IMMUNOWATCH

SPECIAL EDICION - MAY 2020

COVID-19



INTRODUCTION

MabDesign and the COVID-19 pandemic

he 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.

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.

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

ELITICAL S









TABLE OF CONCENC

- 4. EDICORIAL
- 5. COVID-19: Treatment, vaccines and diagnostics
- 7. GLOBAL COLLABORATION FOR THE FIGHT AGAINST COVID-19
- 9. THE FRENCH RESPONSE CO COVID-19
- **12.** FUNDING AND AID FOR CHE COVID-19 response
- 15. SCIENCIFIC LICERACURE ON COVID-19
- **17.** COVID-19 and Incelleccual propercy

18. UPCOMING MABDESIGN EVENCS ON COVID-19





EDICOLIAL

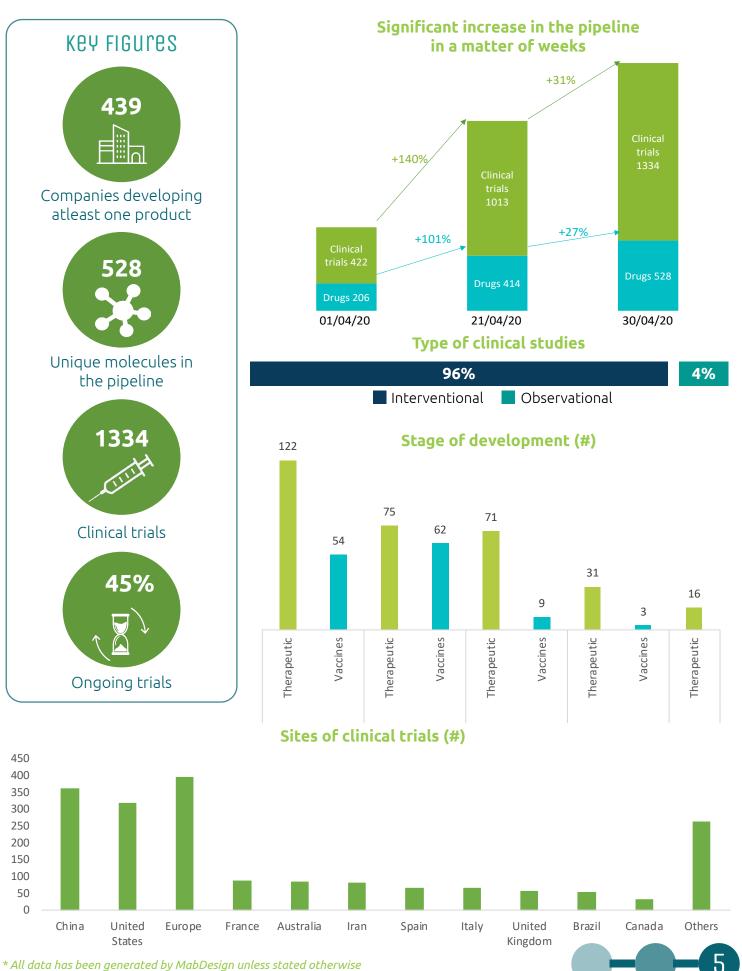
COVID-19: Message from MabDesign president, Francis Carré



Mankind's history has been marked by various outbreaks of infectious diseases across centuries with several of them reaching global proportions. Amidst this COVID-19 pandemic, the scientific committee at large must once again rise up to the challenge of providing fast solutions to this new health crisis. Since the beginning of the outbreak, various actors from the immunotherapy field have been continuously joining the fight in keeping at bay the severe acute respiratory syndrome coronavirus 2 SARS-CoV-2, causative agent of the current pandemic. All over the world, vaccines and therapies are being researched and developed in the hope of keeping millions safe or saving them. France's immunotherapy network obviously responded to this call of arms against COVID-19. Several pharmaceutical and biotechnology companies are even setting the pace in key aspects of this pandemic response through innovative or repurposed products and services. Others have joined forces with both local and foreign partners to enhance their *R&D* capabilities. Together, they are working relentlessly towards combatting SARS-CoV-2. In these uncertain times, MabDesign is fully committed to supporting its members and the immunotherapy network in general. All our services have been maintained since the beginning of the lockdown. In parallel, we have adapted our training offers and have modified our forthcoming scientific events. We are monitoring closely the current situation so as to make any necessary amendments to our services and actions. Finally, MabDesign has been actively contributing to the COVID-19 pandemic response which includes this special edition of Immunowatch.

4

COVID-19: Treatment, Vaccines and Diagnostics*

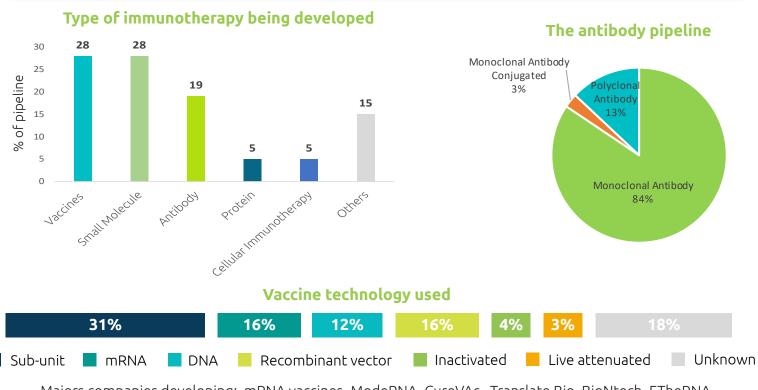


* All data has been generated by MabDesign unless stated otherwise

COVID-19: Treatment, Vaccines and diagnostics*

Immunotherapy as frontline treatment for COVID-19

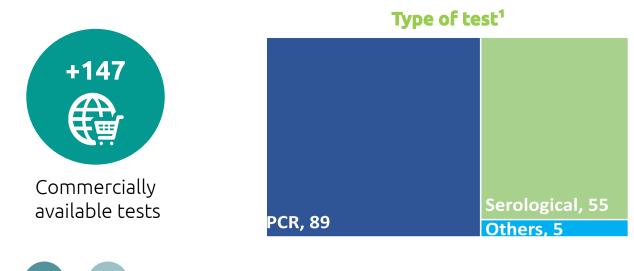
Several types of immunotherapy are being evaluated in the hope of providing solutions to tackle the COVID19 pandemic.



Majors companies developing: mRNA vaccines- ModeRNA, CureVAc , Translate Bio, BioNtech, ETheRNA DNA vaccines- Innovio Pharmaceuticals, Linea Rx, AnGes

Several COVID-19 diagnostics tools are already available

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



* All data has been generated by MabDesign unless stated otherwise 1. Latest update 29/04/2020 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

GLOBAL COLLABORATION FOR THE FIGHT AGAINST COVID-19



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.

Partnering agreements between healthcare companies

Selection of latest major deals related to COVID-19

ANNOUNCED Dace	Dear description	TYPE OF Product	
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		
21/04/20	Bayer to Enter into Research Partnership with Population Health Research Institute (PHRI) to Identify COVID-19 Treatments	Small molecule	
16/04/20	Dynavax Technologies and Sinovac Biotech Enter into Collaboration to Develop COVID-19 Vaccine	Vaccine	
08/04/20	CSL Behring and SAB Biotherapeutics Enter into Partnership for COVID-19	Antibody	
05/04/20	GlaxoSmithKline and Vir Biotech to Enter into Collaboration for COVID-19	Antibody	
03/04/20	GlaxoSmithKline Enters into Agreement with Xiamen Innovax Biotech for COVID-19 Vaccine	Vaccine	
02/04/20	Emergent BioSolutions Enters into Agreement with US Government to Develop Plasma- Derived Therapy for COVID-19 Patients	Antibody	
02/04/20	Amgen and Adaptive Biotechnologies to Enter into Licensing Agreement to Develop Antibodies to Treat COVID-19		
26/03/20	Twist Bioscience Enters into Agreement with Vanderbilt University Medical Center to Supply Critical Products and Identify Antibody Therapeutics for COVID-19	Antibody	
26/03/20	Ology Bioservices Enters into Agreement with Inovio Pharma to Manufacture COVID-19 DNA Vaccine	Vaccine	
17/03/20	Pfizer and BioNTech Enters into Co-Development Agreement for Potential COVID-19 Vaccine	Vaccine	
12/03/20	AbCellera and Lilly to Co-develop Antibody Therapies for the Treatment of COVID-19	Antibody	
12/03/20	Vir Biotech to Enter into Collaboration with Biogen on Manufacturing of Antibodies to Potentially Treat COVID-19	Antibody	
05/03/20	AnGes Enters into Co-Development Agreement with Osaka University to Develop Coronavirus Vaccine	Vaccine	
05/03/20	Pfizer Plans to Enter into Collaboration with BioNTech to Develop Vaccines for Coronavirus	Vaccine	



Source: GlobalData



Selection of latest major deals involving French companies

ANNOUNCED Dace	Deal description	TYPE OF Producc
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
20/0320	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



8





THE FRENCH RESPONSE CO 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.



MabDesign has also created an online database summarizing the involvement and expertise of every entity listed above. This can be accessed <u>here.</u>





THE FRENCH RESPONSE CO 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 diagnostics tests

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

NG Biotech has launched serological test NG-Test® COVID-19 which allows for rapid detection of both SARS-CoV-2 specific IgM and IgG.

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 treatment or vaccines

Medesis Pharma is applying its patented technology, originally developed to treat radiationinduced 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 COVID19associated 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 COVID19

Innate Pharma is a conducting Phase II clinical trial, evaluating the safety and efficacy of its anti-C5aR 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 COVID19 patients.

Theravectys is currently working on an antibody vaccine against COVID19 & A multivalent and universal T-cell vaccine to address all current and previous coronavirus strains as well as future mutated coronaviruses and new variants.

ARE YOU INVOLVED IN THE COVID-19 RESPONSE? Register to our inventory or send us your latest news

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 <u>here</u> or send your latest news to our communication department (laure. delhon@mabdesign.fr)





FUNDING AND AID FOR CHE COVID-19 RESPONSE

Funding schemes

International

Eureka Multilateral call for solutions for COVID-19 Echo Period – Life without a vaccine Deadline 15/05/2020

https://www.eurekanetwork.org/content/multilateral-call-solutions-covid-19-echo-period

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

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

Fast-track co-creation funding for COVID-19 related activities. Deadline: 30/06/2020

https://www.eosc-portal.eu/fast-track-co-creation-funding-covid-19-related-activities

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/

COVID-19 Rapid collaboration call by European Health Data and Evidence Network (EHDEN). Dealine: 14/05/2020

https://www.ehden.eu/vision-and-mission/





FUNDING AND AID FOR CHE 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-pourdevelopper-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

Concours d'innovation i-Nov. Deadline :12/05/2020

https://www.bpifrance.fr/A-la-une/Appels-a-projets-concours/Appel-a-projets-Concours-d-innovationi-Nov-38041

Challenge Covid-19. Deadline : 15/05/2020

https://www.bpifrance.fr/A-la-une/Appels-a-projets-concours/Le-Challenge-Covid-19-appel-auxpartenariats-tech-internationaux-face-a-la-crise-!-49286

L'intelligence artificielle pour une expérience améliorée du système de santé. Deadline : 01/07/2020

https://www.health-data-hub.fr/appel-a-projets

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 Foundation France. Deadline : not specified

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





FUNDING AND AID FOR CHE COVID-19 RESPONSE

Funding schemes

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

DIM 1HEALTH-Appel à projets en Ile de France. Deadline : 15 mai 2020

https://www.dim1health.com/appels-a-projet/appel-a-projet-2020/

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

Appel à Manifestation d'Intérêt (AMI) flash pour soutenir les efforts de recherche et accélérer les innovations susceptibles de lutter contre le Coronavirus en Nouvelle Aquitaine. Deadline : 24 mai 2020

https://www.nouvelle-aquitaine.fr/communiques-presse/lutte-contre-covid-19-region-nouvelleaquitaine-lance-ami-aupres-acteurs-recherche-innovation.html

Appel à projets santé exceptionnel 2020 en Alpes-Maritimes. Dealine : 20/07/2020

https://www.departement06.fr/appels-a-projets/soutien-aux-equipes-medicales-et-scientifiques-dudepartement-pour-des-innovations-techniques-dans-le-domaine-de-la-sante-35665.html

Other notable endevours

COVID-19 Therapeutics Accelerator by Bill & Melinda Gates Foundation, Wellcome, and Mastercard

https://www.gatesfoundation.org/TheOptimist/coronavirus

Coalition Innovation Santé face à la crise sanitaire du Covid-19

https://www.coalitioncovid.org/

Coalition for Epidemic Preparedness Innovation (CEPI)

https://cepi.net/

L'initiative OpenCovid19 pour développer collectivement des outils et méthodes opensource et bas-coût

https://app.jogl.io/program/opencovid19



IMMUNOWATCH - SPECIAL EDITION COVID-19 | MAY 2020



SCIENTIFIC LITERATURE

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 Novel Coronavirus from Patients with Pneumonia in China, 2019.

Zhu N, Zhang D et al. N Engl J Med. 2020 doi: 10.1056/NEJMoa2001017.



Structure-based design of antiviral drug candidates targeting the SARS-CoV-2 main protease.

Dai W, Zhang B et al. Science. 2020 doi: 10.1126/science.abb4489.



COVID-19 and artificial intelligence: protecting health-care workers and curbing the spread.

Mcall B. Lancet Digit Health. 2020 doi: 10.1016/S2589-7500(20)30054-6.



SARS-CoV-2: a storm is raging.

Pedersen SF, Ho YC. J Clin Invest. 2020 doi: 10.1172/JCI137647.



Early dynamics of transmission and control of COVID-19: a mathematical modelling study.

Kucharski AJ, Russell TW et al. Lancet Infect Dis. 2020 doi: 10.1016/S1473-3099(20)30144-4.



Molecular Mechanism for Antibody-Dependent Enhancement of Coronavirus Entry

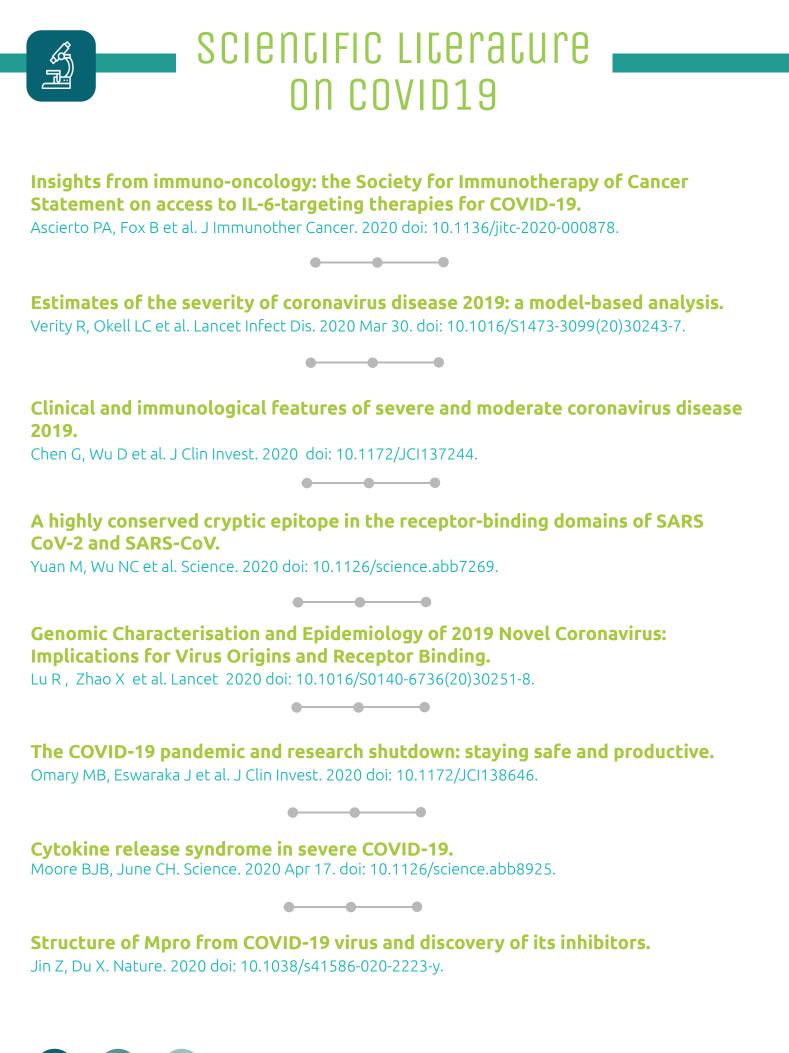
Wan Y, Shang J et al. J Virol . 2020 doi: 10.1128/JVI.02015-19.

• • •

SARS-CoV-2 Cell Entry Depends on ACE2 and TMPRSS2 and Is Blocked by a Clinically Proven Protease Inhibitor.

Hoffmann M, Kleine-Weber H et al. Cell. 2020 doi: 10.1016/j.cell.2020.02.052.





IMMUNOWATCH - SPECIAL EDITION COVID-19 | MAY 2020



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.

TICLE	TECHNOLOGY DOMAINS	Pacenc Number	APPLICATION DATE
Novel coronavirus N gene nucleic acid detection kit	Biotechnology	CN111004870	2020-03-10
Adenovirus vector vaccine for preventing SARS-CoV-2 infection	Pharmaceuticals	CN110974950	2020-03-05
COVID-19 knockout DNA CoVID-19 suitable triple knockout DNAi remedy	Pharmaceuticals	KR20200032050	2020-03-05
Nucleic acid composition, kit and method for detecting 2019 novel coronavirus	Biotechnology	CN110982945	2020-03-04
Novel coronavirus RT-PCR detection method and kit	Biotechnology	CN110982943	2020-03-03
Novel visualized constant-temperature rapid detection kit for coronavirus	Biotechnology	CN110982944	2020-03-03
Composition, kit and method for detecting and typing coronavirus and application thereof	Biotechnology	CN110982942	2020-03-02
Nucleic acid sequence for expressing SARS-CoV-2 virus antigen peptide and its application	Pharmaceuticals	CN110951756	2020-02-23
Composition of anti-coronavirus macleaya cordata benzylisoquinoline alkaloid and resveratrol and application thereof	Pharmaceuticals	CN110960532	2020-02-21
Alcohol disinfection bidirectional sprayer for novel pneumonia	Medical technology	CN210302020U	2020-02-15
Novel method for treating bronchitis by gasifying and inhaling eucalyptus oil	Pharmaceuticals	CN111000901	2020-02-10

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.





The 4th Edition of the Immunotherapies & Innovations for Infectious Diseases Congress (I4ID2020) will be held in Lyon, France 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.

https://www.i4id.org/





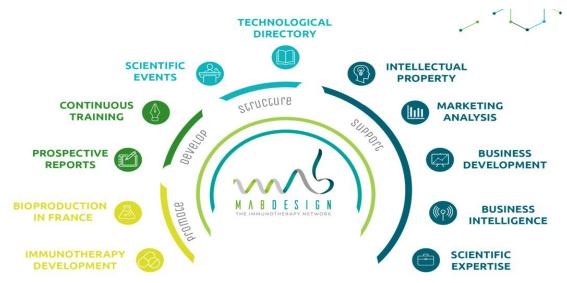
MABDESIGN'S REPONSE DURING CHE COVID19 PANDEMIC

MORE NEWS ARE ON THE WAY! To be kept in the loop, register to our newsletter

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 <u>here.</u>

About MabDesign

 MABDESIGN is a French membership organization in the field of immunotherapy. Created in 2014 MABDESIGN is managed by four competitivity clusters (Atlanpole Biotherapies, Eurobiomed, Lyonbiopole, Medicen) and three pharmaceutical companies (LFB, Pierre Fabre and Sanofi), and one biotech (DBV Technologies).



• **Operational since September 2015**, MABDESIGN has over 170 members, including pharmaceutical and biotechnology companies, service providers, training organizations, and equipment suppliers at the cutting edge of technology.



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

Follow us on @Mabdesign_fr in MabDesign