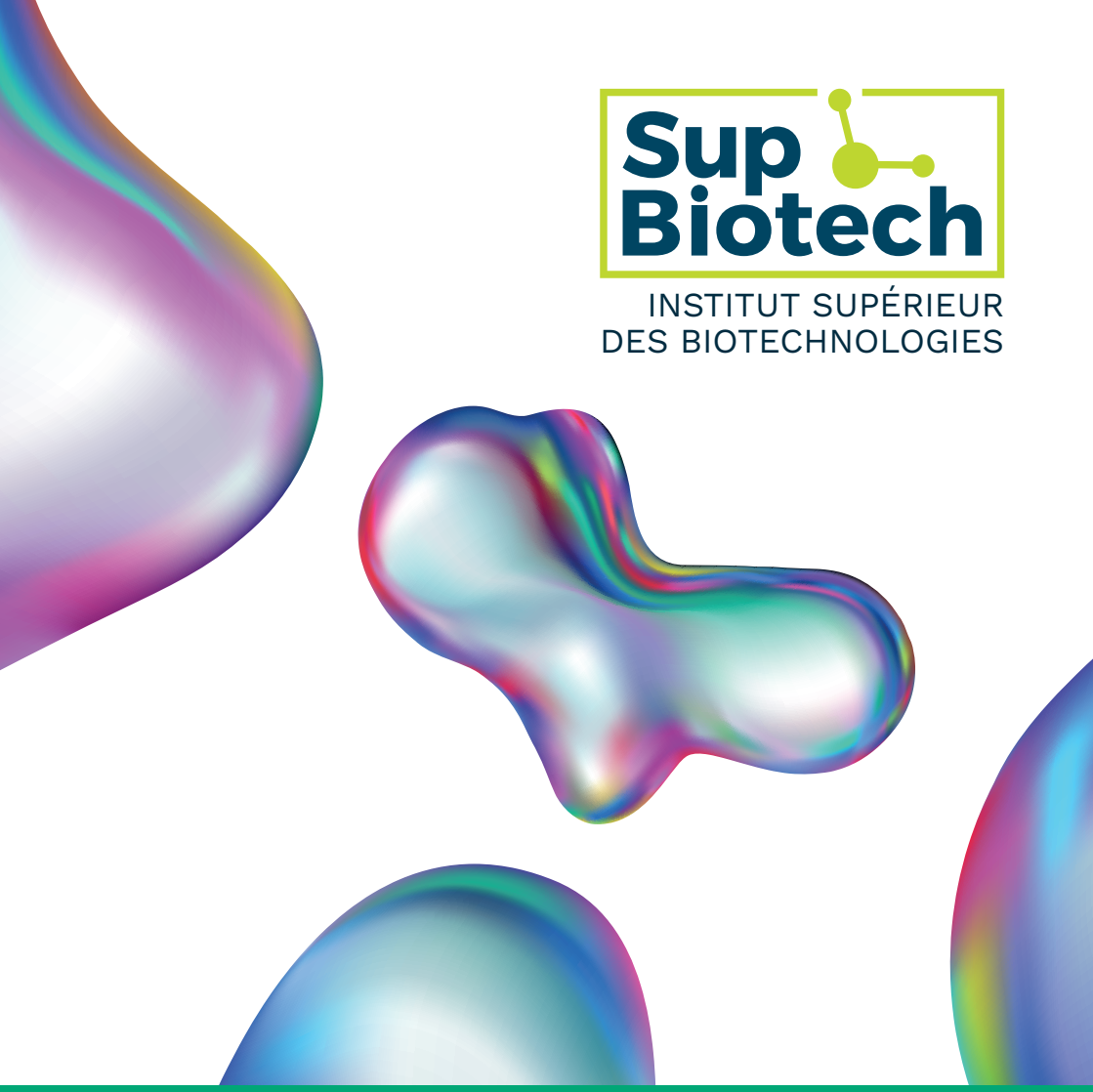
Sup Biotech

INSTITUT SUPÉRIEUR
DES BIOTECHNOLOGIES



Research & Innovation at SupBiotech

editorial

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Dear international collaborators,

In this document you will find a description of the research department of SupBiotech, one of the leading French engineering schools (écoles d’ingénieurs) in the field of biotechnology, as well as a presentation of our open facilities, available to both students and researchers.

Located in the Paris Ile-de-France Region, SupBiotech benefits from a rich scientific environment. France has consistently prioritized and supported research and development, placing it at the forefront of national concerns. The country boasts a rich history of generating revolutionary discoveries and advancements that have profoundly influenced various domains. SupBiotech’s laboratories are integrated within this thriving ecosystem and take great pride in contributing to this enduring heritage of exceptional research.

Our research laboratories engage in close scientific collaboration with renowned French research institutions, covering a wide range of applications in the field of biotechnology. These collaborations span various domains, including agri-food, environment, health and pharmaceutical research.

SupBiotech’s network of French research institutions, which encompasses universities, hospitals, research centers, startups and big pharma companies, provides students with comprehensive knowledge and essential skills required to thrive in the field of biotechnology. This diverse learning environment empowers students to make a positive societal impact while simultaneously advancing their career opportunities.

I invite you to discover in this brochure how SupBiotech’s research labs and partners promote innovation in the dynamic French research ecosystem. Our biotech facilities: 3D printing FabLab, Cooking lab, Bioproduction lab and 3D Imaging facilities are a great way to provide tools to develop the imagination of both students and researchers. We are always open to new collaborations, and pride ourselves in taking part in the education of the future generation of biotech engineers.

SupBiotech is committed to promoting innovation and excellence in research and our research teams are looking forward to meeting with you.

Sincerely, ”

Frank Yates,
Director of SupBiotech’s
Research Department

SupBiotech's collaboration

SupBiotech's collaboration with leading French academic institutions and companies in the biotechnology industry provide valuable opportunities for students and alumni, to gain practical skills and knowledge about the latest industry trends. For researchers, partnerships lead to funding and collaboration on cutting-edge projects. With an extensive range of partners, including Medicen Paris Region, Vitagora, Bioeconomy for Change, Cosmetic Valley, as well as a tight network of biotech companies, SupBiotech graduates are prepared for the workforce and have the necessary experience to succeed in biotechnology, environment, food science and biomedical engineering careers.

Celltechs Laboratory - Cell engineering and organoids

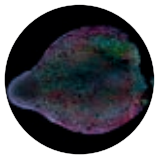
CellTechs
LA RECHERCHE SCIENTIFIQUE AU COEUR DE SUPBIOTECH

The CellTechs Laboratory studies neurodegenerative diseases through tissue engineering. CellTechs, in close partnership with the prestigious French institute CEA, uses stem cells and 3D differentiation techniques to obtain in vitro brain organoids, which are three-dimensional structures expressing specific characteristics of human organs. These models will enable us to better understand, predict and treat neurodegenerative pathologies such as Alzheimer's disease.

Imaging is a key component of disease modeling. To capture the 3D architecture of the brain organoids produced in the lab, Celltechs combines tissue clearing and expansion microscopy with light sheet fluorescence microscopy. This state-of-the-art microscopy technique allows for the fast acquisition of 3D images with a cellular resolution. CellTechs Laboratory's research on neurodegenerative diseases and its experience on organs-on-a-chip technology are advancing the understanding, treatment, and pharmaceutical testing capabilities in this field of biotechnology.

Selected reading

Castiglione H, Vigneron P, Baquerre C, Yates F, Rontard J, Honegger T: Human Brain Organoids-on-Chip: Advances, Challenges, and Perspectives for Preclinical Applications. Pharmaceutics 2022, 14:2301.



A section of Cerebral Organoid (Cyan: DAPI, Green: NeuN, Red: GFAP, Magenta: MAP2)
© CellTechs lab

CellTechs has a long-standing partnership with the CEA (French Alternative Energies and Atomic Energy Commission)
https://www.cea.fr

NETRI's patented organs-on-chip technologies enable the creation of standardized and predictive in vitro human models.
https://netri.fr

Brain Organoid-on-Chip project

Microfluidic devices can provide a solution by giving access to a highly controlled microenvironment. CellTechs has teamed up with NETRI, a leading French company in the design and manufacture of compartmentalized microfluidic devices, to explore the great potential of combining organoid and microfluidics technologies for preclinical research. Mettre ce texte, ci-dessous dans un encadré

LRPIA- Environment and Food Laboratory

The LRPIA laboratory conducts research at the intersection of agri-food and environment, to unlock innovative applications for plant by-products. One of the missions of LRPIA to contribute actively to the bioeconomy and the circular economy. With a focus on sustainability and practicality, the projects of LRPIA encompass investigations into the antifungal properties of agricultural co- and by-products, enriching the realm of biocontrol products.

In collaboration with the French Museum of Natural History, the LRPIA aims to identify novel compounds that can be harnessed in organic farming, in order to promote sustainable agricultural practices. Moreover, the LRPIA is dedicated to unraveling the intricate relationship between soil and plant microbiota, exploring their vital roles in the realm of agriculture.

LRPIA is proud to contribute to a future where biotechnology research drives sustainable agriculture and fosters a harmonious coexistence with our environment.

Nanopore : a hand-held next generation sequencing instrument used at LRPIA to sequence and identify microbiota. © LRPIA lab

Selected reading

"Measuring Volatile and Non-volatile Antifungal Activity of Biocontrol Products." Gligorijevic, V., Benel, C., Gonzalez, P., Saint-Pol, A. J. Vis. Exp. (166), e61798, doi:10.3791/61798 (Dec2020).

PBS LABORATORY - Social Science and biotechnology

SupBiotech's social science laboratory, PBS, is specialized in the study of science and technology. Its research program focuses on biotechnologies and the entities they produce (stem cells, organoids, biocontrol techniques, etc.). The empirical investigations carried out by the lab focus on the biological resources (human, plant, micro-organisms) that biotech produces and their support to innovation. Some of the questions raised include: How are biological resources produced? What happens to them outside the laboratory? What are their contributions to the evolution of our societies (in the medical, environmental, agricultural fields, etc.)? What issues do they raise? How are they changing the professions involved in science, medicine, engineering? Research topics at PBS focuses on biomedicine and the environment, with the aim of involving engineering students in interactive and original teaching. In short, research at PBS sheds light on biotechnological innovations and the uses to which they give rise, and communicates these findings to SupBiotech's students, thus contributing to the training of responsible engineers who are mindful of today's social, ethical and environmental issues.

Selected reading

"Pandemic Covid-19 and controversy in France: a sociological analysis through emotions", Vermot C and Milanovic F, in A. Scribano & al. (dir.) Covid-19 and emotion, London: Palgrave McMilan. (2023)

*Sociological study of an innovative biocontrol technique. Observation in a Microbial Ecology Laboratory

ORGANACT – A project dedicated to the study of organoids

Organoids are and self-organize in vitro.

Organact is a multi-institutional funded which focuses on human organoids (three-dimensional tissue structures that resemble organs) and the issues they can raise.

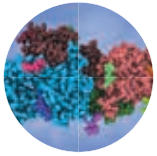
Organact proposes an analysis of the regulatory activities applicable to human organoids, based on sociological, anthropological and legal studies, in an interdisciplinary approach. The project is based on an ethnographic fieldwork which consists in studying four complementary cases in France, covering a continuum of practices from fundamental research to clinical application.

BIRL- Bioinformation Research Laboratory

The Bio-Information Research Laboratory (BIRL integrates biotechnology, numerical methods, and chem-informatics research to manage artificial and natural biological systems. Focusing on cell growth and metabolism, BIRL works with IPSA (Aeronautic School of IONIS Education Group) and Centrale Supélec to model microorganism growth in bioreactors for Hydrogen production. Collaborating with the French UCA University, the BIRL also explores, through computer modeling, the cellular metabolism in order to better control cell growth incancer or in bioproduction. The BIRL also develops chem-informatics tools for drug discovery in cancer and parasitic diseases.

The interdisciplinary research conducted at the BIRL is aimed at providing novel solutions in different fields of biotechnology, including optimizing biomass production, and developing systemic therapies for cancer or parasitic diseases.

Selected reading



"Regulation of eukaryote metabolism: An abstract model explaining the warburg/crabtree effect. "Gibart L, Khoodeeram R, Bernot G, Comet JP, Trosset JY. Processes 2021, 9:1–33.

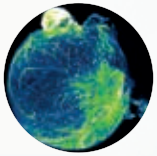
Research Facilities and scientific network

SupBiotech offers facilities for researchers and students including a 3D Fab Lab for prototyping, a Bioproduction facility for microbiology, an Advanced Imaging platform, a Food Science lab and over 100 square meters of lab space for conducting experiments and learning new techniques. Students can use these state-of-the-art facilities for class projects and independent research.

As an active member of the Unigreen alliance, SupBiotech provides students comprehensive ecological transition education through collaborative educational and research programs like workshops, conferences, exchanges, internships, and joint projects between the LRPIA lab and European Unigreen partners on topics such as biocontrol and soil microbiomes.

3D Microscopy

The SupBiotech 3D Microscopy Platform, co-developped with the CEA research institute, is equipped with a state-of-the-art light sheet microscope that enables 3D imaging of biological samples. With this advanced technology, researchers can observe the internal structures of samples.
The platform offers a range of imaging techniques and tools to support various research projects in the fields of biotechnology, bioengineering, and cell biology. Students and researchers can benefit from the expertise of the SupBiotech staff who provide guidance and assistance with imaging protocols and data analysis.



Brain organoid (three months old) obtained from human IPS cells. [CellTechs Laboratory, SupBiotech] 3D image obtained with light-sheet microscopy (UltraMicroscope). Neurons stained with a Tuj1 antibody

3D Cell Imaging Platform, CellTechs SupBiotech/CEA laboratory.

Bioproduction Facility

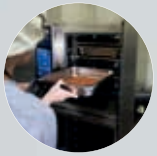
The bioproduction facility at SupBiotech is equipped with a photobioreactor (an incubator allowing to use light as an energy source) from one of the leading French experts in the field: Synoxis. SupBiotech's laboratories are also fully equipped with mini fermenters, to support both research and student practical sessions. The Synoxis Photobioreactor is a cutting-edge technology that allows for the cultivation of micro-organisms, including algae and bacteria, under tightly controlled conditions.
The mini fermenters are used to conduct experiments on a smaller scale and are ideal for student practicals. These tools provide researchers and students with the necessary resources to carry out experiments for their projects.

Bioproduction laboratory at SupBiotech.

Synoxis photobioreactor in use in a microalgae production experiment.

Food Science Lab

Supbiotech's Food Science lab is geared towards fostering innovation in the food industry through the development of new products and the optimization of existing ones. It is fully equipped and is used as a resource to support research, practical training as well as student projects, such as the participants to the EcoTrophelia Innovative Product Competition. It is also the main lab used during SupBiotech's Food Science Summer Schools! The SupBiotech Food Science lab is supervised by a team of experienced professionals working in collaboration with academia and industry.



Students working in SupBiotech's Food science lab (Ecotrophelia Biotech Food Competition)

3D Printing Fablab

SupBiotech's 3D printing FabLab is a well-equipped facility that provides students and researchers with the latest 3D printing technologies.
The FabLab has a range of 3D printers and provides practical training to design, model and print 3D objects.
The facility is open and students and researchers can experiment together with 3D printing techniques and develop their own prototypes.
Thanks to the 3D printing FabLab, students and researchers can unleash their creativity, acquire practical skills, and collaborate on designing, modeling, and printing 3D objects.

3D printing FabLab at SupBiotech.

Prototype for the Technobees project, 2020.

A prototype for the BioSand Innovative Project Team, 2023.

Unigreen European Alliance

SupBiotech is a member of UNIgreen – The Green European University: an Alliance of 8 European Higher Education Institutions that share the common vision of promoting excellence in Teaching, Learning, Research and Innovation in field of Sustainable Agriculture, Green Biotechnology and Environmental and Life Sciences.

The Unigreen European University comprises eight campuses: SupBiotech (France), University of Almería (Spain), Agricultural University of Iceland, Agricultural University of Plovdiv (Bulgaria), Instituto Politécnico de Coimbra (Portugal), Università degli Studi di Modena (Italy), Warsaw University of Life Sciences (Poland) and Haute École de la Province de Liège (Belgium).

SupBiotech is a proud member of Unigreen, which offers students a comprehensive education in the field of ecological transition. As an active member of the alliance, SupBiotech participates to both educational programs (workshops, conferences, exchange programs, internships...) as well as research programs, through a tight partnership with SupBiotech's LRPIA laboratory.

Themes such as biocontrol products usable in agriculture or soil microbiote are studied in collaboration with UNIgreen partners....).

In summary, the Unigreen project fosters collaboration between 8 European campuses, aiming to drive ecological transformation in agriculture.

SupBiotech actively engages within the alliance, offering students a global learning experience and research prospects in ecological transition, including innovative studies in the field of environmental science.

https://unigreen-alliance.eu/

testimonies

Agnès Saint-Pol
Director of the LRPIA laboratory

“Fungal biotechnologies are a key to address contemporary environmental challenges.”

Cécile Vermot
Asst Prof at PBS laboratory

“In this year's keystone project, students delved into the theme of PBS's research on breast milk. This allowed them to craft a scientific approach, bridging biology and sociology, marking a pioneering endeavor.”

Ouerdia Arkoun
Asst Prof in Mathematics, BIRL laboratory

“In the field of biotechnology, the precise and systematic language of mathematics is invaluable. It provides us with the tools for modeling, predicting, and understanding the complexities that the future holds.”

Axelle Gramatikoff
Promo 2025

“My work at the CellTechs lab showed me how the applications of iPSC and genetic engineering can contribute to research on neurodegenerative diseases.”

supbiotech.fr
supbiotech.fr/recherche-innovation-biotechnologie

Sup Biotech

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