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.

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.
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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.
COVID-19: Treatment, Vaccines and Diagnostics*

Significant increase in the pipeline in a matter of weeks

<table>
<thead>
<tr>
<th>Date</th>
<th>Clinical Trials</th>
<th>Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/04/20</td>
<td>422</td>
<td>206</td>
</tr>
<tr>
<td>21/04/20</td>
<td>1013</td>
<td>414</td>
</tr>
<tr>
<td>30/04/20</td>
<td>1334</td>
<td>528</td>
</tr>
</tbody>
</table>

Type of clinical studies

- **Interventional**: 96%
- **Observational**: 4%

**Key figures**

- **439**: Companies developing at least one product
- **528**: Unique molecules in the pipeline
- **1334**: Clinical trials
- **45%**: Ongoing trials

**Stage of development (#)**

- **Therapeutic**: 122
  - Preclinical: 54
  - Phase I: 75
  - Phase II: 62
  - Phase III: 71
- **Vaccines**: 9
  - Therapeutic: 31
  - Vaccines: 3
  - Therapeutic: 16

**Sites of clinical trials (#)**

- China: 430
- United States: 350
- Europe: 320
- France: 120
- Australia: 100
- Iran: 90
- Spain: 80
- Italy: 70
- United Kingdom: 60
- Brazil: 50
- Canada: 40
- Others: 30

*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 COVID-19 pandemic.

The antibody pipeline

- Monoclonal Antibody: 84%
- Polyclonal Antibody: 13%
- Monoclonal Antibody Conjugated: 3%
- Others: 14%

The antibody pipeline is shown in the pie chart above.

Vaccine technology used

- mRNA: 31%
- DNA: 16%
- Sub-unit: 12%
- Recombinant vector: 16%
- Inactivated: 4%
- Live attenuated: 3%
- Unknown: 18%

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.

+147 commercially available tests

- PCR, 89
- Serological, 55
- Others, 5

* All data has been generated by MabDesign unless stated otherwise


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
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.

### Selection of latest major deals related to COVID-19

<table>
<thead>
<tr>
<th>Announced Date</th>
<th>Deal Description</th>
<th>Type of Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>23/04/20</td>
<td>ReiThera Enters into Agreement with LEUKOCARE and Univercells for COVID-19 Vaccine</td>
<td>Vaccine</td>
</tr>
<tr>
<td>22/04/20</td>
<td>Precision For Medicine Enters into Partnership with Karyopharm Therapeutics for COVID-19</td>
<td>Small molecule</td>
</tr>
<tr>
<td>21/04/20</td>
<td>Bayer to Enter into Research Partnership with Population Health Research Institute (PHRI) to Identify COVID-19 Treatments</td>
<td>Small molecule</td>
</tr>
<tr>
<td>16/04/20</td>
<td>Dynavax Technologies and Sinovac Biotech Enter into Collaboration to Develop COVID-19 Vaccine</td>
<td>Vaccine</td>
</tr>
<tr>
<td>08/04/20</td>
<td>CSL Behring and SAB Biotherapeutics Enter into Partnership for COVID-19</td>
<td>Antibody</td>
</tr>
<tr>
<td>05/04/20</td>
<td>GlaxoSmithKline and Vir Biotech to Enter into Collaboration for COVID-19</td>
<td>Antibody</td>
</tr>
<tr>
<td>03/04/20</td>
<td>GlaxoSmithKline Enters into Agreement with Xiamen Innovax Biotech for COVID-19 Vaccine</td>
<td>Vaccine</td>
</tr>
<tr>
<td>02/04/20</td>
<td>Emergent BioSolutions Enters into Agreement with US Government to Develop Plasma-Derived Therapy for COVID-19 Patients</td>
<td>Antibody</td>
</tr>
<tr>
<td>02/04/20</td>
<td>Amgen and Adaptive Biotechnologies to Enter into Licensing Agreement to Develop Antibodies to Treat COVID-19</td>
<td>Antibody</td>
</tr>
<tr>
<td>26/03/20</td>
<td>Twist Bioscience Enters into Agreement with Vanderbilt University Medical Center to Supply Critical Products and Identify Antibody Therapeutics for COVID-19</td>
<td>Antibody</td>
</tr>
<tr>
<td>26/03/20</td>
<td>Ology Bioservices Enters into Agreement with Inovio Pharma to Manufacture COVID-19 DNA Vaccine</td>
<td>Vaccine</td>
</tr>
<tr>
<td>17/03/20</td>
<td>Pfizer and BioNTech Enters into Co-Development Agreement for Potential COVID-19 Vaccine</td>
<td>Vaccine</td>
</tr>
<tr>
<td>12/03/20</td>
<td>AbCellera and Lilly to Co-develop Antibody Therapies for the Treatment of COVID-19</td>
<td>Antibody</td>
</tr>
<tr>
<td>12/03/20</td>
<td>Vir Biotech to Enter into Collaboration with Biogen on Manufacturing of Antibodies to Potentially Treat COVID-19</td>
<td>Antibody</td>
</tr>
<tr>
<td>05/03/20</td>
<td>AnGes Enters into Co-Development Agreement with Osaka University to Develop Coronavirus Vaccine</td>
<td>Vaccine</td>
</tr>
<tr>
<td>05/03/20</td>
<td>Pfizer Plans to Enter into Collaboration with BioNTech to Develop Vaccines for Coronavirus</td>
<td>Vaccine</td>
</tr>
</tbody>
</table>

Source: GlobalData
## Selection of latest major deals involving French companies

<table>
<thead>
<tr>
<th>Announced Date</th>
<th>Deal Description</th>
<th>Type of Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>24/04/20</td>
<td>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.</td>
<td>Others</td>
</tr>
<tr>
<td>22/04/20</td>
<td>Valneva and Dynavax Technologies Enter into Collaboration to Advance Vaccine Development for COVID-19</td>
<td>Vaccine</td>
</tr>
<tr>
<td>15/04/20</td>
<td>LFB and the biotech company Xenothera sign an agreement for the production of the first clinical batch of a drug candidate</td>
<td>Antibody</td>
</tr>
<tr>
<td>14/04/20</td>
<td>Sanofi and GlaxoSmithKline to Enter into Co-Development Agreement for Covid-19</td>
<td>Vaccine</td>
</tr>
<tr>
<td>06/04/20</td>
<td>CSL Behring Enters into Co-Development Agreement with Takeda Pharma, Biotest, Bio Products Laboratory, LFB and Octapharma for Treatment of COVID-19</td>
<td>Antibody</td>
</tr>
<tr>
<td>27/03/20</td>
<td>Sanofi Pasteur Enters into Co-Development Agreement with Translate Bio to Develop Novel mRNA Vaccine Candidate Against COVID-19</td>
<td>Vaccine</td>
</tr>
<tr>
<td>20/0320</td>
<td>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)</td>
<td>Vaccine</td>
</tr>
<tr>
<td>16/03/20</td>
<td>Sanofi and Regeneron to Enter into Collaboration for COVID-19</td>
<td>Antibody</td>
</tr>
</tbody>
</table>

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 COVID-19 response

Companies providing solutions and collaborations

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

**SKILCELL** 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.
Companies developing treatment or vaccines

**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 COVID19-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 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.

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**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 [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**

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


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


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 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


**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


**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-innovation-i-Nov-38041

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


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

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


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

**Funding and Aid for the 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.defense.gouv.fr/aid/deposer-vos-projets/subventions/rapid](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


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


**Other notable endeavours**

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

[https://www.gatesfoundation.org/TheOptimist/coronavirus](https://www.gatesfoundation.org/TheOptimist/coronavirus)

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

[https://www.coalitioncovid.org/](https://www.coalitioncovid.org/)

Coalition for Epidemic Preparedness Innovation (CEPI)

[https://cepi.net/](https://cepi.net/)

L’initiative OpenCovid19 pour développer collectivement des outils et méthodes open-source et bas-coût

[https://app.jogl.io/program/opencovid19](https://app.jogl.io/program/opencovid19)
As of going to press, more than 7000\(^1\) scientific articles on the current COVID-19 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.

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

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

SARS-CoV-2: a storm is raging.


Molecular Mechanism for Antibody-Dependent Enhancement of Coronavirus Entry

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

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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
Insights from immuno-oncology: the Society for Immunotherapy of Cancer Statement on access to IL-6-targeting therapies for COVID-19.


A highly conserved cryptic epitope in the receptor-binding domains of SARS CoV-2 and SARS-CoV.

Genomic Characterisation and Epidemiology of 2019 Novel Coronavirus: Implications for Virus Origins and Receptor Binding.

The COVID-19 pandemic and research shutdown: staying safe and productive.

Cytokine release syndrome in severe COVID-19.

Structure of Mpro from COVID-19 virus and discovery of its inhibitors.
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.

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

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 response during the COVID-19 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 here.

About MabDesign

- **MABDESIGN** is a French membership organization in the field of immunotherapy. Created in 2014 MABDESIGN is managed by four competitiveness 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.

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- @Mabdesign_fr
- MabDesign

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