unique molecules in the pipeline

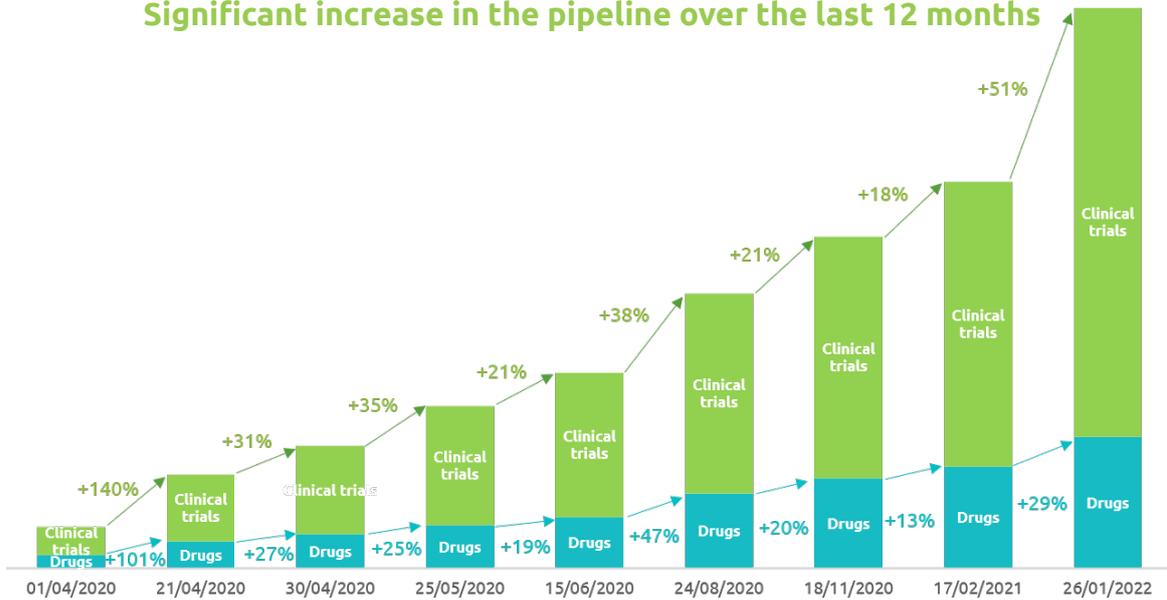


Clinical trials



Ongoing trials

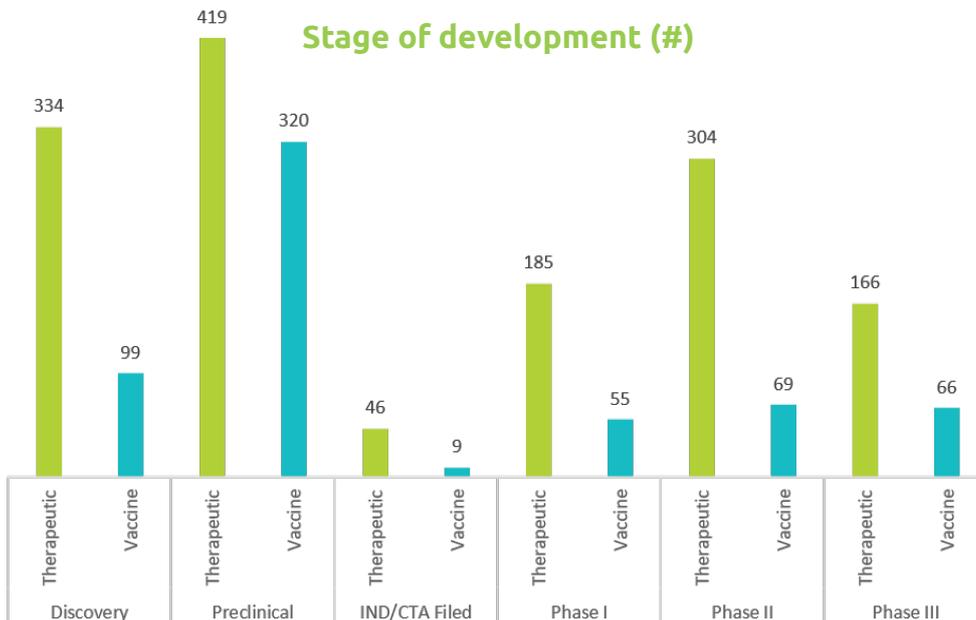
Significant increase in the pipeline over the last 12 months



Type of clinical studies



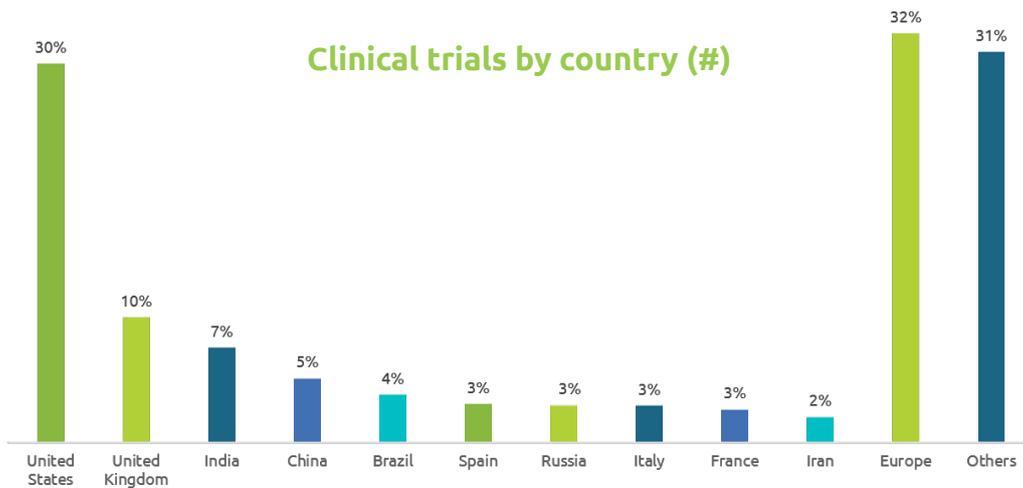
Stage of development (#)



* All data has been generated by MabDesign unless stated otherwise



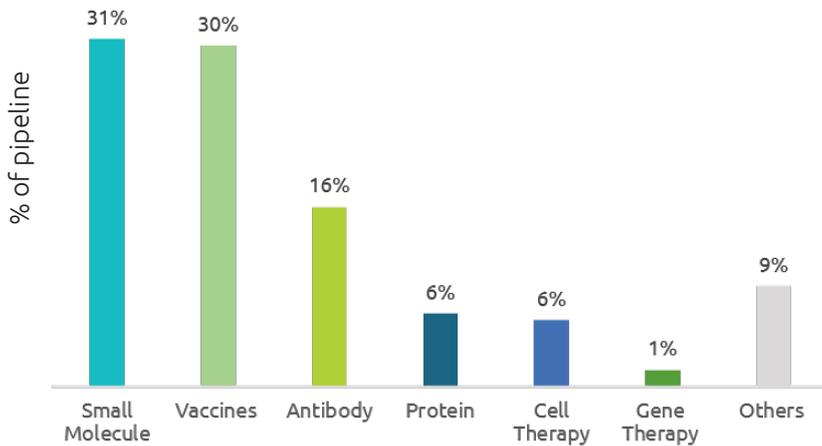
COVID-19 PIPELINE*



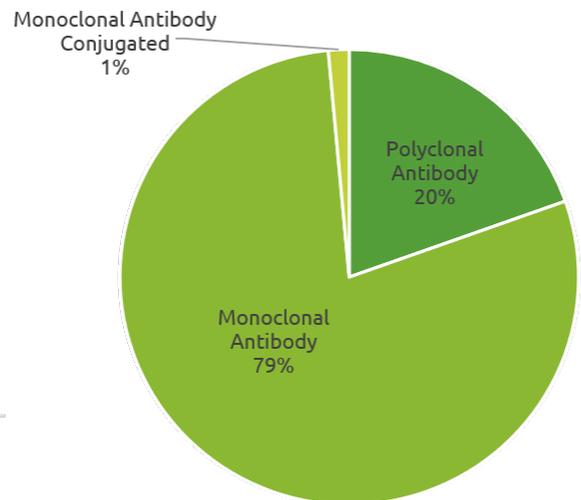
Immunotherapy as frontline treatment for COVID-19

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





COVID-19 PIPELINE*

Several COVID-19 diagnostic tools are already available

Tackling the COVID-19 pandemic does not only involve therapeutic or preventive treatments but also effective diagnostics tools. In the last few weeks, several new antigen-based diagnostic tests offering fast and reliable results have received regulatory clearance.



Commercially available tests

Type of test¹



* All data has been generated by MabDesign unless stated otherwise

1. Latest update 10/02/2022 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

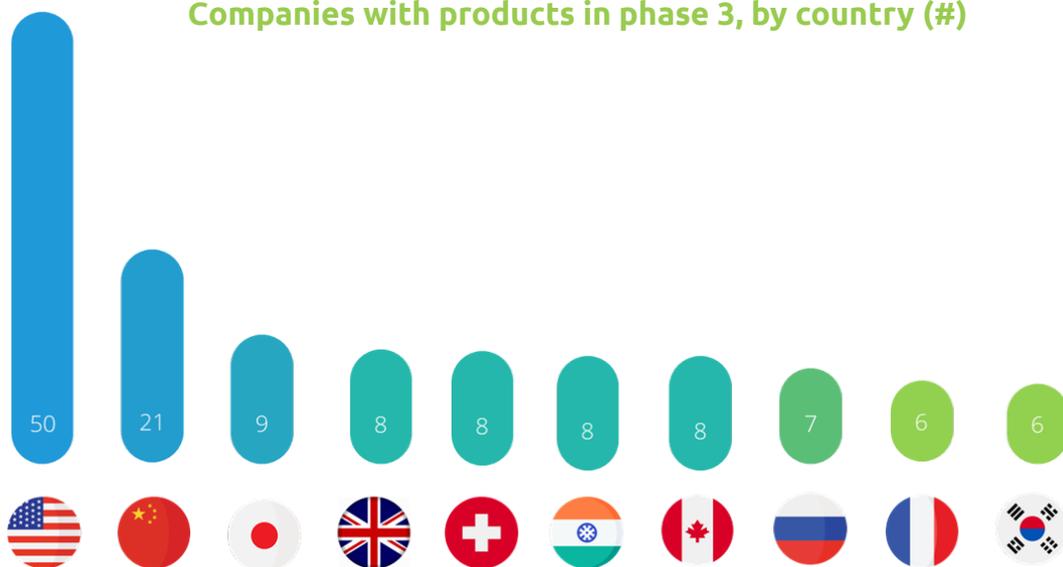
Serological: Detection of virus-specific antibodies which are produced by the immune system



COVID-19 PIPELINE: FOCUS PHASE 3*

Therapeutic products in phase 3

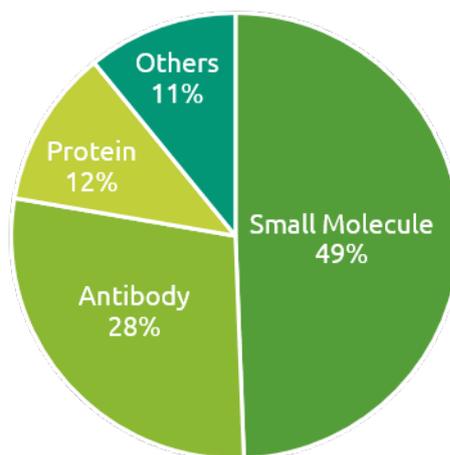
Companies with products in phase 3, by country (#)



Type of products actually in phase 3

146

drugs in phase III





COVID-19 PIPELINE: FOCUS COMPANIES IN FRANCE*

Products in phase 3

Drug name	Molecule type
Hydroxychloroquine	Small molecule
Coronavirus Disease 2019 (COVID-19) (bivalent) vaccine	Subunit Vaccine
Bio-101	Small molecule
Motrem	Peptid
Clofoctol	Small molecule
VLA-2001	Inactivated Vaccine
VLA-2101	Inactivated Vaccine
XAV-19	Antibody

sanofi

biophytis

INOTREM
control innate immunity

Institut Pasteur de Lille

valneva

xenothera

Products in phase 2

Drug name	Molecule type
Masitinib	Small molecule
Glenzocimab	Antibody
GNS-561	Small molecule
Avdoralimab	Antibody
CYT-107	Protein
SP-0253	Subunit Vaccine
Aldesleukin	Small molecule
NP-02	Small molecule

ABSOLUCE

Acticor
Biotech

GS
GENOSCIENCE PHARMA

Innate pharma

RevImmune

sanofi

ILTOO
PHARMA

medesis

Products in phase 1

Drug name	Molecule type
Ivermectin	Small molecule
Coronavirus Disease 2019 (COVID-19) vaccine	Vaccine
HFB-30132A	Antibody

MedinCell

OSE IMMUNO THERAPEUTICS

HiFiBio
HIGH FIDELITY BIOLOGY

* All data has been generated by MabDesign unless stated otherwise

NOVEL BIOLUMINESCENT CELL-BASED VLP ASSAYS FOR ANTIVIRAL THERAPEUTIC DEVELOPMENT

Characterize antiviral neutralization antibodies or small molecule inhibitors with the HiBiT-PsVLP technology: *safe, quantitative, and rapid, monitor in live cells and in real time!*



Proof Of Concept with the new SARS-CoV-2 HiBiT-PsVLP Assay to detect the inhibition of SARS-CoV-2 entry using HiBiT-tagged PsVLPs

Assay Design:

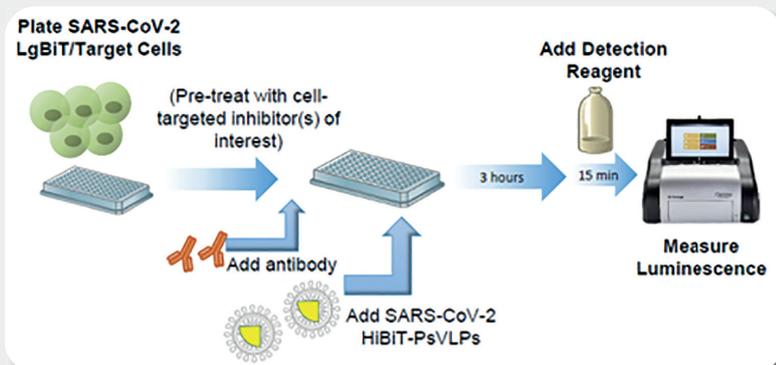
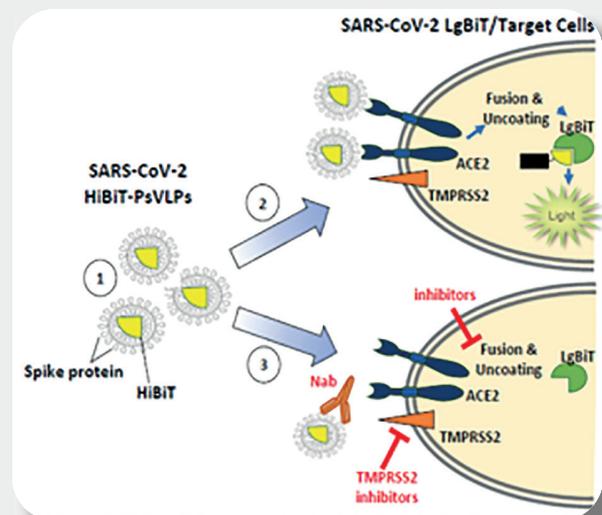
- HiBiT-tagged VLPs pseudotyped with SARS-CoV-2 Spike protein are added to SARS-CoV-2 LgBiT/Target Cells. HiBiT is packaged inside the PsVLPs.

Without Inhibitors or NABs:

- Viral entry by membrane fusion
- HiBiT released into target cells
- HiBiT/LgBiT complementation
- **Luminescent signal**

With Inhibitors or NABs:

- No viral entry
- No HiBiT/LgBiT complementation
- **No Luminescent signal**



- **Simple, rapid, L1 Biosafety requirement** (non-replicative system)
- **Thaw-and-Use format:** no need to generate live (pseudo) virus and culture cells
- **Quantitative assay readout with specific signal**



NEW Custom Service
available to develop VLP assays for other viruses!

Discover more Promega Bioassays as Gene Reporter Bioassays, PBMC ADCC Assays, Lumit Immunoassays...



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
18/01/22	NEW 4basebio Discovery Enters into Research Collaboration with eTheRNA Immunotherapies
18/01/22	NEW Novartis Enters into Licensing Agreement with Molecular Partners for COVID-19 Treatment
17/01/22	NEW MSD Enters into Co-Promotion Agreement with Kyorin Pharma for Oral COVID-19 Treatment
10/01/22	NEW Pfizer to Enter into Option Agreement with Acuitas Therapeutics
04/08/21	NEW F-star Therapeutics Enters into Collaboration with Merck
02/08/21	NEW Insilico Medicine and Westlake Pharma Enter into Partnership for COVID-19
30/06/21	NEW Cytovation Enters into Collaboration with Merck
25/05/21	NEW Bristol-Myers Squibb Enters into Licensing Agreement with Xencor for Covid-19
24/05/21	NEW Moderna Expands Partnership with Aldevron
12/05/21	NEW Torrent Pharma Enters into Licensing Agreement with Eli Lilly for COVID-19 Treatment
11/05/21	NEW Dr. Reddy's Labs Enters into Licensing Agreement with Eli Lilly for COVID-19 Treatment
27/04/21	NEW Emcure Pharma Enters into Licensing Agreement with Merck for COVID-19 Therapeutic
18/02/21	Pfizer Enters into Agreement with BioNTech to Evaluate COVID-19 Vaccine in Pregnant Women
15/02/21	Novavax and SK Bioscience Enter into Licensing Agreement for Covid-19 Vaccine

Source: GlobalData

Check the older deals in the previous editions



GLOBAL COLLABORATION FOR THE FIGHT AGAINST COVID-19

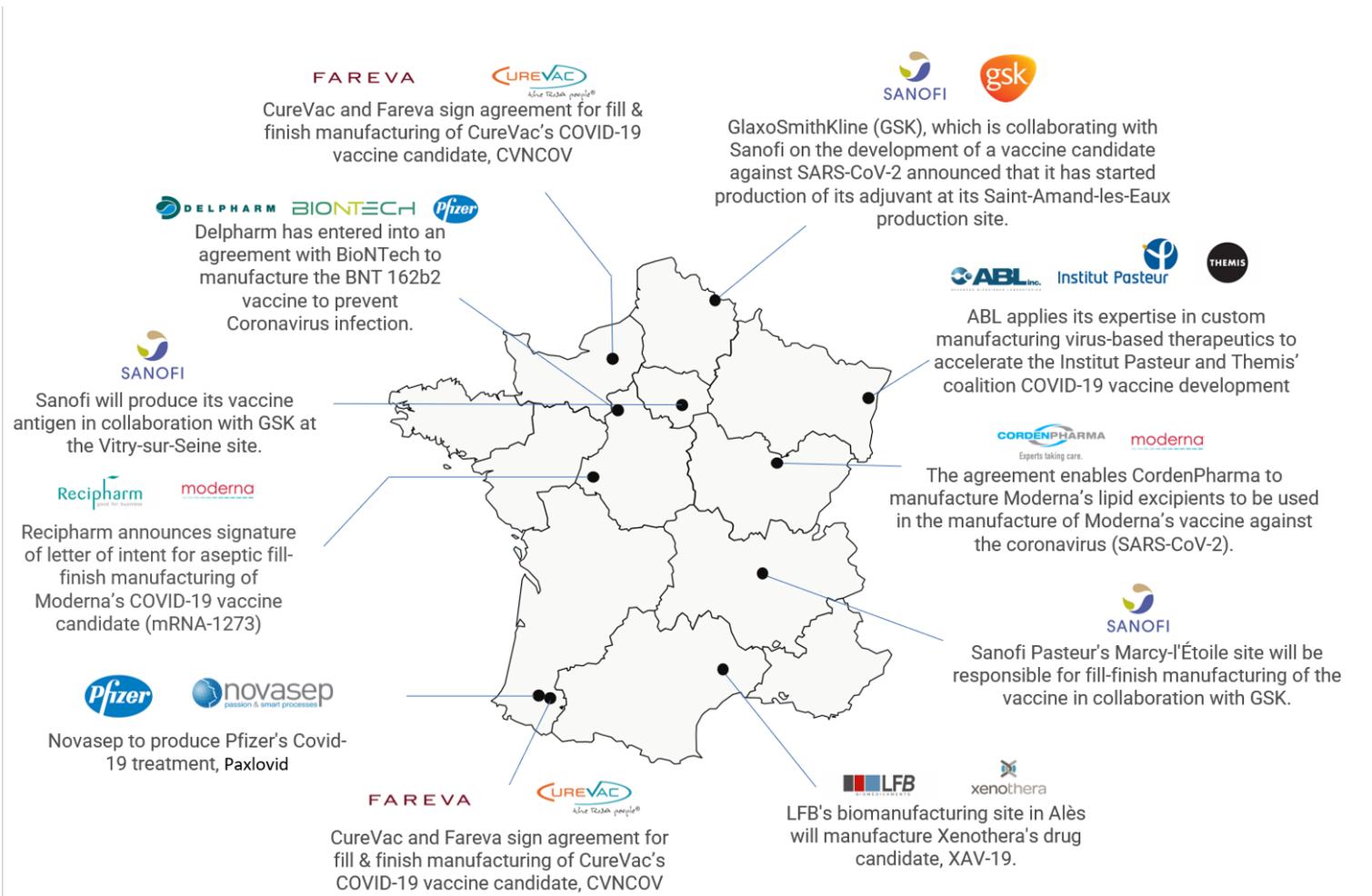
Selection of latest major deals involving French companies

Announced date	DEAL DESCRIPTION
29/11/21	NEW Valneva Enters Manufacturing Agreement with IDT Biologika for VLA-2001
17/09/21	NEW Vaxinano Enters Manufacturing Agreement with GTP Bioways for COVID-19 Vaccine Candidate
30/06/21	NEW OSE Immunotherapeutics Enters Manufacturing Agreement with Cenexi for CoVepiT
04/06/21	NEW Sanofi Enters Manufacturing Agreement with Unigen for Coronavirus Disease 2019 (COVID-19) (bivalent) vaccine
05/05/21	NEW SpikImm Enters into Licensing Agreement with Pasteur Institute for Covid-19 Treatment
28/04/21	NEW Xenothera SAS Enters Phase II/III Clinical Trial Agreement with Excelya SAS for XAV-19
26/04/21	NEW Moderna Enters Manufacturing Agreement with Sanofi for COVID-19 vaccine Candidate
06/04/21	NEW AB Science Enters into Licensing Agreement with University of Chicago for Prevention and Treatment of COVID-19
01/03/21	NEW RevImmune SAS Enters Phase II Clinical Trial Agreement with ReSolution Latin America for CYT-107 (GDCT0423271)
22/02/21	NEW Johnson & Johnson Enters Manufacturing Agreement with Sanofi for JNJ-78436735



BIOPRODUCTION SITES FOR COVID-19 VACCINES AND DRUGS IN FRANCE

On top of its significant pipeline of COVID-19 curative and prophylactic candidates, France is also involved in the large scale production of biologics including vaccines against SARS-CoV-2. For far, we have identified 10 bioprocessing sites across 5 regions further underlying the recognised local know-how and capacity in biopharmaceutical production.





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

ID solution has developed several diagnostic tests including ID™ SARS-CoV2/UK/SA Variant Triplex to detect SARS-CoV-2 variants

Theradiag, French company specialized in autoimmune and infectious diagnostic tests, sells an COVID-19 antigenic test, CE marked

Scientists from the **Pasteur Institute** and **ESPCI Paris-PSL** have developed COVIDISC, inexpensive, simple and portable, which can be used to extract RNA, amplify it via a technique known as RT-LAMP (loop-mediated isothermal amplification) and visualize the results directly on the box using a very low-cost mechanism

Enalees and Bertin Technologies, in collaboration with **Institut Pasteur**, have developed an ultra-rapid diagnostic test to immediately isolate infected individual as it can provide within 30 minutes a more reliable result than salivary or antigen tests.

Biotem, in collaboration with a multidisciplinary team (LBPA, Université CNRS-ENS Paris-Saclay et Hôpital Bichat AP-HP), has developed the AmpliFlow® SARS-CoV-2 kit to further strengthen their arsenal of rapid diagnostic tests for COVID19.

BioSella is now proposing a complete solution for the detection of SRAS-CoV-2 with the BioExtract® Premium Mag extraction kit and the Bio-T® kit TriStar Covid-19. This new solution has been evaluated by the Centre National de Référence des Virus des Infections Respiratoires and is under license from Institut Pasteur.

CellMade can produce, since the 20th of October, the necessary reagents involved in the manufacturing of 100 000 PCR tests per week.

Toda Pharma's Coronadiag + test is a rapid immunochromatography assay for the detection of IgG and IgM in whole human blood. It allows for rapid and reliable detection of the 2019-nCoV virus (Coronavirus; SARS-CoV2) within just 15 minutes from a single drop of blood.

BioMerieux : The company have developed 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.

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

Skiagenics 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.



THE FRENCH RESPONSE TO COVID-19

Companies developing diagnostic tests

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.

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 TO COVID-19

Companies developing treatments or vaccines

New Truffle Capital and **Pasteur Institute** have created *SpikImm* to develop a monoclonal antibody as innovating treatment against COVID-19.

New Meletios Therapeutics has raised 3,8 millions euros to develop a new generation of antiviral treatments against COVID-19.

New COVID-19: Fab'entech treatment enters in clinical phase.

B Cell Design develops a treatment against COVID-19

Flash thérapeutics (Toulouse) develops a vaccine produced with a method transferring ARN in cells without integration of genetic material into the host cell genome

The French biotech **Theravectys**, global pioneer of lentivirus vector technology, announced the closure of € 16,5 million fund raising. The aim of this funding is for clinical assays on human with several vaccine candidates, notably against SARS-CoV2 (Covid-19) and administered in nasal airways.

Nicox : Evaluation of naproxinod as potential additive treatment of COVID-19 by its partner Fera Pharmaceuticals

4P Pharma is developing a targeted therapeutic approach to improve respiratory function

Medsenic : Use of MCS222 to fight against cytokine storm responsible for the Acute respiratory distress syndrome (ARDS) induced by SARS-Cov 2

Ai-biopharma is proud to be one of 37 partners in the CARE consortium – Europe's largest initiative with a grant totaling € 77.7 million to accelerate therapy development for COVID19 and future coronavirus threats

ANGANY engage in « COVID-19 vaccine race » with a promising vaccine approach which could be particularly useful in specific target groups such as old people.

HiFiBiO Therapeutics, announced the successful completion of the first cohort of the Phase I study (NCT04590430) of HFB30132A, a SARS-CoV-2 neutralizing antibody for the treatment and prevention of COVID-19.

Acticor Biotech : Glenzocimab (Fab-9O12) is under development for the treatment of SARS-Cov-2-related acute respiratory distress syndrome, acute ischemic stroke and pulmonary embolism.

The biotech company **Divincell**, specialized in the development of nano-vehicles capable of transporting drugs in the body, offers this mode of administration to fight against Covid-19.

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

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



THE FRENCH RESPONSE TO COVID-19

Companies developing treatments or vaccines

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

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.

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



THE FRENCH RESPONSE TO COVID-19

Companies developing treatments or vaccines

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

Ilto 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

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

NIH- Opened COVID19-specific funding opportunities Deadline: up to December 2022

<https://covid19.nih.gov/funding/open-funding-opportunities#open-funding-opportunities-1>

CEPI-Opened COVID19-specific funding opportunities Deadline: up to December 2022

https://cepi.net/get_involved/cfps/

French

ANRS-AAP Covid long 2022-2 Deadline : 31/03/2022

<https://www.anrs.fr/fr/actualites/949/soutien-la-recherche-lancement-dun-appel-projets-covid-long-en-2021-2022>

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 232,000 scientific articles on the current COVID19 pandemic have been published since 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. For this update, we have chosen to focus on the Omicron-specific literature.

SARS-COV-2 Variants: Differences and Potential of Immune Evasion.

Hirabara SM., Serdan TDA. et al., *Front Cell Infect Microbiol.* 2022 doi: 10.3389/fcimb.2021.781429.

Efficacy of Antibodies and Antiviral Drugs against Covid-19 Omicron Variant.

Takashita E., Kinoshita N. et al., *Engl J Med.* 2022 doi: 10.1056/NEJMc2119407.

The T cell immune response against SARS-CoV-2.

Moss P. *Nat Immunol.* 2022 doi: 10.1038/s41590-021-01122-w.

Antibacterial and antiviral high-performance nanosystems to mitigate new SARS-CoV-2 variants of concern.

Tiwari S., Juneja S. et al., *Curr Opin Biomed Eng.* 2022 doi: 10.1016/j.cobme.2021.100363.

Receptor binding and complex structures of human ACE2 to spike RBD from omicron and delta SARS-CoV-2.

Han P., Li L. et al., *Cell.* 2022 doi: 10.1016/j.cell.2022.01.001.

Altered TMPRSS2 usage by SARS-CoV-2 Omicron impacts tropism and fusogenicity.

Meng B, Abdullahi A. et al., *Nature.* 2022 doi: 10.1038/s41586-022-04474-x.

Efficacy of Antibodies and Antiviral Drugs against Covid-19 Omicron Variant.

Takashita E., Kinoshita N. et al., *N Engl J Med.* 2022 Jan 26. doi: 10.1056/NEJMc2119407.

Recognition and inhibition of SARS-CoV-2 by humoral innate immunity pattern recognition molecules.

Stravalaci M., Pagani I. et al., *Nat Immunol.* 2022 doi: 10.1038/s41590-021-01114-w.



SCIENTIFIC LITERATURE ON COVID19

SARS-CoV-2 Omicron-B.1.1.529 leads to widespread escape from neutralizing antibody responses.

Dejnirattisai W., Huo J. et al., Cell. 2022. doi: 10.1016/j.cell.2021.12.046

Structural basis of SARS-CoV-2 Omicron immune evasion and receptor engagement.

McCallum M., Czudnochowski N. et al, Science. 2022 doi: 10.1126/science.abn8652.

SARS-CoV-2 Omicron variant replication in human bronchus and lung ex vivo.

Hui KPY., Ho JCW. Et al., Nature. 2022 doi: 10.1038/s41586-022-04479-6.

Searching for escape-resistant anti-SARS-CoV-2 neutralizing antibodies.

Mahla RS., Dustin LB. J Clin Invest. 2022 doi: 10.1172/JCI157416.

Three exposures to the spike protein of SARS-CoV-2 by either infection or vaccination elicit superior neutralizing immunity to all variants of concern.

Wrtil PR., Stern M. et al., Nat Med. 2022. doi: 10.1038/s41591-022-01715-4.

SARS-CoV-2 Omicron variant: Antibody evasion and cryo-EM structure of spike protein-ACE2 complex.

Mannar D., Saville JW. et al., Science. 2022 doi: 10.1126/science.abn7760.

Vaccines Elicit Highly Conserved Cellular Immunity to SARS-CoV-2 Omicron.

Liu J., Chandrashekar A. et al., Nature. 2022 Jan 31. doi: 10.1038/s41586-022-04465-y.

The Omicron variant is highly resistant against antibody-mediated neutralization: Implications for control of the COVID-19 pandemic.

Hoffmann M., Krüger N. et al., Cell. 2022 doi: 10.1016/j.cell.2021.12.032.

T cell responses to SARS-CoV-2 spike cross-recognize Omicron.

Keeton R., Tincho MB. Et al., Nature. 2022 Jan 31. doi: 10.1038/s41586-022-04460-3.



SCIENTIFIC LITERATURE ON COVID19

SARS-CoV-2 Omicron variant: Antibody evasion and cryo-EM structure of spike protein-ACE2 complex.

Mannar D., Saville JW. Et al., Science. 2022 Jan 20 doi: 10.1126/science.abn7760.

An infectious SARS-CoV-2 B.1.1.529 Omicron virus escapes neutralization by therapeutic monoclonal antibodies.

VanBlargan LA., Errico JM. Et al., Nat Med. 2022 doi: 10.1038/s41591-021-01678-y.

Considerable escape of SARS-CoV-2 Omicron to antibody neutralization.

Planas D., Saunders N. et al., Nature. 2021. doi: 10.1038/s41586-021-04389-z.

PubMed LitCovid

LitCovid is a curated literature hub for tracking up-to-date scientific information about the 2019 novel Coronavirus. It is a comprehensive resource on the subject, providing a central access to 103547 (and growing) relevant articles in PubMed. The articles are updated daily and are further categorized by different research topics and geographic locations for improved access.

Access the database here : <https://www.ncbi.nlm.nih.gov/research/coronavirus/>



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 observed the emergence of a COVID19-specific patent landscape within months only of the outbreak at its epicenter in Wuhan. We here provide a summary of this landscape for 2020. We have also included a list of all the COVID19-specific patents from French entities or individuals.

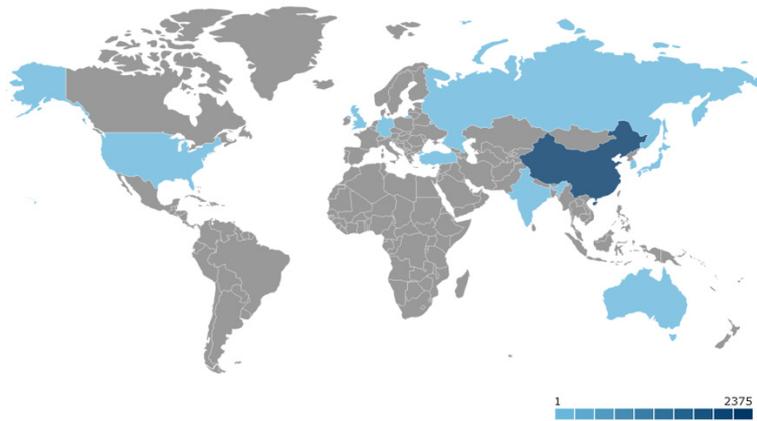


Covid-19 related patents in 2020

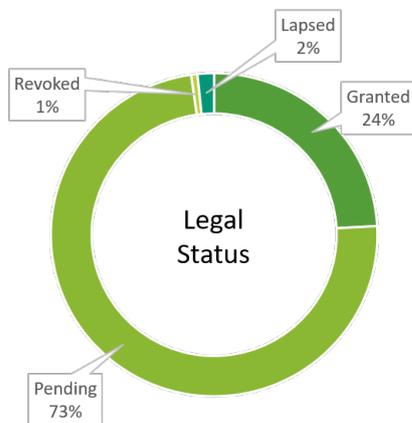
Top 3 Technological domain



Country of publication (excludes EP and WO)



Legal status



Patents linked to therapeutics



Patents linked to vaccine



Patents linked to diagnostics

* Keyword search for Covid 19 and associated variantes under independent claims, title or abstract in the Orbit patent database

** Percentage increase in the number of patents for each category since last update



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TITLE	TECHNOLOGICAL DOMAIN	PATENT NUMBER	APPLICATION DATE
Method and kit for detecting novel coronavirus antigen	Analysis of biological materials Biotechnology	CN202111644663	2021-12-30
Novel coronavirus nucleocapsid protein antibodies for in vitro diagnosis	Analysis of biological materials Pharmaceuticals	CN202111644661	2021-12-30
Antibody specifically binding with novel coronavirus S protein and application thereof	Analysis of biological materials Biotechnology	CN202111635934	2021-12-30
Novel coronavirus nucleocapsid protein antibodies for in vitro diagnosis	Analysis of biological materials Pharmaceuticals	CN202111650274	2021-12-30
Novel coronavirus antibody with broad-spectrum neutralizing activity and preparation method and application thereof	Pharmaceuticals	CN202111591859	2021-12-24
Novel detection method, detection test strip and kit for coronavirus neutralizing antibody	Analysis of biological materials	CN202111584062	2021-12-23
Primer and probe for detecting novel coronavirus and application of primer and probe	Biotechnology	CN202111435667	2021-11-30
Amplification primer composition and kit for detecting novel coronavirus	Biotechnology	CN202111384742	2021-11-22
Novel coronavirus antibody detection kit	Analysis of biological materials	CN202111376606	2021-11-19
Monoclonal antibody for resisting novel coronavirus N protein and application thereof	Analysis of biological materials Biotechnology	CN202111361909	2021-11-17
Novel coronavirus recombinant protein with broad-spectrum neutralization activity and preparation method thereof	Biotechnology	CN202111354553	2021-11-16
Oligonucleotide for detecting infectivity of novel coronavirus, kit containing oligonucleotide and application	Biotechnology	CN202111324425	2021-11-10



COVID-19 AND INTELLECTUAL PROPERTY

TITLE	TECHNOLOGICAL DOMAIN	PATENT NUMBER	APPLICATION DATE
Application of triazolethione derivative in preparation of novel coronavirus inhibitor	Pharmaceuticals	CN202111300969	2021-11-04
Novel coronavirus neutralizing antibody detection card and preparation method thereof	Analysis of biological materials	CN202111299167	2021-11-04
GISAID typing-based novel coronavirus genotype reference sequence, design primer, kit and application	Biotechnology	CN202111293893	2021-11-03
Fluorescent quantitative PCR method and kit for detecting novel coronavirus subgenomic	Biotechnology	CN202111294163	2021-11-03
Primer-probe combination for rapid nucleic acid detection of novel coronavirus 2019-nCoV through isothermal amplification and application of primer-probe combination	Biotechnology	CN202111287242	2021-11-02
Nucleoside compound and pharmaceutical composition and application thereof	Pharmaceuticals	CN202111286183	2021-11-02
Nucleic acid composition, kit and method for simultaneously detecting multiple mutant strains of novel coronavirus	Biotechnology	CN202111290666	2021-11-02
Detection device, detection reagent or detection kit for new coronavirus antibody	Analysis of biological materials	CN202111270147	2021-10-29
Method for predicting risk stratification of new coronary pneumonia patient based on machine learning	Computer technology	CN202111273906	2021-10-29



COVID-19 and Intellectual Property - Focus France

TITLE	ASSIGNEE	PATENT NUMBER	LEGAL STATUS
Methods and pharmaceutical composition for the treatment of infectious diseases	CENTRE HOSPITALIER UNIVERSITAIRE DE NICE INSERM - INSTITUT NATIONAL DE LA SANTE & DE LA RECHERCHE MEDICALE UNIVERSITE COTE D AZUR	WOEP2021/068845	PENDING
Modulators of purinergic receptors and related immune checkpoint for treating acute respiratory distress syndrom	INSTITUT GUSTAVE ROUSSY	WOEP2021/064718	PENDING
Methods for treating a complement mediated disorder caused by viruses	ALEXION PHARMACEUTICALS ASSISTANCE PUBLIQUE HOPITAUX DE PARIS	WOUS2021/027636	PENDING
Severe acute respiratory syndrome (sars) - associated coronavirus diagnostics	INSTITUT PASTEUR	WOEP2021/058781	PENDING
Nucleic acid vaccine against the sars-cov-2 coronavirus	INSTITUT PASTEUR	WOEP2021/025053	PENDING
Severe acute respiratory syndrome (sars) - associated coronavirus diagnostics	INSTITUT PASTEUR	US16/936,752 EP20189060 US16/944,649	GRANTED
System for detecting persons tested positive for contagious disease	MICHEL RAYMOND	FR2005958 FR2104331	PENDING
Method and kit for the detection of sars-cov-2 virus in a sample based on reverse transcription loop-mediated isothermal amplification (rt-lamp)	CNRS - CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE SKILLCELL	WOEP2021/058209 EP20166524	PENDING
Live recombinant measles virus expressing coronavirus antigens - its use in eliciting immunity against coronaviruses	INSTITUT PASTEUR	EP20305141	PENDING
flexible device for reducing viral load of 2019-nCov coronavirus	DICRPOCQ FRANCOIS	FR2001259	PENDING



MABDESIGN UPCOMING EVENTS



PARTNERING DAY



24 MAY 2022
LYON

<https://mabdesign-partnering-day.mabdesign.b2match.io/>

10TH AIS Antibody Industrial 2022 Symposium

JUNE 28-29, 2022
MONTPELLIER, FRANCE



<https://aiscongress.com/>



7TH BIOPRODUCTION CONGRESS

29-30 September 2022 - Lyon
CMC READINESS TO ACCELERATE
BIOTHERAPEUTICS FOR PATIENTS

<http://www.biopcongress.com>



immunotherapies & innovations for Infectious Diseases

6th Congress 2022 – November 2022 – LYON, FRANCE



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<https://www.i4id.org/>



ABOUT MABDESIGN

MabDesign, the French biotherapy industry association, aims to structure the biopharmaceutical industry in France from its R&D phases to biomanufacturing and marketing. Its objective is also to promote the creation of innovative start-ups resulting from academic research, to increase the visibility of the biopharmaceutical industry, to promote exchanges, to support the development and competitiveness of companies, and to stimulate innovation. Created in 2014 MABDESIGN is administered by ABL Europe, Biomérieux, DBV Technologies, Institut Pasteur, Lyonbiopôle, Pierre Fabre, Sanofi, Thermo Fischer, TreeFrog therapeutics and 3 independent field experts.

MABDESIGN OFFERS

STRUCTURE THE INDUSTRIAL SECTOR ...

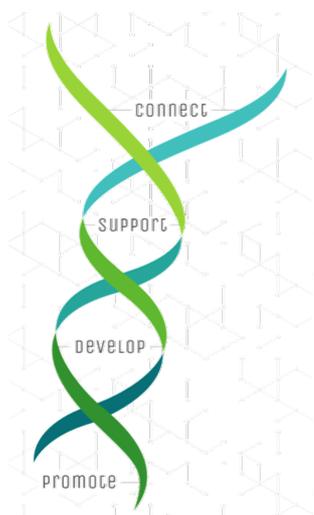


... to increase its **readability** and international **visibility**.

SUPPORTING THE INDUSTRIAL SECTOR...



... to enhance its **value offer** and **its competitiveness**.



Operational since September 2015, MabDesign currently has more than 220 member companies, including pharmaceutical and biotech companies, service providers, training organizations, high-tech equipment suppliers and specialized consultants.

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Bât. L'Initial
17, rue Crépet
69007 Lyon
Tél. 04 78 02 39 88
contact@mabdesign.fr
www.mabdesign.fr