
PRESS RELEASE

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Autoimmune and inflammatory diseases associated with primary immune deficiencies: 11 major healthcare players in France commit to accelerating the development of precision medicine

The Imagine Institute, Sanofi, Ariana Pharmaceuticals, Assistance Publique - Hôpitaux de Paris (AP-HP), INRAE, CEA, Institut Pasteur, Institut Curie, University of Paris, Sorbonne University and Inserm announce the signature of a consortium agreement within the framework of the Programme d'Investissements d'Avenir. This project aims to develop a precision medicine for patients with autoimmune and inflammatory diseases associated with primary immune deficiencies.

Coordinated by *Imagine* Institute and funded with 9,9 million of euros over 5 years, ATRACTion program is one of the 15 winners of the fourth call for projects “*Recherche Hospitalo-Universitaire en santé*” of *Investissement d'Avenir* program launched by the French government and managed by ANR. It is supported by a consortium of 11 academics and industrial partners who joined forces to develop disruptive and transformative approaches in the fields of diagnosis, prognosis and therapies to fight pathologies related to the mechanisms of autoimmunity and inflammation in primary immune deficiencies.

Primary immune deficiencies group more than 420 rare monogenic diseases affecting the development, the function or the regulation of the immune response. The symptoms, extremely varied and of different degrees of severity can lead to significant diagnostic and therapeutic wandering. Patients suffering from these pathologies generally require extensive treatments throughout their lives, which can have important side effects.

Under the coordination of Dr. Frédéric Rieux-Laucat, Inserm Research Director at *Imagine* Institute, ATRACTion takes advantage of a highly favorable multidisciplinary and translational environment that brings together all the partners implicated in the project. It gathers academic experts from different fields (immunology, microbiology, data science, artificial intelligence, multi-omic analysis), medical doctors and industrial partners. Participate in this ambitious project multiple partners: Sanofi, Ariana Pharmaceuticals, Assistance Publique – Hôpitaux de Paris (AP-HP), INRAE, CEA, Institut Pasteur, Curie Institute, Université de Paris, Sorbonne Université and Inserm.

« **The strength and originality of this project relies on single-cell analysis of human biological samples that will lead to the emergence of new and uncharacterized biological interaction networks, and on the analysis in parallel of the microbiota composition and microbial metabolites in order to understand the role of intestinal bacteria in these pathologies** », announces Dr. Frédéric Rieux-Laucat. ATRACTion opens the door to a more personalized medicine and to new diagnostic and therapeutic

solutions, based on new molecules or on the repositioning of molecules already used for other pathologies.

ATRACTION aims to change the care of patients with primary immune deficiencies presenting symptoms related to autoimmunity and inflammation: **"the fundamental goals of the project are to propose an application to support healthcare professionals in their decisions concerning diseases' diagnostics or therapeutics, and to develop new therapeutic strategies"**.

This program demonstrates public and private sector interest in deciphering autoimmune/inflammatory diseases through **multi-omic investigations coupled with artificial intelligence-based analysis**. The quality of the expertise of the partners involved in the creation of a customized program is what makes ATRACtion unique in its field.

About Imagine Institute: *Imagine* is the first European center for research, care and teaching on genetic diseases. With the mission of understanding and curing them, the Institute brings together 1000 of the best doctors, researchers and healthcare personnel in an architecture that creates synergies. It is this unprecedented continuum of expertise, combined with proximity to patients, that allows Imagine to make discoveries for the patients. The approximately 9,000 genetic diseases that have been identified affect 35 million patients in Europe, and nearly 3 million in France, where 30,000 new cases are diagnosed each year. Nearly 60% of the children received in consultation leave without a genetic diagnosis and 90% of genetic diseases have no cure. Faced with this major public health issue, the challenge is twofold: to diagnose and cure. www.institutimagine.org

About the other partners

Sanofi: Sanofi is dedicated to supporting people through their health challenges. We are a global biopharmaceutical company focused on human health. We prevent illness with vaccines, provide innovative treatments to fight pain and ease suffering. We stand by the few who suffer from rare diseases and the millions with long-term chronic conditions. With more than 100,000 people in 100 countries, Sanofi is transforming scientific innovation into healthcare solutions around the globe.
Sanofi, Empowering Life. www.sanofi.com

Ariana Pharma: Ariana Pharma is a leading digital health Company focused on developing advanced therapeutic decision support systems. Using its KEM® Explainable Artificial Intelligence (XAI) technology, Ariana helps its partners introduce personalized medicine clinical trial design into their protocols and identify the best clinical endpoints, the best responders and the best potential synergistic drugs. Ariana routinely collects and combines clinical data with omic data, immunological readouts, microbiota, Patient Reported Outcomes as well as Real World Evidence data. Combining advanced data analytics with regulatory expertise, Ariana helps translate findings into innovative clinical plans. With a growing number of successful therapeutic development applications, KEM® is the only FDA-reviewed technology that systematically explores combinations of biomarkers, producing more effective biomarker signatures for precision medicine. Ariana has developed Onco KEM®, the most advanced, clinically tested, oncology treatment selection system. Founded in 2003 as a spin-off of the Institut Pasteur, Paris, France, the company operates a subsidiary in the United States since 2012. Further information is available at www.arianapharma.com/.

AP-HP: Europe's leading hospital and university center (CHU), the AP-HP and its 39 hospitals are organized into six hospital-university groups (AP-HP. Center - University of Paris; AP-HP. Sorbonne University; AP-HP. Nord - University of Paris; AP-HP. Paris Saclay University; AP-HP. Henri Mondor University Hospitals and AP-HP. Hôpitaux Universitaires Paris Seine-Saint-Denis) and are organized



around five Paris Region universities. Closely linked to major research organizations, AP-HP has three world-class university hospital institutes (ICM, ICAN, IMAGINE) and France's largest health data warehouse (EDS). A major player in applied research and innovation in healthcare, AP-HP holds a portfolio of 650 active patents, its clinician-researchers sign nearly 9,000 scientific publications each year and more than 4,000 research projects are currently under development, all sponsors combined. In 2020, AP-HP obtained the Institut Carnot label, which rewards the quality of its partnership research: Carnot@AP-HP offers industrial players applied and clinical research solutions in the field of healthcare. In 2015, AP-HP also created the AP-HP Research Foundation to support biomedical and health research conducted in all of its hospitals. <http://www.aphp.fr>

INRAE (Unit MetaGenoPolis): MetaGenoPolis (MGP) is an INRAE centre expert in gut microbiome research applied to human and animal health and nutrition, funded by the Programme des Investissements d'Avenir (Laureate 2012 and 2019). MGP's expertise in the analysis of the gut microbiome and its implications for health and nutrition has been widely recognized in the international scientific community since 2010. In collaboration with industry, academia and clinics, MGP conceives and implements projects tailored to the partner's need. ISO 9001 certified, the protocols and procedures are constantly maintained at the cutting edge of technology. To explore the link between the microbiome, nutrition and health, MGP has innovative technological platforms accompanied by an ethical center UCLy (Catholic University of Lyon). MGP also aims to develop more industrial partnerships and the creation of start-ups to accelerate microbiome science and innovation in health and nutrition. <http://mqps.eu/>

CEA : CEA is a major player in research, at the service of the State, the economy and citizens. It provides concrete solutions to their needs in four main areas: energy transition, digital transition, technologies for the medicine of the future, defense and security. Pushing back the frontiers of knowledge.

CEA conducts fundamental research in the fields of biotechnology and health, matter and universe sciences, physics and nanosciences. It places at the heart of its objectives the production and publication of knowledge and know-how at the best global level. This knowledge is also an indispensable source for CEA's other missions. In 2019, nearly 3,800 scientific publications were signed by CEA researchers, three quarters of which are the result of international collaborations. www.cea.fr

Institut Pasteur and Institut Pasteur International Network: The Institut Pasteur, a non-profit foundation with recognized charitable status set up by Louis Pasteur in 1887, is today an internationally renowned center for biomedical research with a network of 32 institutes worldwide. In the pursuit of its mission to prevent and control diseases in France and throughout the world, the Institut Pasteur operates in four main areas: research, public health, education and training, and development of research applications. More than 2,700 people work on its Paris campus. The Institut Pasteur is a globally recognized leader in infectious diseases, microbiology, and immunology. Other avenues of investigation include cancer, genetic and neurodegenerative diseases, genomics and developmental biology. This research aims to expand our knowledge of the living world in a bid to lay the foundations for new prevention strategies and novel therapeutics. Since its inception, 10 Institut Pasteur scientists have been awarded the Nobel Prize for Medicine. www.pasteur.fr

Institut Curie: Institut Curie, France's leading cancer center, combines an internationally-renowned research center with a cutting-edge hospital group that treats all types of cancer, including the rarest. Founded in 1909 by Marie Curie, Institut Curie employs 3,600 researchers, physicians, and health professionals across three sites (Paris, Saint-Cloud, and Orsay), working on its three missions: treatment, research, and teaching. A private foundation with public utility status, Institut Curie is authorized to receive donations and legacies, and thanks to the support of its donors, is able to make discoveries more quickly, improving treatments and quality of life for patients. For more information, visit: www.curie.fr

University of Paris: As an intensive, multidisciplinary research university, the University of Paris has risen to the level of the most prestigious French and international institutions thanks to its very high level research, its advanced training of excellence, its support for innovation and its active participation in the construction of the European research and training area.





Université de Paris has 61,000 students, 4,500 teacher-researchers, 22 doctoral schools and 142 research laboratories. [Visiter u-paris.fr](http://www.u-paris.fr).

Sorbonne University: Sorbonne University, born from Paris-Sorbonne and Pierre and Marie Curie Universities merge, is a world-class multidisciplinary intensive research university. Sorbonne University covers the entire disciplinary spectrum of literature, medicine and science. Anchored in the heart of Paris, with a regional presence, it is committed to the success of its students and strives to meet the scientific challenges of the 21st century and to transmit the knowledge from its laboratories and research teams to society as a whole. Thanks to its nearly 55,000 students, 6,700 teacher-researchers and researchers, and 4,900 administrative and technical staff who support it on a daily basis, Sorbonne University aims to be diverse, creative, innovative and open to the world. Together with the National Museum of Natural History, the Université de Technologie de Compiègne, INSEAD, the Pôle Supérieur Paris Boulogne Billancourt and France Education International, it forms the Sorbonne University Alliance. The diversity of the members of the Alliance Sorbonne University promotes a global approach to teaching and research. It promotes access to knowledge for all and develops numerous joint programs and projects in initial, continuous and lifelong education in all disciplines. Sorbonne University is a member of Alliance 4EU+, a new model of European university, with the Charles Universities of Prague (Czech Republic), Heidelberg (Germany), Warsaw (Poland), Milan (Italy) and Copenhagen (Denmark). www.sorbonne-universite.fr

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