

Committed, *to fighting* *against* diseases

2021 Annual Report



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Accelerating
research *and acting*
for **tomorrow's**
health.

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2021 ANNUAL REPORT

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Scientific
publications

Partners *and*
support

Research, prevention, innovation, transformation

The teams at the Institut Pasteur de Lille are committed now more than ever!

After 2020 marked by the fight against the Covid-19 pandemic, the teams of Institut Pasteur de Lille nearly resumed the normal course of their activities. Research is advancing, prevention is intensifying, innovation is progressing, projects are continuing... thanks to the unwavering commitment of the teams and the generosity of patrons and donors. Looking back at this post-Covid year with Prof Xavier Nassif, Managing Director, and Didier Bonneau, Deputy Managing Director.

How was 2021 for the Institut Pasteur de Lille and its teams?

› **Prof Xavier Nassif**

After 2020 when the mobilisation of our teams in the face of the pandemic was extraordinary, 2021 allowed, if I dare say so, a certain return to normality. Infectious diseases, metabolic and cardiovascular diseases, neurodegenerative diseases, cancers, diabetes... our research and prevention teams are now closer than ever to understanding and fighting against these diseases, slowing their development, imagining the treatments of tomorrow and changing behaviours.

› **Didier Bonneau**

Financially and organisationally, we have managed to stay on track: The Foundation is now ready for the future. It is in line with the objectives that had been set to give it a solid structure, a necessary condition for its transformation and future development.

In December 2021, the Institut Pasteur de Lille ended the clinical trial to test the efficacy of a SARS-CoV-2 drug. Beyond the disappointment, what lesson did you learn from it?

› **Prof Xavier Nassif**

The task force, which was set up in February 2020 by a team of 30 researchers, has been maintained and is continuing its research. Through its knowledge and resources in medicinal chemistry, the Institut Pasteur de Lille has shown that it can

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**The task force,
which was set up in
February 2020, has
been maintained and is
continuing its research.**

Prof Xavier Nassif

play a major role in the search for a drug against SARS-CoV-2, thus showing itself to be one of the leaders in the fight against major infectious threats. We had to stop our clinical trials on clofoctol, which we discovered was potentially active in limiting the replication of the disease. To be honest, this was a disappointment. This decision involved several factors. On the one hand, the time required to obtain authorisations to carry out this trial and, on the other hand, the acceleration of the vaccination campaign. The combination of these two factors meant that when we were able to start our trial, 80% of the age group of the target population of our trial, that is, the unvaccinated over 50 years of age, were already vaccinated. Added to this was the low motivation to be included in a randomised placebo-controlled trial with some unvaccinated Covid-19-positive persons over 50 years of age. All of these factors made our trial unfeasible with the means we had available. However,



Prof Xavier Nassif and Didier Bonneau

during this pandemic, the Institut Pasteur de Lille held its rank perfectly by mobilising its teams from the beginning to very quickly identify a possible treatment for this infection and we continue to do so. In fact, work is still under way to identify a vaccine that could be administered nasally.

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Our research and prevention teams have mobilised on all fronts. This team success in the face of adversity is to be applauded.

Didier Bonneau

› **Didier Bonneau**

The Covid record was a success. Even if it did not produce the desired results, the clinical trial could be conducted quickly through the tremendous mobilisation of our teams of researchers. Regarding prevention, after participating in Covid screening with our partner Synlab, we supported the vaccination campaign since April 2021 by being a vaccination centre and then supporting the Zenith initiative in Lille. Our research and prevention teams have mobilised on all fronts. This team success in the face of adversity is to be applauded.

What is the scientific strategy of the Institut Pasteur de Lille and what are the ambitions of the Foundation for the coming years?

› **Prof Xavier Nassif**

When it comes to research, we follow a long-term strategy. The Institut Pasteur de Lille has set longevity at the core of its scientific project. If tomorrow we want to age well, we need to better understand cardiovascular diseases, degenerative diseases, or even metabolic diseases like diabetes. We must also prepare for the 2026 five-year labelling of our research teams this year by instilling a reflection aimed at structuring research differently to build the Foundation of tomorrow and prepare for the future.



› **Didier Bonneau**

We also need to formalise health prevention strategies to take into account the future progression of health organisation and toxicology and biosafety activities to support the environmental objectives of our time.

What is the financial health of the Institut Pasteur de Lille? Are the current resources sufficient to meet the future challenges of the Foundation?

› **Didier Bonneau**

In 2021, the Foundation has not yet achieved a balance, but its so-called “competitive field” activities (health checks, nutrition, hospital hygiene, microbiological safety, toxicology) have shown encouraging results. We are continuing the efforts undertaken as part of the operational and financial plan. . Our strategy remains as follows: maintain scientific excellence and increase its resources, sustain the operational and financial soundness of the “competitive field” activities, ensure the transformation of the Foundation, its campus, its governance and its organisation and optimise its financial, material and human resources. As for the research, its growing support must be self-financed by the development of patronage and the support of the economic world. In the next five years, we want to double fundraising among individuals and enhance our skills in project sponsorship and in connection with public funding.

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Our strategy remains as follows: maintain scientific excellence, ensure the progression of the Foundation, its governance and its organisation and optimise its financial, material and human resources.

Didier Bonneau

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The year 2022 must be the beginning of a joint reflection on a more flexible, adaptable organisation that allows young scientists to emerge and to be able to reach their full potential alongside more experienced researchers.

Prof Xavier Nassif

Has the Institut Pasteur de Lille achieved international recognition?

› **Prof Xavier Nassif**

The aura of the Institut Pasteur de Lille is real. It is measured by the excellence of its research, its scientific publications and its international attractiveness. We want to recruit the best to strengthen our fundamental research in the service of health for all. We initiated an invitation to tender in the early fall of 2021 for which we had about 60 candidates, including some of very high quality. We selected two of them to create their teams on our campus.

Despite the health crisis, has the Institut Pasteur de Lille been able to make progress on the transformation of the Campus through the real estate project structuring for the future?

› **Didier Bonneau**

The Institut Pasteur de Lille currently occupies a site of nearly 2.2 hectares, which consists a parcel of land in the heart of the city on which 50,000 m² of buildings are built, mainly offices and laboratories, including 15,000 m² that is under utilised or unused. This land optimisation project, totalling €60 million, provides for the rehabilitation and creation of rental income over time: rehabilitation for attractiveness and rental income to ensure the sustainability of the financial balances of the foundation and its support for research. In 2021, all the funds (€33 million) for the rehabilitation were raised through a loan from the European Bank for Reconstruction and Development and other banking partners. This project must be completed in 2025, subject of course to the impact of the pandemic and the war in Ukraine.

In a few words, what are the major projects planned for 2022?

› **Prof Xavier Nassif**

The year 2022 must be the beginning of a joint reflection on a more flexible, adaptable organisation that allows young scientists to emerge and to be able to reach their full potential alongside more experienced researchers. The transformation also involves instilling this new dynamism by raising the skill levels of these young talents for future generations and research. Our constant desire is to contribute to economic development by helping scientists to value their results, the fruit of their research, and by supporting scientific valorisation, in collaboration with our partners, INSERM, CNRS, the University of Lille and the University Hospital of Lille.

› **Didier Bonneau**

There is no shortage of projects. In 2021, by means of the support of LCL, we signed a letter of intent with ADIMEP in Toulouse, to expand the longevity programme in this territory. We are pleased with this first partnership that lays the foundation stone of our extensive project to create a longevity network throughout France; accessibility to this prevention programme and sharing prevention issues between professionals are, in my opinion, at the heart of current societal challenges. Internally, we are launching a major project to adapt our IT structure for cybersecurity and the digitalisation of all our processes. We continue our policy of training our teams for the challenges of tomorrow to promote skill development for everyone. At last, the Institut Pasteur de Lille is more than ever a leader in the territory: we will participate in the information-research network of Hauts-de-France with our partners and in the creation of a data centre for research. We have passed a significant milestone that allows us today to more calmly prepare for the future.

Committed, *to* advancing research

“Fundamental research is the source of all progress. Every year, researchers at the Institut Pasteur de Lille advance science and human health in the spirit of Pasteurian values. All are committed to striving for excellence in their research, guided by the motto of Louis Pasteur: “Placing science at the service of health”.

The Institut Pasteur de Lille has been a pioneer in the fight against infectious diseases. In recent decades, the alarming emergence of new infectious agents and the Covid-19 pandemic have reminded us of the need to act in the face of new threats. The increasing resistance of many bacteria to antibiotics whose use, too often systematic and sometimes inappropriate, has led to the emergence of multi-resistant strains is also a source of concern. Antibiotic resistance is now considered by the World Health Organisation to be one of the most serious threats to global health. Resistance to antibiotics, antituberculosis drugs, bacteria responsible for community-acquired infections, these subjects motivate our teams. In 2021, the work performed by our researchers will help us to find new ways to fight against resistant bacteria. Great advances have also been made in virology and parasitology, in the search for new cancer treatments, in the knowledge of metabolic, cardiovascular and neurodegenerative diseases, and of course diabetes, which affects more than 425 million people worldwide.

The scientific quality of the Institut Pasteur de Lille and its international influence are measured by the scientific projects undertaken, individuals recruited and programs developed. As a site of international excellence and a major venue for fundamental research, our Campus attracts and recruits the best researchers in their specialty every year. They come from all over the world and this year, their work has received prestigious European funding and has been the subject of notable publications in international scientific journals. It is a source of great pride for all of us! »

Prof Xavier Nassif,
Managing Director





Diseases

cardiovascular and neurodegenerative:

understanding them to better treat them.

Why does the probability of death after a stroke vary from person to person? Why does heart failure often occur after a myocardial infarction? How can the spread of Tau protein aggregates be combatted in Alzheimer's disease and thus slow its progression? How can inflammation be controlled to better combat ageing? Research suggests new perspectives for prevention and treatment, paving the way for personalised medicine and longer life expectancy without disability.

U1167

Prof Philippe Amouyel



CEREBROVASCULAR ACCIDENTS (CVA)

Post-stroke mortality varies depending on the nature of the event.

The death rate from haemorrhagic strokes is 48%, or almost 1 death in every 2 cases, and 15% for ischemic strokes. This is the result of a study conducted by the team of Dr Aline Meirhaeghe from 2008 to 2017 based on mortality data recorded systematically in the morbidity register of cerebrovascular accidents (stroke) of Lille. It focuses on the disparities in mortality (probability of death after stroke) at 28 days following a stroke, depending on the aetiology of the stroke, in adults over 35 years of age. Specifically, three-quarters of deaths at 28 days occur within 6 days of the event for haemorrhagic strokes and within 16.5 days for ischemic strokes. The fatality rate also varies according to stroke subtypes: Cardioembolic strokes and strokes due to undetermined causes are the most common, and have fatality rates of 16% and 18%, respectively. In contrast, arterial thrombotic strokes and lacunar strokes are less frequent and less severe with mortality rates of 3%. The study also found that age at the time of the stroke and its severity are mortality factors. And that rapid treatment in a neurology service improves patient survival by approximately 80%.

150^K

Every year, 150,000 people are victims of a stroke

ALZHEIMER'S DISEASE

S100B protein, a protection against the Tau protein.

Neurodegenerative diseases called tauopathies, the most common of which is Alzheimer's disease, are characterised by the deposit of amyloid plaques in the form of extracellular aggregates, and by neurofibrillary degeneration linked to the aggregation of abnormal Tau protein in neurones. Using the nuclear magnetic resonance technique, researchers from the team of Dr Isabelle Landrieu (INSERM, Institut Pasteur de Lille) and that of Dr Claudio M. Gomes in Lisbon studied the interactions between the S100B protein and the Tau protein. They discovered that the S100B protein masked the region of the Tau protein responsible for its aggregation and protected the brain from the toxic formation of aggregates. Ultimately, this advance could make it possible to find synthetic molecules with therapeutic potential that would slow the progression of Alzheimer's disease. This work was published in November 2021 in the scientific journal Nature Communications.

3^M ✓

3 million people are affected by Alzheimer's disease (1.2 million patients and 1.8 million caregivers).

HEART FAILURE

Why does it often occur after a heart attack?

Heart failure is the inability of the heart muscle to perform its role of propelling blood in the body in a normal manner. It may occur after a heart attack such as myocardial infarction. Heart failure affects 5 to 10% of the population and mostly the elderly. Among persons who have suffered a heart attack, 30% are victims of cardiac remodelling (ERM) with a progression toward heart failure for 10% of them, and death at 5 years for 5% of them. A new approach has been developed by the team of Dr Florence Pinet from tissue sections to measure mitochondrial respiration in the heart using Seahorse technology. It allowed the characterisation of the pathophysiological mechanisms involved in the accumulation of phosphorylated desmin in the heart, following a heart attack. It thus appears that the accumulation of these toxic proteins in the form of aggregates results from an elimination defect by the cells, and contributes to the development of heart failure.

PREMATURE AGEING

Inflammation, a soon to be controlled phenomenon?

Inflammaging reflects an acute inflammation, even mild, which affects all the cells of the body that participate in the acceleration of their ageing. Among the causes of this inflammaging are diet and diabetes. This reaction between sugar and proteins, which gives advanced glycation end products (AGEs), contributes to accelerated ageing. These AGEs are formed by the Maillard reaction and absorbed by the body. The research work carried out by the team of Prof Éric Boulanger led to the discovery of a new intestinal absorption route for dietary AGEs by the body, endocytosis, which opens up new perspectives on the physiopathological mechanisms of these compounds whose interaction with the RAGE receptor participates in this inflammaging.

New therapeutic targets **against cancer.**

Elimination of senescent cell accumulations by antibodies, identification of new MET receptor mutations, correction of DNA mutations: to better understand the mechanisms of resistance to cancer treatments that allow us to identify new therapeutic targets, in order to offer better-targeted therapies to cancer patients.

UMR9020 - UMR1277
**Dr Isabelle
 Van Seuningen**



CANCERS AND RARE DISEASES

A targeted treatment to correct DNA mutations?

Incubated at Eurasanté, Genvade Therapeutics was established in 2021 by Dr Fabrice Lejeune (DR Inserm), Target team member. The start-up develops a molecule for therapeutic purposes, called GV-01, possessing mutation-correcting biological activity. This molecule is a drug candidate of interest for treating certain orphan genetic diseases, including certain forms of cystic fibrosis. This therapeutic treatment could also be of interest in the treatment of cancer to re-express "tumour suppressor" genes.

And also...

Dr Fabrice Lejeune was also the winner of the call for projects of the INCa "Cancer Biology and Sciences" - PLBIO 2021, whose objective for the project was to promote antitumour immune response via the transreading of mRNAs. His works on therapeutic RNAs in cancer is also part of an exploratory Priority Research Programme and Equipment (PEPR) under France's National Recovery and Resilience Plan.



TARGETED THERAPIES AND CANCERS

MET receptor: new mutations discovered in patients with kidney cancer.

The Target team of Dr David Tulasne (DR Inserm) seeks to interpret the role of mutations affecting genes involved in abnormal cell proliferation. She is working on targeted therapies against the MET receptor, particularly on patients with lung cancer. Research has been carried out as part of a collaboration between the Lille team and researchers and doctors specialising in molecular diagnosis in the field of oncology at the Gustave Roussy Institute, the first European cancer centre. They identified mutations of this receptor in patients with hereditary kidney cancer. A number of functional tests have been conducted to determine whether the identified mutation is activating and could thus cause cancer. This information makes it possible to provide special monitoring to families carrying this mutation, but also to adapt their management by the potential use of treatments specifically targeting the MET receptor. This research published in the scientific journal "Human Mutation" opens the way for the use of MET receptor-targeting therapies for patients carrying these mutations.

And also...

As part of the development of interdisciplinary projects for the Canther research unit, Dr David Tulasne was awarded a national grant for the ANR thesis "Artificial Intelligence" in collaboration with Prof Mohamed Elati, Professor of Universities (University of Lille) in "bio-informatics, systems biology, and artificial intelligence" and member of the "Cell Plasticity and Cancer" team of the Canther unit. Their work focused on the research of the regulation networks related to the MET receptor and its mutations in lung cancer. They identify new targets for lung cancer.

SENESCENCE, FIBROSIS AND SECONDARY CANCERS

The promise of senolytics.

Because they also damage healthy cells, radiotherapy treatments can induce another type of cancer several years after the initial disease. In effect, ionising radiation used for cancer treatment kills cancer cells through the mechanism of DNA strand breakage, but this radiation can extend to peripheral non-tumour cells, leading to cancer. The team of Prof Corinne Abbadie (Senescence, Fibrosis and Cancer), professor of cell biology at the University of Lille, was the winner of the call for projects INCa-PLBIO-2021 – SENSARCOME, whose aim was to target and eliminate senescent cells induced by radiotherapy using senolytic molecules. The initial results of this project were published in the excellent scientific journal eLife. In addition to being induced in therapeutic contexts, senescent cells accumulate with age. This accumulation is associated with many chronic diseases, including most cancers, diabetes, cardiovascular diseases, dementia, arthritis, osteoporosis and fragility. Therefore, senolytics could have a wide range of therapeutic applications.

And also...

The "Senescence, Fibrosis and Cancer" team, on its "Fibrosis" side, is developing translational research with researchers and clinicians from the Lille University Hospital. Notably, Prof François-Xavier Glowacki, nephrologist (PU-PH) and winner of the 2021 Sanofi Innovation Awards in Europe. The objective of this program was to translate innovative university research more quickly into clinical projects that have a significant impact on patients. His research has allowed him to identify non-coding RNAs as potential therapeutic targets in Alport syndrome, a nephropathy that can lead to renal fibrosis and loss of kidney function. Funding from Sanofi will allow him to continue his research and, in particular, the development of small therapeutic molecules that combat this type of renal fibrosis, and certainly cancer.

1st 

Cancers are the leading cause of death in France.

18^M 

Over 18 million new cases of cancer are reported each year worldwide.

New therapeutic approaches *in the prevention of* cardio-metabolic diseases.

Metabolic syndrome, non-alcoholic steatohepatitis (NASH), type 2 diabetes, these pathologies are very often associated with cardiovascular complications. The researchers' work focused on identifying new diagnostic and therapeutic targets and strategies to better prevent and treat them.

U1011
Prof Bart Staels

EXCELLENCE IN RESEARCH

Three teams of the unit labelled "FRM team".

As a sign of excellence, the label "MRF team" (Medical Research Foundation) is awarded for three years and aims to finance innovative work in biology, with a high potential for application in human health. After the team of Dr H       D     in 2020, two other teams of the unit received this prestigious label in 2021. Team 1 of Prof Bart Staels presented a project entitled "The connection between NASH and cardiovascular complications". This inter-team project brings together Team 1 with Dr David Montaigne, cardiologist at Lille University Hospital, and Team 3 led by Dr David Dombrowicz, expert in immunology. Team 4 of Dr Philippe Lefebvre proposed a project entitled "The control of intercellular communication in liver fibrosis", whose objective is to identify new therapeutic approaches through a better understanding of the pathology.





FATTY LIVER DISEASE

New therapeutic targets coming soon?

Fatty liver disease or NASH (acronym for non-alcoholic steatohepatitis) is due to the accumulation of fat in the liver associated with inflammation, linked to poor eating habits and a sedentary lifestyle. In France, 1 in 5 persons are affected by this ever-increasing disease, which is the cause of a growing number of liver transplants. As no drug treatment exists to date, research continues. In 2021, a work led by the team of Dr David Dombrowicz carried out the characterisation of NASH in the immuno-inflammatory system using cohorts of patients with various levels of pathological severity.

And also...



Dr Joel Haas, young American researcher from INSERM and member of the unit of Prof Bart Staels, was awarded a prestigious research contract for a period of five years from the European Research Council (ERC starting grant). The objective of the project is to better understand the metabolic and immunological signals involved in the transition from early to severe fatty liver disease. This is a particularly ground-breaking project at the frontier of immunology and metabolism. This funding will allow him to better understand the pathophysiology of the disease and identify potential new therapeutic targets or even diagnostic factors to improve patient care.

CANCEROLOGY

A young Italian researcher, Anna Rita Cantelmo, heads a new team.

Dr Anna-Rita Cantelmo joined the unit of Prof Bart Staels in August 2021. Specialising in vascular metabolisms, she benefitted from the ATIPE-Avenir programme, a programme to support young researchers in order to build their own research team. In addition to her research on the role of endothelial cells in the development of cancers, she will work with other teams in this unit to conduct research on vascular function.

25 %

NASH accounts for 25% of liver cancer cases.

1 / 5

1 in 5 adults has hepatic steatosis in France.

For the development of personalised medicines.

Identified as one of the top ten public health threats by the World Health Organisation (WHO), antimicrobial resistance has become a global public health issue. At the same time, treatments for certain pathologies using anti-inflammatory drugs or immunosuppressants are not optimal, and severe forms are resistant to treatments or relapses are common. Researchers are advancing new therapeutic solutions to develop personalised medicines for coronaviruses, autoimmune diseases and certain forms of cancer and to combat antibiotic resistance.

U1177

Prof Benoit Déprez



200 K

The Medicines Discovery Centre (Centre de Découverte des Médicaments) of the Institut Pasteur de Lille has an automated screening platform that is unique in France and benefits from the premier academic chemical library in Europe with 200,000 molecules and compounds.

VIROLOGY

The protease of SARS-CoV-2 analysed for the first time.

The establishment of the Covid-19 Task Force in February 2020 had several objectives: in the short-term, to find a therapeutic treatment for the SARS-CoV-2 virus in response to the health emergency using a molecular repositioning strategy; in the medium-term, to find a pan-coronavirus treatment in order to anticipate mutations and treat all coronavirus conditions, which constitute a significant threat. The unit of Prof Benoit Déprez in collaboration with the teams of Prof Philippe Amouyel and Dr Jean Dubuisson (CIIL), composed of virologists, chemists, biochemists and structural virology experts, analysed the main protease of SARS-CoV-2, the agent of Covid-19, for the first time using nuclear magnetic resonance (NMR) spectroscopy. This protease codenamed “3CLpro” is a promising therapeutic target. Very specific to coronaviruses, it is not present in humans. The researchers obtained structural and dynamic information at the atomic level for this enzyme, whose mode of action is extremely complex. These results are significant for the future development of antiviral drugs. This work, the result of a vast collaborative and multidisciplinary programme, was published in the prestigious journal *Angew Chem Int Ed Engl*.

CANCERS AND AUTOIMMUNE DISEASES

The European CAPSTONE-ETN project is on track.

Prof Rebecca Deprez-Poulain, Head of the Drugs and Molecules for Living Systems team, is the coordinator of this consortium made up of 10 beneficiaries, 9 partner organisations and includes 7 manufacturers. This multidisciplinary project aims to train experts in structural biology, immunology, biochemistry, proteomics and medicinal chemistry to develop small molecules intended to treat autoimmune diseases and cancer, based on the modulation of endoplasmic reticulum aminopeptidases (ERAP). It will fund 14 doctoral theses in Europe that will contribute to a large-scale scientific programme.

ANTIBIOTIC RESISTANCE

A new family of inhibitors has been discovered.

Antibiotic resistance is a major public health problem. It is therefore essential to discover new strategies to combat these resistant bacteria. A major obstacle to antibiotic development is the ability of Gram-negative bacteria to expel them via efflux pumps, thus reducing their intrabacterial concentration. A Franco-German consortium made up of researchers from the Lille Infection and Immunity Centre (CIIL), the Drugs and Molecules for Living Systems unit (M2SV, Inserm U1177-ULille), and the Biochemistry Institute at the Goethe University of Frankfurt am Main (Germany), discovered, characterised and optimised a new family of inhibitors that blocks these bacterial efflux pumps. These inhibitors act through a new mechanism by binding to the essential parts of the protein that provide the energy necessary for the efflux of antibiotics. By blocking the pumps, this new class of molecules potentiates the activity of a wide range of antibiotics in Gram-negative bacteria. This work, published in the journal *Nature Communications*, opens up very interesting perspectives in the field of infectious diseases of bacterial origin.

SCREENING

Two labels for national recognition.

Unique in France, the screening activities of the Institut Pasteur de Lille are now integrated into a national research infrastructure: ChemBio France. They are also recognised by the IBiSA label, which supports investments in platforms and resources for biology, health and agronomy, open to the scientific community and supports them in their quality approach. This dual national recognition focuses on phenotypic screening activities by cellular imaging and the use of mass spectrometry. These two tools are used by many research units within the Lille Campus.

Laboratory-company complementarity.

The Centre d'Infection et d'Immunité de Lille (CIIL- Lille Infection and Immunity Centre) and the unit of Prof Benoit Déprez, together with the Swiss company BioVersys, have created a joint laboratory-company team for the discovery and optimisation of next-generation antibiotics. Hosted at the Institut Pasteur de Lille, Smart-Lab is a project funded by the European Regional Development Fund (ERDF). Several patents were filed in 2021.



For more responsible research.

In a Pasteurian logic, the creation of drug candidates must be sustainable and economically feasible. Obtained in 2021 by the University of Lille, S-DISCO (Sustainable Drug Discovery) is the new “Erasmus Mundus” master set up by several teaching teams in Europe including several researchers from the unit of Prof Benoit Déprez.

Diabetes: *soon treatments more accurate, more effective?*

Diabetes is often presented as a silent and dreadful epidemic. However, this metabolic disease is not inevitable. With prevention, early management and precision medicine, researchers are acting on all fronts to combat this scourge, which affects 1 in 11 adults worldwide.

UMR8199 - U1283
Prof Philippe Froguel



LABEX-EGID

Installation of a metabolomics platform.

The arrival of Dr By means of the regional “Accueil de talents” arrangement deployed as part of Brexit, Marc-Emmanuel Dumas, as an expert in metabolomic interactions and microbiome analyses, recruited his team and installed a metabolomics technical platform at the EGID. This is a major asset for the multi-omic characterisation of PreciDIAB National Centre cohorts and for establishing new collaborations with academic and industrial partners.

And also...

The team of Dr Dumas published an article in December 2021 in the prestigious journal Nature demonstrating how the interactions between gut bacteria and drugs can influence the progression of cardiovascular disease.

193^M ✓

193 million people with diabetes are undiagnosed.

460^M ✓

460 million patients affected worldwide.

700^M ✓

700 million people will be potentially affected by diabetes in 2040.



TYPE 2 DIABETES

A new step toward personalised medicine.

In 2021, researchers of the team led by Dr Amélie Bonnefond discovered that patients with type 2 diabetes may be carriers of an identifiable DNA mutation, which would allow for more precise treatment. These promising results will allow the launch of interventional research projects for these patients who carry mutations in the actionable genes of monogenic diabetes and pave the way for personalised treatments. These advances have been published in the prestigious scientific journal *Nature Metabolism*.

And also...



The 2021 Minkowski Grand Prize of the European Diabetes Association was awarded to one of our researchers, Dr Amélie Bonnefond, in recognition of the excellence of her research on the genetics of diabetes. Awarded annually since 1966, this is the most prestigious European diabetes prize.

Antibiotic resistance, infections, epidemics,... *a public health priority.*

U1019 – UMR9017
Dr Jean Dubuisson

Coronavirus, tuberculosis, severe asthma, toxoplasmosis, whooping cough,... research in the field of infectious and inflammatory diseases is one of the major priorities for the Lille Infection and Immunity Centre (CIIL). The discovery of more effective treatments through the implementation of new therapeutic approaches is a necessity in the face of growing antibiotic resistance.

ASTHMA

New therapeutic approaches to treat severe forms.

Chronic respiratory diseases are one of the major causes of mortality and morbidity. The severity of asthma has been linked to certain types of bacteria recognised by NOD1, a receptor associated with asthma. The team of Dr Anne Tsicopoulos (CIIL-U1019) assessed whether the microbiota of the host or mites (an allergen responsible for the majority of allergic asthma) could influence the severity of asthma through the NOD1 receptor. The team showed that inhibition of NOD1 or its signalling pathway inhibited the parameters of asthma to mites, regardless of the intestinal microbiota of the host. In contrast, peptidoglycans derived from the bacterial family Bartonellaceae, present in mites, activate the NOD1 signalling pathway in epithelial cells. When mites are depleted in peptidoglycans, they are less able to induce asthma. These results suggest that NOD1 detection of some mite-associated bacteria exacerbates the severity of asthma in vivo, and that inhibiting this pathway may be a therapeutic approach to treating asthma.



**TUBERCULOSIS****More effective treatments against the emergence of resistant bacilli.**

With more than 1.5 million deaths each year, tuberculosis remains the leading cause of death from infection to date. The constant increase in antibiotic-resistant *Mycobacterium tuberculosis* strains justifiably concerns national and international health authorities. This urgent situation requires the discovery of more effective treatments and biomarkers that can measure patient progress in real time. The Mustart project (Multiparametric Strategies against Antibiotic Resistance in Tuberculosis), funded by the Future Investment Program (PIA), brings together 9 laboratories that share their expertise and innovative anti-tuberculosis molecules to stimulate host defences, reduce the virulence of the bacillus, destroy its dormant and persistent forms, and identify drug synergies. Reducing treatment time and the risk of developing resistant bacilli is at the heart of this challenge. The second objective of Mustart is to identify, using innovative mass spectrometry and NMR technologies, biomarkers for treatment progression in animal model and in patients to avoid therapeutic failures and the emergence of resistant bacilli. This €2.4 million scientific project is coordinated by Dr Alain Baulard and brings together more than 40 French tuberculosis experts located at the Institut Pasteur de Lille (CIIL and U1177); at the IPBS, TBI and LMGM in Toulouse; at the Sorbonne University and the Institut Pasteur in Paris; at the CEA, Saclay and CIRI-HCL, Lyon.

1.1^M ✓

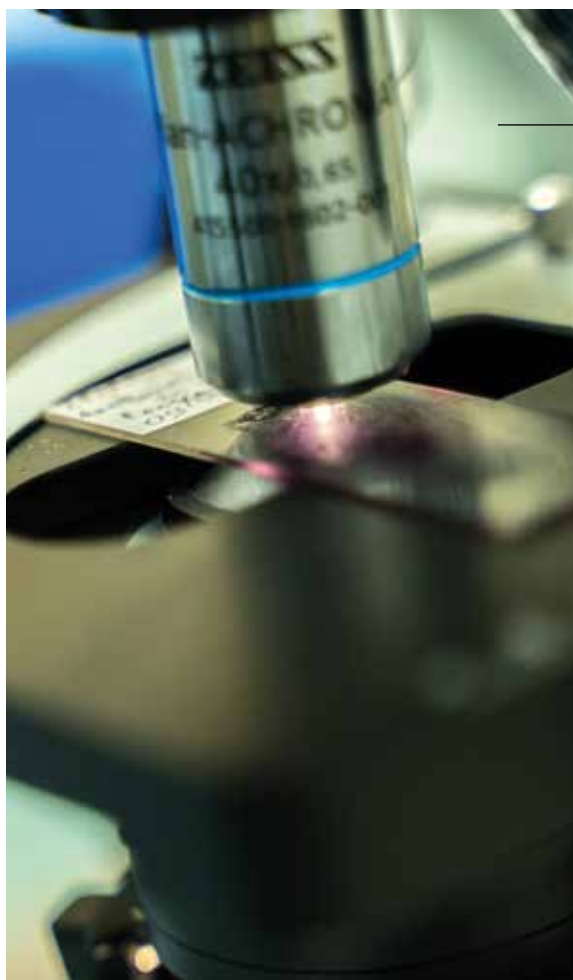
1.1 million children have developed tuberculosis worldwide.

2030 ✓

Ending the tuberculosis epidemic by 2030 is one of the health targets of the UN Sustainable Development Goals.

1.5^M ✓

Tuberculosis causes 1.5 million deaths every year.



TOXOPLASMOSIS

Discovery of a protein responsible for the pathogenicity of parasites.

The virulence of parasites causing toxoplasmosis or malaria depends on their ability to multiply rapidly. Understanding the mechanisms for organising and coordinating the division in these parasites is therefore essential to combat them. The team led by Dr Mathieu Gissot has identified a protein that coordinates the division and dictates the right time to produce daughter parasites. In the absence of this protein, the parasite is no longer able to multiply. In addition, the presence or absence of this protein determines the choice of the parasite as to the different simplified division modes used for its growth. This study therefore allows us to better understand how these parasites have evolved flexible division modes, making it possible for them to proliferate in a large number of organisms, and shows that this protein is a key to the pathogenicity of the parasite opening the way to new therapeutic possibilities. This research was published in the journal Nature Communications.

ANTIBIOTIC RESISTANCE

The first infant vaccination with BCG was introduced 100 years ago!

BCG (for Bacillus Calmette-Guerin) is today the most widely used vaccine in the world and the oldest vaccine still in use. The vaccine was developed at the Institut Pasteur de Lille by its first Managing Director, Professor Albert Calmette, and his colleague Camille Guérin. To celebrate this centenary, the CIIL and Institut Pasteur de Lille organised an international symposium from 17 to 19 November 2021, which brought together nearly 200 participants from 5 continents.

1 Billion



1 billion is the number of lives saved in 100 years, thanks to BCG.

**ANTIBIOTIC RESISTANCE****“Trojan horse”
antibiotics against
bacteria.**

Increasing rates of antibiotic resistance is a major threat for the future treatment of bacterial infections. However, many clinically relevant bacteria have a complex cell wall that limits the entry of antibiotics and prevents their activity. These bacteria require the acquisition of nutrients from their environment, and in the case of iron, this is achieved by the secretion of molecules (siderophores) that capture environmental iron and are then reabsorbed. This pathway of iron assimilation is also a weakness of bacterial antibiotic armour, and nature has evolved to synthesise “Trojan horse antibiotics”, where antibiotics are linked to these siderophores (called sideromycins), which divert the iron reabsorption system to deliver the antibiotic to the bacterium. By studying new natural sideromycins, the team of Dr Ruben Hartkoorn has discovered a promising new biomimetic way to couple antibiotics to siderophores, which then allows their active delivery into bacteria. Defining the scope of this technology and developing new biomimetic “Trojan horse antibiotics” is the primary objective of the ERC-COG AntiBioClicks programme, supported by the European Research Council (ERC-consolidator Grant) and supported by the researcher.

150^K ✓

150,000 annual infections
by multidrug-resistant
bacteria.

10^M ✓

By 2050, antibiotic
resistance could be
responsible for 10 million
deaths per year.

Diabetes, obesity, metabolic surgery: *new hopes for patients.*

From the first global transplant of pancreatic islets carried out at the Lille University Hospital and now entered into routine care for severe forms of type 1 diabetes to surgery that opens up new therapeutic pathways, the great advances made in innovative therapies for diabetes have been rewarded.

U1190

Prof François Pattou

ISLET TRANSPLANTATION

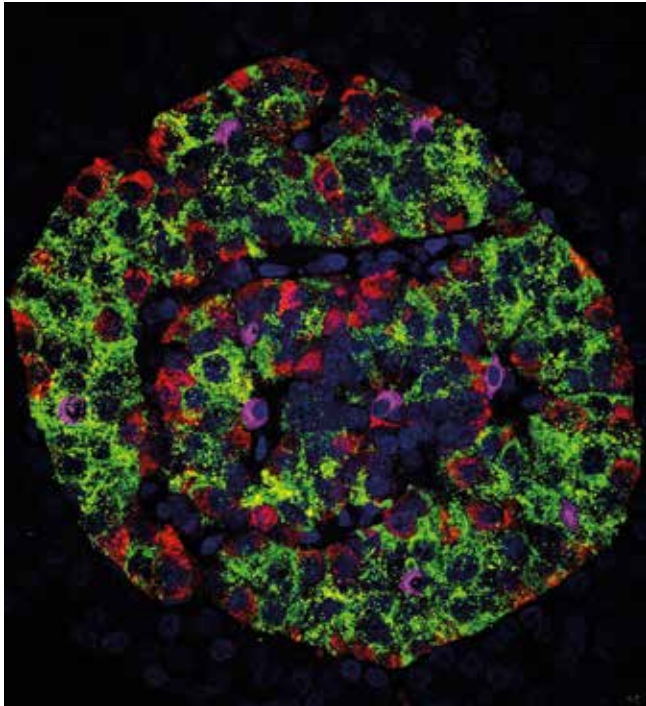
World premier: a hope for treatment of Type 1 diabetes.

The “islet of Langerhans” transplant, or cell therapy for diabetes, is used to replace the destroyed cells of the pancreas in order to restore a regulated production of insulin. This technique makes it possible to normalise the glycaemic control of patients or even to discontinue insulin therapy. The work carried out for 15 years by the team of Prof François Pattou, Marie-Christine Vanthighem and Julie Kerr-Conte led to the first pancreatic cell transplant at Lille University Hospital in December 2021. Lille University Hospital has thus become the first institution in France to benefit from authorisations to take the pancreas of a donor, to cultivate the islets of Langerhans in the laboratory, and then to transplant them in a recipient patient. This intervention is now reimbursed by health insurance, following authorisations issued by the French National Authority for Health (Haute Autorité de Santé) and the ARS. A dozen grafts have already been carried out.

And also...

An agreement with the Strasbourg University Hospital and the biotherapy platform of the Institut Pasteur de Lille was signed to produce the islets that will be grafted for a parallel program in Strasbourg.





TYPE 2 DIABETES

Treating patients with metabolic surgery.

Obesity surgery involves modifying the anatomy of the digestive system, which reduces the amount of food consumed and/or the assimilation of food by the body. In patients with type 2 diabetes, metabolic surgery also leads to a rapid decrease in blood sugar levels. In clinical practice, the indications for this effective but invasive approach are still debated for type 2 diabetes. The team of Prof François Pattou, with Prof Ricardo Cohen and Dr Violette Raverdy, identified a subgroup of patients that was associated with the best results after metabolic surgery, both in terms of improving diabetes and renal function. Validated in Sao Paulo by a team of Brazilian researchers and published in the prestigious journal *Lancet Diabetes Endocrinol*, these results open the door for the first time to precision medicine in metabolic surgery.



COVID-19

The link between obesity and the risk of confirmed Covid-19 complications.

After age, obesity is considered the second highest risk factor for developing a serious infection with SARS-CoV-2. The team led by Dr Mikael Chetboun and Prof Mercè Jourdain was the first to establish a link between obesity and the severity of Covid-19. This study, which appeared in the journal *Obesity*, was among the most cited publications internationally in 2020. It indicated that more than 47% of infected patients entering reanimation were obese. In addition, having a BMI greater than 35 significantly increased the risk of being placed on invasive mechanical breathing, regardless of age, high blood pressure and diabetes. A multicentre study conducted in 2021 confirmed these results and showed that patients who had their obesity surgically removed before a potential SARS-CoV-2 infection were less severely affected.

4.5^M

Over 4.5 million people in France have diabetes, but around one million of them do not know it.

5.3%

More than 3.5 million people are treated with drugs for diabetes, or 5.3% of the population.

90%

Type 2 diabetes is the most common (more than 90%) and is on the rise worldwide.

CPER-CTRL

Results of the 4th call for projects.

In October 2019, the Institut Pasteur de Lille launched the 4th call for research projects as part of the State-Region Planning Contract – Transdisciplinary Research Centre on Longevity (CTRL - Centre Transdisciplinaire de Recherche sur la Longévité) programme funded by the government, the Hauts-de-France region, European Metropolis of Lille (MEL) and ERDF funds. The calls for CPER-CTRL projects aim to promote cooperation between teams in the region on new topics related to longevity as well as the emergence of new teams. Starting 1 September 2020 for an initial duration of 15 months, each project was granted funding of €83,000.

ACRONYM	TITLE IN FRENCH	TEAMS	
		Name, Surname	Unit
OBEPI-muscle	(Epi)genomics of muscle biopsies in insulin resistance associated with obesity	Amna Khamis	UMR 8199
		François Pattou	UMR 1190
DREAM 2	Manipulation of the Rev-erba/apelone interaction to restore antibacterial immunity in elderly subjects	François Trottein	CIIL t12
		Hélène Duez	UMR 1011
TAUTOXIN	Consequences of cerebral inflammation caused by the parasite Toxoplasma gondii on the exacerbation of pathological processes in tauopathies.	Sabrina Marion	CIIL
		David Blum	UMR-S 1172
NL4TB-2	New generation of leads to combat tuberculosis - 2	Baptiste Villemagne	U1177
		Ruben Hartkoorn	CIIL

Internationally recognised expertise.

Microbiological safety, genetic toxicology, environmental and clinical microbiology are recognised specific expertises developed at the Institut Pasteur de Lille, and sometimes nowhere else. Close to the concrete applications of research, their work contributes to the well-being and health of all.



ENVIRONMENTAL MICROBIOLOGY

Supports manufacturers in their future innovations.

The SARS-CoV-2 pandemic has brought to light respiratory viruses, which can be transmitted through the air but also by surfaces (deposit of contaminated droplets). Faced with this observation, but also with other infectious agents present in the environment (bacteria, viruses, fungi), manufacturers are thinking about tomorrow's products and materials to take into account this microbiological risk. Air purifiers, textiles functionalised for train seats, antimicrobial metro bars, etc.: the USM is involved in various applied research programmes in close collaboration with the industrial world. Wherever microbiological risk exists, the team brings the specificity of its expertise in environmental microbiology to enable leaders in innovation to develop new products, processes or technologies. The unit supports various industrial research centres in Europe to provide its skills in their future development: Alstom, Saint-Gobain, Daikin, Dyson... Its role: to evaluate the effectiveness of a product or process against a pathogenic microorganism in the environment. The studies conducted by the team of Dr Vialette are closely related to industrial realities, practical uses and concrete applications of research.

And also...

- The USM is composed of 3 specific laboratories corresponding to the microorganisms studied: bacteria, viruses, fungi.
- 1 ANR research project was submitted on the theme of air in collaboration with the Clinical Microbiology Unit created in 2020 by Anne Goffard, virologist at the Lille University Hospital and researcher at the CILL.



GENETIC TOXICOLOGY

Ensure the chemical safety of food contact materials.

Food packaging is a source of chemical contamination of food due to the migration of substances, sometimes toxic, intentionally (compounds used in the basic formulation of the packaging) or unintentionally added (degradation products, impurities, etc.). In this context, the PACKSAFE project, funded by ANR and coordinated by Prof Marie-Christine Chagnon (AgroSup Dijon) aims to develop a multidisciplinary approach (physico-chemistry, toxicology, chemometrics) to guarantee the safety of finished packaging (paper-cardboard, plastics) and ultimately the health of consumers.

GENETIC TOXICOLOGY

A “soft glue” with a longer analgesic effect.

Pain is the most common reason for patients to consult a doctor. After surgery, it is considered one of the most distressing symptoms. Sometimes, poor adhesion of tissues causes irritation and tension that are a source of additional pain. In this specific case, analgesics are administered to relieve pain, but their action lasts only a few hours. The SOFTGLUE project, funded by ANR and coordinated by Dr Ruxandra Gref (Paris-Saclay University, Orsay) aims to develop a non-toxic “soft glue” to suture skin and liver wounds without mechanical stress (i.e. without rigidity) while allowing an analgesic effect over a long period of time. This project is conducted in partnership with Dr Priscille Brodin (CIIL).

And also...

- The Toxicology Laboratory is a partner of the “Pollution, Health, Longevity” (P2SL) Division, created at the initiative of the Institut Pasteur de Lille, and whose ambition is to federate all the actors of Hauts-de-France involved in environmental health in order to promote research in this field.
- The laboratory has developed new predictive in vitro models, including 3D cell cultures (spheroids and organoids) reproducing the micro-anatomy in vitro of an organ, to eventually use them in genotoxicity tests.



CLINICAL VIROLOGY

Studies on all fronts of research.

Monito-CoV-ageing study: Carried out by the Lille University Hospital and labelled “National Research Priority” by CAPNET, the study focuses on the evaluation of the quality of anti-SARS-CoV-2 vaccine response in elderly subjects residing in residential care facilities for dependent elderly persons (EHPAD), compared to young and immunocompetent subjects such as healthcare personnel.

Therapide trial: The CMU participated in the Therapide trial labelled “National Research Priority” by CAPNET, by developing an RT-PCR method for the quantification of the SARS-CoV-2 genome. The unit organised the circuit of biological samples from the samplers’ offices to the Institut Pasteur de Lille, analysed the biological samples and made the analysis reports.

CritiSARS2: Carried out by Prof K. Faure (CHU – CIIL) and submitted as part of the Flash COVID call for projects in March 2020, the study aims to identify new viral, inflammatory and immune markers for critical forms of Covid-19. The CMU is responsible for two work packages, which allow funding of €32,000 (ANR funding – Hauts-de-France region).

AAP Infinite 2021: The study consists of testing high-pressure viral inactivation capacities on breast milk. The consortium is composed of a group led by J. Lesage, Infinite, specialised in the study of the particularities of breast milk, and the CMU-Virology for coronavirus tests and the MCV-VHE group for VHE tests. The analyses are in progress.

POMADE-CoV study: As part of an I-SITE – ULNE call for projects to fund doctoral theses, the CMU obtained co-funding for the supervision of a foreign student, whose mission is to develop custom porous materials capable of quickly capturing and inactivating coronaviruses. This doctoral student is co-supervised by Prof C. Volkringer (École Centrale de Lille) and Prof Anne Goffard. His virology work is carried out under the supervision of Dr P. Bouquet.

And also...

Since 2020, the Clinical Microbiology Unit (CMU) has been asked by manufacturers for expertise to test antiviral products for SARS-CoV-2 or to evaluate the neutralising power of monoclonal antibodies.



CLINICAL MICROBIOLOGY

A new laboratory dedicated to antibiotic resistance.

Created in 2021 under the coordination of Prof Patrice Nordmann, this laboratory is dedicated to the molecular and biochemical analysis of emerging mechanisms of antibiotic resistance and the development of rapid diagnostic tests that also contribute to the evaluation of novel therapeutics. Initial experiments were conducted on the analysis of resistant mutants in *K. pneumoniae* expressing different types of carbapenemases (KPC). These mutants resistant to one of the new antibiotic combinations, imipenem/relebactam, combining a carbapenem and a carbapenemase inhibitor, can be obtained *in vitro* after several selection cycles. An initial analysis shows the selection of at least mutants related to chromosomal mutations on the genes of transmembrane permeability proteins (porins). These mutations are stable and transfer vertically (to offspring) and not horizontally (plasmid transfer). These results will contribute to the optimisation of the therapeutic choice of Gram-negative bacillus infections expressing certain carbapenemases.

And also...

The development of this laboratory will continue rapidly in its orientation of expertise in the field of emerging antibiotic resistance in Gram-negative bacilli by associating with several national and international partnerships.

Committed, *to promoting* health *and preventing* diseases

“The ambition of the Longevity and Preventative Health Centre (CPSL - Centre Prévention Santé Longévité) is to be a reference centre for preventative health, in order to help the population live better longer. Recent years have reinforced our concern for the less fortunate, who are both a priority for our preventative health examinations and our educational activities in the field. In the implementation of our preventative actions, our challenge is to amplify our evaluated prevention approach and make it shine. These two aspects are at the core of the deployment of longevity pathways and personalised pathways, which allow an assessment of behavioural fragilities and risk factors of target populations. Their spin-off in French territory began with the aim of creating a longevity network. With scientific knowledge and high-level expertise in the field of prevention, nutrition, vaccination..., the Institut Pasteur de Lille thus wishes to contribute to meeting societal challenges related to the lengthening of life expectancy and the essential progression of health organisation with an increased emphasis on the role of prevention and in the continuity of Pasteurian missions and ethics. The company has become a major prevention site, beyond psychosocial risks, occupational diseases or musculoskeletal disorders. Through our actions, our goal is to support companies and their employees in the fields of nutrition, the promotion of physical activity, in the fight against stress and addictions, and in good sleep education. Thus, the CPSL is very ambitious, along with their drive and skills, served by the teams more than ever committed to the service of “health for all”.

Dr Jean-Michel Lecerf,
Medical Director





The Longevity and Preventative Health Centre, *innovation in the service of healthy ageing*

The CPSL brings together all the preventative health activities of the Institut Pasteur de Lille. Open to individuals, communities and companies, it offers innovative pathways in preventive medicine and health education. It also leads public health actions with populations in the field and carries out scientific assessments for manufacturers as well as within its clinical centre NutrInvest. In 2021, the CPSL entered a new phase of its development with an initial collaboration as part of a longevity network based on an ambitious prevention approach evaluated in the service of the population, public actors and companies.

PREVENTATIVE HEALTH

After Lille, Parcours Longévité® is accessible in Toulouse

The Parcours Longévité® spin-off project came to fruition at the end of 2021 with the signing of a letter of intent with ADIMEP, a preventive medicine association based in Toulouse, and thanks to the financial support of LCL, which has committed itself along with the Institut Pasteur de Lille to deploy it throughout France.

Created in 2017 and completed in 2018 with coaching, this unique preventive medicine system consists of a health check, personalised support and a one-year follow-up to allow everyone to have a role in their health and have the keys to healthy ageing for as long as possible. From September 2022, this programme will be offered to active persons, retirees, early retirees, family caregivers and young people aged 16 to 25 in the Toulouse region.

Waiting for its accessibility in other cities... and nearby.





VACCINATIONS AND TRAVEL MEDICINE

Preventing traveller's illnesses

The teams of the renowned international vaccination centre, approved by the World Health Organisation, are working to create a true travel medicine and a future centre for the prevention of infectious diseases. In 2021, with the gradual reopening of borders, vaccination and travel advice continued at a steady pace.

And also...

In 2021, the CPSL teams participated in the Covid-19 vaccination effort, within the vaccination centre of the Institut Pasteur de Lille, but also as part of the Zenith vaccinodrome in Lille, which opened in April. In the fall, they also vaccinated nearly 4 000 employees in about 100 companies in the region against the flu.



TRAINING

Qualiopi-certified CPSL

Introduced by the "Avenir Professionnel" law, the Qualiopi certification is a quality certification attributed to organisations that provide training. The aim is to ensure the quality of training sessions delivered to professionals and to make this level of quality visible to the general public. Since 1 January 2022, certification is mandatory to be able to benefit from public and mutualised funding. By obtaining it in November 2021, the CPSL became an Approved Joint Collector Organisation (OPCA - Organisme Paritaire Collecteur Agréé) in charge of collecting the companies' financial obligations in terms of professional training, which makes it a recognised actor in the training market.

11,962

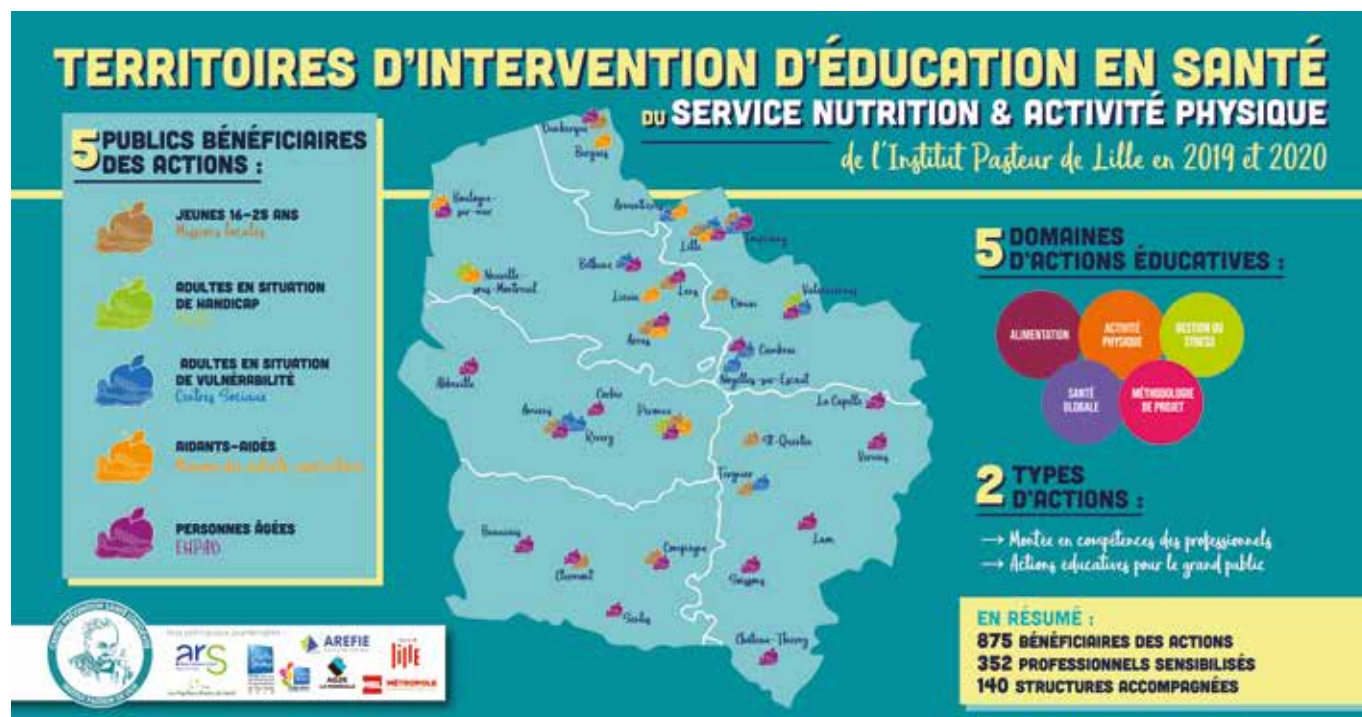
11,962 Preventative Health Examinations (PHE) carried out, including more than 57% intended for those in precarious situations.

9

9 clinical research studies in nutrition with more than 1,200 visits conducted on various themes.

295

295 professionals involved in health education



HEALTH EDUCATION

Being the leader in prevention

Strongly anchored in the territory of the European Metropolis of Lille (MEL) and the department, the CPSL carries out various and varied actions in response to the needs of the populations. In the short term, it intends to become the leader in prevention, education, training and health, first of all in Hauts-de-France, but also beyond via professional contacts.

679

679 beneficiaries of educational actions.



HEALTH EDUCATION

Desire for well-being

The Nutrition & Physical Activity Service works hand in hand with cities and the national government to improve the physical, psychological and social well-being of the inhabitants in the Priority Area of Cities (QPV - Quartier Prioritaire des Villes) of the MEL and in the Hauts-de-France. Adapted physical activity (APA) is used as a gauge of well-being, combined with a varied, balanced and controlled diet and supplemented with wellness techniques such as relaxation, stress and emotion management, time management, etc. In 2021, 5 dossiers were filed for 11 communes and 12 priority areas.



PREVENTION RESEARCH

The PrevenDIAB project is on track

A good example of the interactions required between the world of research and the world of prevention, the PrevenDIAB project aims to determine the factors leading to diabetes and accelerated ageing. An initial epidemiological study will analyse socio-economic, anthropometric, clinical and biological factors, and the associated behaviours among 2,200 people examined at the health check. After a development phase of the study protocol carried out in 2020, enrolment started in December 2021. This vast project, which benefits from ERDF and ANR funding, brings together the Scientific Studies Department of the Institut Pasteur de Lille, the CPSL and the service of Dr Antonia Gasch, a medical specialist in public health and social medicine whose mission is to coordinate the actions and analyse the data that will be collected. A biobank (DNA – telomeres – metabolomics – microbiota) will be created simultaneously.

Advancing nutrition research

The CPSL proposes, through clinical research, to evaluate the effect of behavioural changes (lifestyle) or new foods / dietary supplements on the health of all. The clinical research centre in nutrition (Nutr'Invest) will thus increase its activity in connection with multiple French companies. In 2021, the clinical research activities were also ISO 9001-2015 certified.

Parcours Longévité®, the R'Form study has launched!

Entitled "Effect of a health check followed by a collective coaching support on the quality of life and lifestyle changes of retired people. An outpatient prospective study", this study was launched with the support of CARSAT, Hauts-de-France. In 2021, 60 inclusions were made. The results of the study are expected in mid-2024.

100

100 trained interns, 14 sessions on nutrition and 5 on tobacco/cannabis.

138

Expatriated assessments.

81

81 evaluation, education and consulting files regarding prevention.

2

2 national conferences on nutrition.

Committed, *to supporting* innovation

The Institut Pasteur de Lille uses the excellence of its research to reveal promising innovations. Identification of projects, filing of patent and licensing, R&D collaborations, trade negotiations, economic feasibility study, research and management of European funding: a dedicated team is present throughout the stages of innovation. As a leader in the service of research, it supports research units in the process of promoting their work and the search for collaborative funding in order to succeed in their technological transfers. “Valuing scientific research means successfully transferring the intellectual property of a laboratory, fundamental research, to bring it to applied research in the industrial environment, and ultimately the creation of innovative companies.”

Maxime Diot,
Legal Director, Head of Compliance
and Research Promotion.





Scientific valorisation

Turning discoveries into innovations for society



Innovation support is carried out in partnership with the Technology Transfer Acceleration Companies (SATT - sociétés d'accélération de transfert de technologie) and the various services for the promotion of academic partners of the Institut Pasteur de Lille (INSERM, CNRS, University of Lille). This research ecosystem is available to researchers to help them measure the potential of their work and advance their project. "The researcher is at the centre of scientific valorisation, and is even the key element. Who better than the researcher to be able to develop their own technology? ", explains Maxime Diot, Legal Director, Head of Compliance and Research Promotion. .

By means of the transdisciplinarity of its research, the Institut Pasteur de Lille develops projects involving all pathologies and all sectors, and that is its real strength. Among the most advanced projects, therapeutic treatments for infectious diseases, and particularly tuberculosis, which remains the most deadly infectious disease in the world. The pan-coronavirus vaccine through protease is also a fantastic project that will require years of research and substantial funding that will have to be sought from partnerships and through fundraising. Because if science advances humanity, without money to support it, no discovery can unfortunately see the light of day...

The Pasteur Lille Campus, **a breeding ground for innovative biotechs**

Biotechnology is revolutionising the health sector. At the heart of the campus, the Institut Pasteur de Lille supports the development of biotechnology and innovative health projects, start-ups and companies. A common goal: to develop promising therapeutic treatments, new services and products for analysis or diagnosis, directly resulting from fundamental research conducted in Lille.

BIOTECHS



TUBERCULOSIS

With Deeplex® Myc-TB, GenoScreen shines internationally.

Three years after its launch, the kit for predicting antibiotic resistance to *Mycobacterium tuberculosis* strains has been successful. Now used in 38 countries, Deeplex® Myc-TB quickly and effectively detects genetic mutations in the DNA of the pathogenic bacteria in question and guides physicians in their medical prescriptions. With this breakthrough innovation, GenoScreen contributes to the fight against tuberculosis, which causes 1.6 million deaths per year worldwide.

And also...

GenoScreen expands its Long-Read sequencing offering with the arrival of Gridlon. Nanopore sequencing makes it possible to obtain very long readings (several hundred kb) allowing the de novo, complete and contiguous assembly of genomes and/or plasmids. This sequencing technology also makes it possible to directly sequence molecules (DNA and RNA) and their modifications (methylations).

GenoScreen

BACTERIAL RESISTANCE

BioVersys for new antibiotic treatments.

The Swiss biopharmaceutical company, established in Lille since 2018, announced the first subjects treated in the phase 1 clinical trial of BVL-GSK098 and in the additional phase 1 clinical trials of BV100. It also received a second CARB-X grant of up to \$15.34 million for the BV300 project. In 2021, several clinical trials began (antibiotic for *Acinetobacter baumannii* infections, and a small molecule that potentiates antituberculosis antibiotics). Other research projects involving conventional (new class of broad-spectrum antibiotics) or non-conventional (anti-virulence agents for the treatment of infections caused by *Staphylococcus aureus*) approaches are currently at an earlier stage.

And also...

During the 2021 edition of the Force Awards, the joint laboratory-company team project Smart-Lab, resulting from the collaboration between the U1177 unit and BioVersys SAS, coordinated by Prof Nicolas Willand, was awarded the public grant. This event highlights the outstanding partnerships between academic research and companies in the Hauts-de-France region.



COVID-19

Apteeus makes progress on clofoctol.

Apteeus is a company originating from the Institut Pasteur de Lille and the University of Lille. The company focuses on revealing the unsuspected pharmacological activities of small molecules and their development for new indications. Several candidate drugs are currently being studied, including clofoctol, resulting from collaborative research carried out with several teams at the Pasteur campus in Lille.





AGEING-RELATED DISEASES

StarkAge 5P: an algorithm to calculate its biological age

The development of the StarkAge 5P (SA5P) ecosystem to prevent ageing and the progression of age-related diseases. An algorithm has been developed to calculate its ARPA® score and biological age through artificial Intelligence (AI) in partnership with CleverDoc, a developer in Lille. The ARPA® Score (for Age-Related Pathologies) is a score based on an AI algorithm that integrates various parameters measured in patients for the detection of fragility factors. These parameters are clinical, biological and genomic. Synlab Group and the Institut Pasteur de Lille contributed to the growth and development of StarkAge 5P along with its founder, Dr Thierry Mathieu

7

7 start-ups based on the campus.

51

51 active patents.

And also...

Development of StarkAge Therapeutics

- StarkAge Therapeutics (SATX) has been recognised by the French government as a “Young Innovative Company”. In 2021, the team expanded with the arrival of Dr Pierre-Michel Bringer as Managing Director and Dr Frederik Oger as Scientific Director.
- The programme of Dr Müge Ogrunc on idiopathic pulmonary fibrosis was awarded the Deeptech 2021 label, including €2 million in non-dilutive funding.
- SATX developed ExoCise™, a proprietary platform, to identify specific biomarkers through a multi-omic approach.

STARKAGE
THERAPEUTICS



High-level platforms *in support of scientific research*

The Pasteur Lille Campus hosts several technological platforms, including seven of the eight Lille biology and health platforms (PLBS) of the Research Support Unit. Dedicated to academic research in Lille, they are also accessible to the entire scientific community, especially biotechnology companies and those specialising in pharmaceutical research.

PLATFORMS

EUROPEAN RESEARCH

Platforms engaged in large-scale scientific projects.

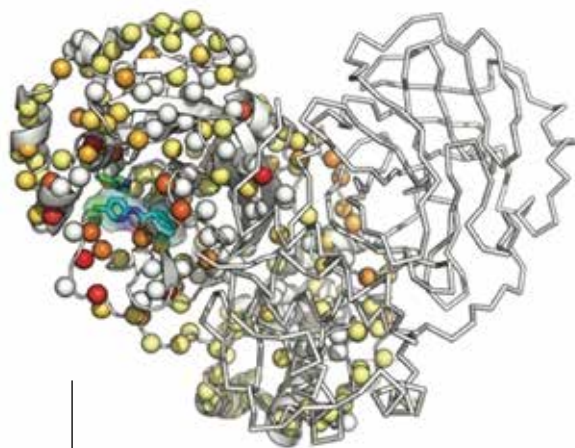
GO@L and P3M participated in the European project H2020 FAIR (Flagellin Aerosol therapy as an Immunomodulatory Adjunct to the antibiotic treatment of drug-Resistant bacterial pneumonia). ARIADNE contributed to a European Recovery Plan (REACT-EU) project to deal with the consequences of the health crisis and to the ANR project Programme Investissements d'Avenir Mustart (Multiparametric strategies against antibiotic resistance in tuberculosis).



11

11 technology platforms globally:

- Including 7 of the 8 PLBS platforms in Lille metropolis.
- 26 engineers and technicians in the service of research, out of the 93 in Lille metropolis.
- 5 platforms labelled IBISA.



NMR - NUCLEAR MAGNETIC RESONANCE

SARS-CoV-2: a fragment with identified antiviral properties.

The protease 3CLpro is an essential enzyme of SARS-CoV-2, because it cuts the precursor polyproteins pp1a and pp1ab into different active proteins which will then allow for the replication of the virus. Therefore, it is an important therapeutic target.

A library of 960 molecular fragments from laboratory U1177 (Prof Benoit Deprez) was screened against the 3CLpro protease using proton (^1H) and fluorine (^{19}F) NMR spectroscopy. At the end of the screening, in 2 steps, 38 fragments were identified, including one with antiviral properties.

And also...

Fluorine used as a reporter in biomolecules.

Fluorine atoms are extremely rare in biomolecules, but can be introduced artificially into peptides or proteins. With Prof Bruno Kieffer (IGBMC, Strasbourg), the platform designed model peptides based on the C-terminal domain of the retinoic acid hormone nuclear receptor containing fluorinated proline residues, and used ^{19}F NMR to characterise binding with a partner. With Dr Pau Bernado (CBS, Montpellier), glutamines and fluorinated prolines were introduced respectively into the homorepetitive polyglutamine and polyproline sequences of the huntingtin protein, making it possible to delimit structures that would otherwise be very difficult to capture.





NUCLEAR BIOLOGICAL RESOURCES CENTRE (BRC)

Collaborations on the THERAPIDE collection and with the CPSL.

With the research team of Prof Benoit Deprez, the BRC participated in the reception, provision and preservation of the THERAPIDE collection. This collection originates from a clinical trial to measure the efficacy of a therapeutic molecule against SARS-CoV-2 versus a placebo. Two other projects were initiated in collaboration with the CPSL teams led by Dr Jean-Michel Lecerf. The first project concerns the reception and preservation of biological samples in order to evaluate the beneficial effect of a dietary supplement on the oxidisability of LDL versus placebo. In the second project, the BRC is responsible for the reception, preparation and preservation of biological samples for the study of the prevalence of diabetes and pre-diabetes.

And also...

The BRC platform saw in 2021 its NF 96-900 certification renewed for 3 years.

In numbers

- More than 500,000 biological samples, some of which have been stored for more than 30 years.
- Biological samples of all kinds: whole blood, plasma, serum, red blood cells, buffy coat, DNA, RNA, urine, cerebrospinal fluids, expired air condensates, hair, stool, nasopharyngeal samples.



BILILLE

Life sciences: shared digital spaces coming soon!

With other platforms of the Institut Pasteur de Lille, Bilille has participated since the end of 2020 in the only EquipEx+ programme in Biology and Health of the metropolis of Lille. The MuDiS4LS (Mutualized Digital Space for FAIR Data in Life and Health Sciences) project aims to build shared digital spaces for life sciences at the national level and promotes open science by providing scientists with all the keys to make their data searchable, accessible, Interoperable and reusable (FAIR).

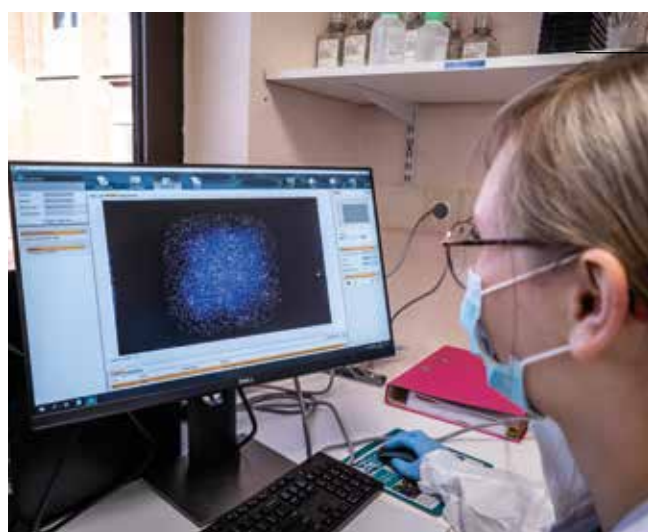




LABELS OF EXCELLENCE

A great recognition for LIGAN MP.

Dedicated to personalised medicine, the LIGAN MP platform is an indispensable resource for the genetic research of human diseases, diabetes and obesity in particular. Equipped with state-of-the-art Next-Generation Sequencing (NGS) equipment, it is recognised nationally and internationally for its pre- and post-analytical skills, as well as its expertise in bioinformatics and biostatistics. In 2021, LIGAN MP was labelled by the GIS IBISA (Infrastructures en Biologie Santé et Agronomie) and joined the central core of the French Genomics national infrastructure. These markers of excellence allow them to offer their skills to scientific, academic and medical communities, as well as private laboratories.



And also...

The ARIADNE (high-throughput and high-content screening), BICeL (imaging), Bilille (bioinformatics), GO@L (genomics) and P3M (proteomics) platforms were also labelled or renewed in labelling by the GIS IbiSA. In addition to the national visibility that this network allows, this labelling is accompanied by funding of €267,000 for the acquisition of scientific equipment that will enrich the array of equipment accessible to the research community. For several years, ARIADNE and Bilille have been participating, respectively, in the infrastructures of ChemBioFrance and the French Institute of Bioinformatics (IFB - Institut Français de Bioinformatique). In 2021, Bilille and GO@L also joined, as associated platforms, the French Genomics research infrastructure.

Committed, **to creating the campus of tomorrow**

“Scientific excellence, preventative health in the service of all, the transmission of knowledge, and its regional, national and international influence, these are our ambitions for the Foundation. These ambitions are realistic and achievable. This is why since 2018, our “Pasteur Campus in Lille” has been totally transformed to become more attractive, more responsible, exemplary and sustainable. By 2025, this necessary transformation in the form of a large-scale real estate project will take shape, become visible and contribute to the physical metamorphosis of the campus, now made up of many buildings scattered here and there over the years. This major structural project will make it possible to modernise the facilities, make it easier to access, improve the well-being of the professionals working there, facilitate exchanges and eventually welcome new employees in the best possible conditions. Today’s campus is transforming to better serve the Foundation of tomorrow. This unprecedented large-scale project is as much a human project as it is a real estate project. It is a real challenge that involves and motivates all of us.

Didier Bonneau,
Deputy Managing Director





A renovated, exemplary and sustainable campus, *faithful to Pasteur's values.*

The Institut Pasteur de Lille welcomes around 800 employees every day on its campus: 320 Pasteurian employees as well as agents from CNRS, INSERM, the University of Lille and the Lille University Hospital, who work in the joint research units, at the CPSL or in the departments of toxicology and microbiological safety, also employees of tenant companies from the world of research and innovation.

Transformation of the campus

Launched in 2016, the real estate project will lead to the physical metamorphosis of the Pasteur Campus in Lille by 2025. It provides for the rehabilitation of buildings that have become old, offices or laboratories, as well as the development of a new residential property project.



REHABILITATION

The Guérin building under construction

The rehabilitation of buildings used for the activities of the Institut Pasteur de Lille, in particular the Guérin and Calmette buildings, is under way. The renovation of the Guérin building will provide the research teams present on the Campus with modern, efficient and scalable laboratories. In February 2021, the first phase of deconstruction, asbestos removal and lead abatement for levels 1, 2, 3 and 4 was initiated. Work will start in May 2022. The rehabilitated Calmette building will be able to accommodate the CPSL teams. It will also be brought into compliance with regard to safety and the reception of persons with reduced mobility. In July 2021, a call for project management proposals consisting of an architectural firm, a design office, a landscaper and an economist was initiated.

**REHABILITATION****A new experimentation platform for PLEHTA.**

PLEHTA has been completely redesigned and installed in premises arranged and designed by its user teams. Delivered in September 2021, the new structure will allow the pooling of research activities and the provision of sophisticated technologies for the entire Lille scientific community.

50 K m²

50,000 m² of surface area to be optimised, including 15,000 m² currently unoccupied.

65 million

total amount of the Campus transformation programme.

2025

end of construction.

**RESIDENTIAL PROJECT****“24 boulevard Louis XIV” is unveiled.**

A consultation file for the construction work on the new residential project of “24 boulevard Louis XIV” was filed in mid-September 2021. The project will see the construction of two buildings: a corner building will be dedicated to offices and shops; another called “Pavillon Pasteur-Lille” will be a place for meetings and exchanges for the research teams on the Campus or its tenants. More broadly, it will offer a new convention space in the Lille metropolis.

Real estate master plan



CALMETTE BUILDING
Ground floor

Rehabilitation work for the reception of the Synlab medical analysis laboratory.



CALMETTE BUILDING
Ground floor

Relocation of the museum in the former home of Albert Calmette.



Relocation of the company cafeteria and exercise facilities

2016

2017

CALMETTE BUILDING
4, 5 & 6th floor

Grouping of services administrative,



2017

2019 - 2020 - 2021

**HIGH-TECHNOLOGY
EXPERIMENTATION
PLATFORM**

Partial rehabilitation of the former company cafeteria.





REROUTING OF NETWORKS

2021-2022

2022-2023

NEW CONSTRUCTION

At the corner of Boulevard Louise XIV – Maréchal Vaillant.

REHABILITATION

Guérin building



CALMETTE BUILDING

Development work for the Longevity and Preventative Health Centre

2024

2024-2025

NEW CONSTRUCTION

Rue de Professeur Calmette.



CSR commitments

The activities of the Institut Pasteur de Lille are part of a Corporate Social Responsibility (CSR) approach. Initiated in 2017 and carried out by the General Management, this approach involves concrete actions on a daily basis by all employees of the campus, and falls into three categories: social, societal and environmental.

Social Being a creator of human values



DEVELOPING EMPLOYABILITY

Adaptation of workstations for health reasons in 2021:
5 (including 2 PC purchases for remote work, 3 ergonomic adaptations at the workplace)

TRAINING BUDGET

1.40% of payroll in 2021 + 1% training tax
104 training sessions in 2021 techniques, adaptations, job retention and 62 trained individuals

EQUAL OPPORTUNITIES

Training of two SRH employees as Disabled Persons Contacts in 2021

PROFESSIONAL EQUALITY INDEX

98/100 (2020-2021 Index published in 2022)

RATE OF WORKERS WITH DISABILITIES

6.80%

SAFE WORKING CONDITIONS

In 2021, with two reported workplace accidents, a level of occupational safety-health performance was maintained in line with the results obtained since 2018. The prevention programme for the coming years will be strongly oriented toward raising staff awareness to the various hazards present on the site.

Rate of frequency and severity

Tf and Tg 2020 = 0

Tf 2021 = 3.6 and Tg 2021 = 0.09

Teleworking has been heavily implemented in connection with health-related lockdowns and protocols.

The fight against psychosocial risks is active, with a specific CSE commission and appointed and trained harassment contacts.

Societal

Serving these communities: local and scientific populations



HEALTH, PREVENTION AND VACCINATION

During the COVID period, the Institute committed itself to the search for a treatment against this virus and all coronaviruses, with the involvement of research teams.

In 2021, the Longevity and Preventative Health Centre (CPSL) teams participated in the Covid-19 vaccination effort, within the vaccination centre of the Institut Pasteur de Lille, but also as part of the Zenith vaccinodrome in Lille, which opened in April. CPSL staff, doctors, nurses and administrative staff committed to this massive vaccination campaign intended for all. This societal and public health commitment is part of the ongoing history of the Institut Pasteur de Lille, which began more than 120 years ago with the creation of a dispensary for diphtheria vaccinations.

HANDLING OF PERSONAL DATA

The work of the Institute is fundamentally human-oriented, starting with the protection of personal data that the Foundation collects and processes, both in its research and health prevention activities, but also for the purpose of calling for generosity, in particular, allowing us to maintain personalised and privileged relationships, especially with our legatees.

Concerned about compliance with European regulations – the General Data Protection Regulation (GDPR) – as well as the French provisions of the “Information Technology and Freedom” law, the Data Protection Officer is in constant contact with all campus teams and works with scientists, medical and administrative staff to disseminate the culture of personal data protection on a daily basis.

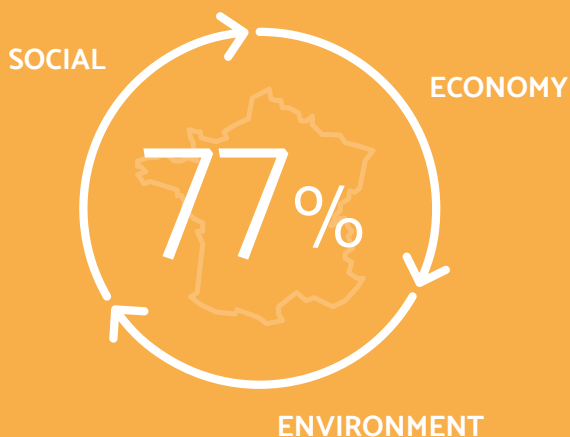
The Foundation also ensures that its partners comply with the standards of protection.

The Data Protection Officer of the Institute attaches particular importance to the respect of data confidentiality by adopting the position of the accompanying person rather than the gendarme.

BIOM % INDICATOR

Percentage of turnover redistributed for sustainable development:

SOCIAL + ECONOMIC + ENVIRONMENTAL



IT SECURITY

The activities carried out at the Institut Pasteur de Lille require a high degree of protection for our information systems. Some data that we may process is sensitive and subject to binding regulations applied to the research sector.

The Institut Pasteur de Lille undertakes to comply with this regulation, which requires the highest standards of protection for information systems, under the control and with the support of ANSSI and qualified partner service providers.

The Institut Pasteur de Lille must be able to anticipate the risks associated with the threats that the Foundation could face, while offering employees a high-performance, available and pleasant working environment.

Events such as the pandemic or the Russian-Ukrainian conflict have acted as boosters of innovation and transformation. We have to be able to respond to new working methods (teleworking, nomadism) in record time, without neglecting the security of our information, so that we can continue to work in the search of scientific and medical solutions that allow us to live better longer.

SIMPLIFICATION AND OPTIMISATION OF PROCEDURES

A computer software to digitise the quality approaches of several services has been deployed. It has made it possible to simplify, or even optimise, a number of activities while maintaining the certifications acquired.

ECONOMIC % INDICATOR

Percentage of turnover redistributed for the benefit of the local economy.

83%

Percentage of your turnover distributed locally

96%

Percentage of your turnover distributed in France

352 ✓

Direct jobs in the territory

57% ✓

Local suppliers

97% ✓

Suppliers in France

899 ✓

Training days completed



Environmental

Being a committed and responsible actor

PRIORITY FOR WASTE SORTING AND MOBILITY.

Cleaning actions have made it possible for the appropriate sectors to eliminate various types of waste, such as computer waste or archives. These actions have contributed to the creation of support jobs in collaboration with the dedicated partners. As regards mobility, awareness-raising actions on active methods have been carried out: loan of electric bikes for one month; workshop to learn how to properly maintain your bike, etc. The Institut Pasteur de Lille was the winner of the 2021 Mobility Challenge in the “Active methods” category for establishments with more than 500 employees thanks to the active participation of Campus employees.

Committed, **to bringing life to our projects**

“With 14 million euros collected in 2021, the mobilisation of our donors, individuals, associations and companies, was exceptional. Donations, patronage, bequests: thanks to everyone’s generosity, research continues to advance. Giving to the Foundation means giving researchers at the Institut Pasteur de Lille the opportunity to go faster and further in their research and the development of new treatments against infectious diseases, which is at the heart of our project, and against other diseases such as diabetes, cancer, cardiovascular diseases, Alzheimer’s disease, etc. Medical research can only be considered over time. Whether general or targeted, regular or one-time, all donations, even the most modest ones, support our research programs and accelerate medical progress.

Being a donor can take different forms: by becoming a volunteer, by launching a sporting challenge, by organising a solidarity action within your company, or by initiating a free collection during a birthday, you are helping us! Our teams are here to help you motivate your entourage and achieve your goal.

Every year, we remind you: there are no small donations, no minimum amounts, everyone can give up to their means. But each donation counts and contributes to the influence of the Foundation, the development of research projects, the equipment in our laboratories or the dissemination of knowledge. THANK YOU TO ALL OUR DONORS! »

Cédric Bouquet,

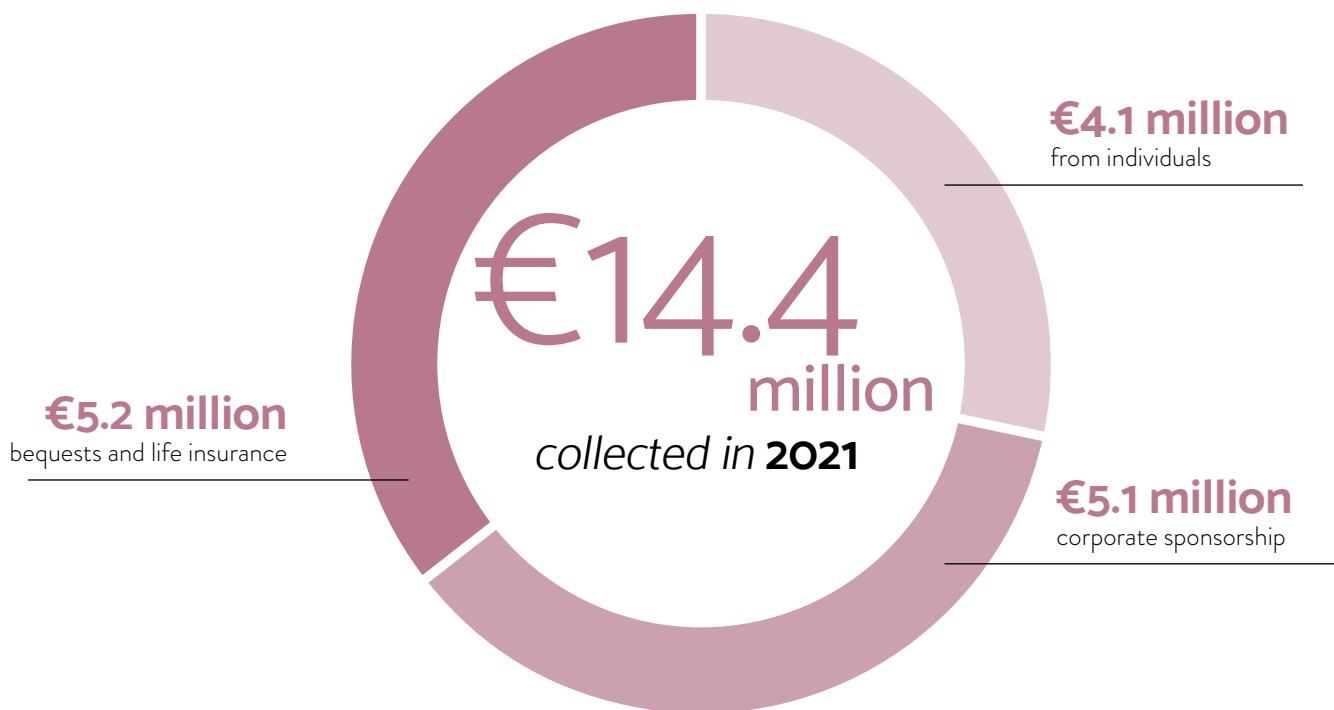
Director of Communication and Sponsorship





Today's donations *make the discoveries of tomorrow.*

Individual initiatives, corporate actions and solidarity events are opportunities to engage in medical research.



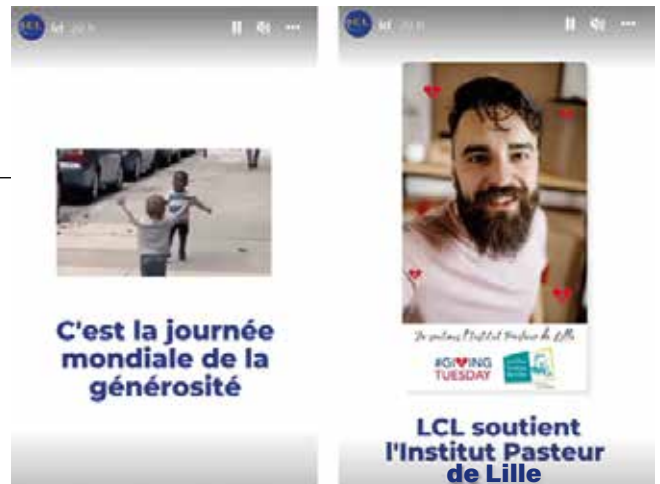
Which helped to finance:

- New laboratory equipment
- New scientific talents
- New fundamental research programmes to better understand diseases and discover new treatments

GIVING TUESDAY, 30 NOVEMBER

A day that fosters generosity!

Patron of the foundation, LCL organised a fundraiser on this occasion from its employees and customers via their social networks, website and applications. Thank you to them for this beautiful solidarity initiative on this world day of generosity.



And also...

The mobilisation of the Campus to thank our donors and patrons for their support.



STUDENTS

Special mention to the Facebook group of students from the University of Lille. (Master's Association 2 Defence and Security Law).



And also...

Inter-faculty crossover.

A great bravo to the students of the IUT of Amiens for the organisation of their 100% digital inter-faculty crossover, a great solidarity initiative for the benefit of research!

PRIVATE INITIATIVES

Happy and generous birthdays!

Thanks to Audrey, Thilo, Stéphanie, Laurent, Etienne, Savannah... and all those who choose to be generous by raising funds via Facebook on their birthdays. An average of €500 per fund was collected for the benefit of the Foundation!

ARTISTS

An exhibition featuring independent artists.

On the 60th anniversary of the “Groupement des Artistes Indépendants de Lille”, at the end of October 2021, some 30 artists put their works up for sale, the proceeds of which they generously donated to the Institute. The joint sale of works of art is a good way to support research.



LIONS CLUB

Tulips against cancer.

More than 50 volunteers from the Lion's Club of Aire-sur-la-Lys participated in the picking, composition of bouquets or their distribution. They collected €5,000 for the Institut Pasteur de Lille. Next edition in 2022.



COMPANIES

The beautiful action of Trenois Decamps.

Trenois Decamps, a Nordic family business, donated to the Institut Pasteur de Lille to help teams fight against COVID-19. A donation made possible by converting customer gift points into donations. A way to engage customers and companies around a solidarity project.



ARTISTS

Poetry in the service of research.

Marie-Ange Hache-Delvallez, 80 years old, a former teacher, put together a book entitled “Écoute... Acoute...”, thirty years of writing poems in patois with their translation into French. She wanted to give the Institut Pasteur de Lille the proceeds from the sale of her book. A beautiful action of solidarity for this patois poetess with a big heart.



COMPANIES

Luminarc, to your mugs!

Luminarc, put in place a beautiful solidarity action: For every mug purchased, 1 euro was donated to the Institute for research against COVID-19. Thus, more than 29,000 euros could be collected!

AND ALSO...



A big thank you to the National Council of Automotive Professions (CNPA) for their contribution to the research carried out by the Institut Pasteur de Lille.



The Foundation is now one of the beneficiaries of the Lilo ethical web search engine, the first French solidarity search engine. Each search carried out makes it possible to accumulate drops of water to be converted into donations for the Institute.

ROTARY

Unwavering support!

Thank you to the Rotarians who rally every year to support our researchers.

COMPANIES

Chronodrive: when fidelity rhymes with solidarity

Since October 2021, Chronodrive has been offering its customers the opportunity to turn their loyalty points into donations for disease research. To date, more than 500 clients have shown their generosity in support of the research. A big thank you to Chronodrive for this great initiative and to their customers for their support.



IT'S NEW!

New website and an online "donor space"!

In order to facilitate online approaches, the Institut Pasteur de Lille has set up a new website including a **secure donor space**, which allows easy management of information, tax receipts and donations.

Every donation, every gesture counts.

How to support us?

Donations, bequests and life insurance, events, solidarity races, online collections, corporate sponsorship... every contribution is essential to providing the Foundation with the means to advance research and design the treatments of tomorrow.



As a donor and testator

A donation to the Institut Pasteur de Lille provides direct support to research teams in their fight against diseases. Bequests, donations and life insurance also ensure the sustainability of our research.

Bequests and life insurance represented nearly 36% of the private resources of the Institut Pasteur de Lille in 2021. Whatever its amount, a bequest, donation or life insurance policy forever unites the history of the benefactor (or testator) to the destiny of the Foundation. At the same time, this act of transmission helps to beautify the world and reveals the deep aspirations of our testators.

The Institut Pasteur de Lille is a foundation recognised for public utility; as such, it is exempt from inheritance tax. Each bequest granted to the Institut Pasteur de Lille is worthy of tremendous respect, remembrance and recognition.

As a sponsoring company

Private funds are a major funding resource for the Foundation. The support of sponsoring companies is therefore essential to carry out the Foundation's ambitious research projects.

As an individual fundraiser

Everyone can commit, at their level and with their means, by initiating a solidarity action to raise funds to support our research work.

In 2021, nearly 20 fundraisers were organised by individuals wishing to support research

As a committed sponsor and volunteer

Putting your popularity at the service of a good cause or giving a little of your time alongside our teams is also supporting our Foundation.

Thanks to our 55,000 donors!

Thanks to our corporate sponsors

- API RESTAURATION
- ASSURANCE ET SOLIDARITE
- AUCHAN RETAIL FRANCE
- COFIDIS
- LACTALIS
- LCL
- LIFE CHEMICALS
- LUMINARC
- LVMH
- MOBILIANS
- SYNLAB
- TRENOIS DECAMPS
- VERSPIEREN
- SUPERMARCHÉ MATCH
- TONNELERIE VICARD
- 1 BESOIN DES SOLUTIONS IT

They bequeathed for research

- Gilberte CABY
- Jeannine DECOSTER-HUREAUX
- Monique DFELHAYE-FRANCOIS
- Germaine BRIATTE-LAMOTTE
- Irène SLIWA
- François CADIC
- Daniël THUILLIER-PARMENTIER
- Emile TIMMERMAN
- Jean-Jacques BERNARD
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- Annick CAZIN
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- Bernard BILLAUDEL
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- Charles ANSART
- Eliane BAUDE
- Thérèse VERTAIN-VALENTIN
- Yvonne DUVIVIER
- Angelo DAVARE
- Jeanne FOURNEAU
- Marcelle BENCHABANE
- Jeannine DEGOUY-HERMAN
- Josette JARDEL FEIXAS
- Lucienne LIAGRE
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- Jeannine EUVRAY-DEPRET
- Victor LEPLAT
- Marguerite LABALETTE
- Odette GOSSE-BECQUART
- Roger VAN HAMME
- Suzanne VAN HUFFEL-BUCSON
- Jean-Marie PRZYBYLA-PELCENER

Scientific

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Nuclear receptors, cardiovascular diseases and diabetes

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Health Examination Centre - CPAM

Dr Gwenaëlle Floc'h

Health Examination Centre - Personalised PL

Dr Sophie Lahousse

Vaccination and Travel Medicine Centre

Dr Gwenaëlle Floc'h

Health Education Centre (Nutrition, Physical Activity and Addictions)

Dr Jean-Michel

Lecerf

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Mixed Services Unit

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PLEHTA platform

Fabrice Infanti

Applied transcriptomics and genomics

Dr David Hot

Cell imaging BiCeL EquipEx ImaginEx BioMed

Dr Franck Lafont

Proteomics and analysis of modified peptides

Dr Jean-Michel Saliou

BILILLE platform

Hélène Touzet

ARIADNE platform

Florence Leroux

High-Security Laboratory

Florent Sebbane

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EquipEx LIGAN Genomics

Prof Philippe Froguel

HTS ADME PK Screening

Prof Benoît Déprez

Nuclear magnetic resonance

Isabelle Landrieu

Chemistry Systems Biology

Dr Oleg Melnyk

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ASSISTANT MANAGER
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and General Resources
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Real Property
Virginie Drelon

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Environment
Charles Quentin

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SPONSORSHIP**

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Sponsorship Department
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Communication
and media
Delphine Fourmy

Fundraising
Laure-Anne Jacob

Patrons
Cédric Caravetta

Bequests
Sylvie Frémaux
Odile Billaut Mulot

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PREVENTATIVE
HEALTH CENTRE**

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of the Longevity and
Preventative Health
Centre

Administrative Unit
Lauren Baudier

Development Unit
Clément Feutry

Key Account Manager
Julie Padol

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ADMINISTRATION
CONTRACT
MANAGEMENT**

Research Administration
Contract Management
Department
Fabienne Jean

Research
Administration
Sylvia Laforce

Contract Management
Ruddy Duthoit

Board of Directors

The Board of Directors of the Institut Pasteur de Lille ensures respect for the fundamental values of the foundation and its statutes. It defines the strategy of the organisation, its economic model and controls its implementation by the Managing Director.

FOUNDATION COLLEGE

Mr Jacques RICHIR,

Deputy Mayor of Lille, Chairman of the Board of Directors of the Institut Pasteur de Lille

Mrs Marie Christine STANIEC WAVRANT, Departmental Councillor, Deputy Mayor of Lille

Mrs Claire MOUNIER VEHIER, Municipal Councillor of the City of Lille

Mrs Justine RATELADE, Municipal Councillor of the City of Lille

Mrs Julie NICOLAS, Municipal Councillor of the City of Lille

INSTITUTIONAL PARTNERS

Mrs Catherine Lefebvre,

Metropolitan Councillor, Representative of the European Metropolis of Lille (MEL) - **Secretary**

Mr Daniel LECA, Regional Councillor, Representative of the Hauts-de-France Region - **Vice-Chairman**

Mrs Charlotte LECOCQ PARMENTIER, Departmental Councillor, Representative of the Departmental Council of the North

Mr Stewart COLE, Managing Director of the Institut Pasteur

Mrs Charlotte LECOCQ PARMENTIER, Departmental Councillor, Representative of the Departmental Council of the North

Mr Samir OULD ALI, North West Regional Delegate INSERM, representing **Mr Gilles BLOCH,** Chairman and Managing Director of the National Institute of Health and Medical Research (INSERM)

Mr Christophe MULLER, Hauts-de-France Regional Delegate of the CNRS, representing **Mr Antoine PETIT,** Chairman and Managing Director of the National Centre for Scientific Research (CNRS)

Mr Jean-Christophe CAMART, President of the University of Lille

COLLEGE OF QUALIFIED PERSONS

Professor François-René PRUVOT, Chairman of the Medical Commission of Lille University Hospital

Master Patrick VACOSSIN, North Chamber of Notaries - **Treasurer**

COLLEGE OF FRIENDS OF THE FOUNDATION

Mr Thierry Letartre, Anios - **Member of the**

COMMISSIONER'S OFFICE OF THE GOVERNMENT

Mr Stéphane LELEU, Hauts-de-France Regional Delegate to the Regional Academic Delegation for Research and Innovation (DRARI)

Executive Committee of the Foundation

Prof Xavier NASSIF – Managing Director

Didier BONNEAU – Deputy Managing Director

Cédric BOUQUET – Director of Communication and Sponsorship

Nathalie MIELCAREK – Director of International Relations

Fabienne JEAN – Director of Research Administration and Contract Management

Claire BRESLER – Human Resources Manager

Sabine ROCHE – Head of Management Control

Executive Committee Scientific

Prof Bart STAELS – INSERM researcher in molecular pharmacology

Dr Camille LOCHT – Director of the Lille Infection and Immunity Centre

Prof Benoit DEPREZ – Director of the “Drugs & Molecules for Living Systems” Unit

Prof Xavier NASSIF – Managing Director

Didier BONNEAU – Deputy Managing Director

Cédric BOUQUET – Director of Communication and Sponsorship

Nathalie MIELCAREK – Director of International Relations

Fabienne JEAN – Director of Research Administration and Contract Management

Dr Jean-Michel LECERF – Medical Director of the Longevity and Preventative Health Centre

€19.3 million

devoted to research in
2021

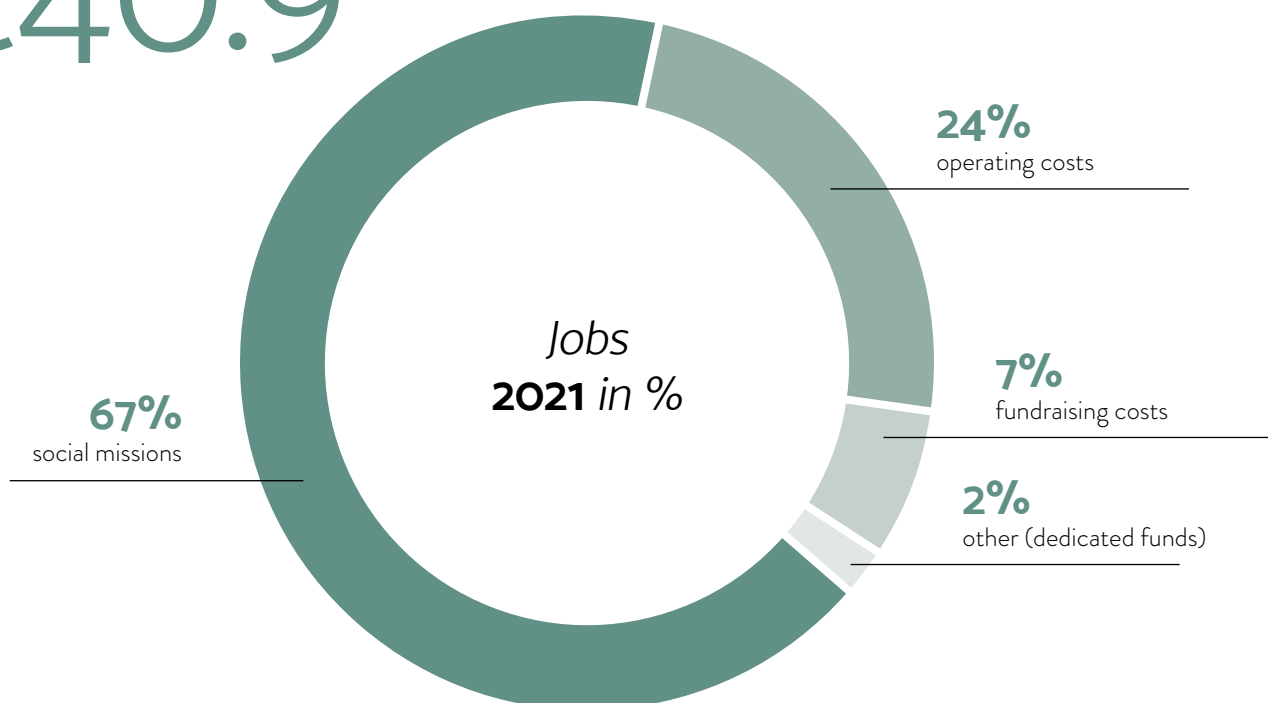
The Institut Pasteur de Lille finances the performance of its missions using various sources, both private and public.

In 2020, the Institut Pasteur de Lille dedicated **€27.3 million** to its primary missions, in particular research (**€19.3 million**), prevention and public information (**€8 million**).



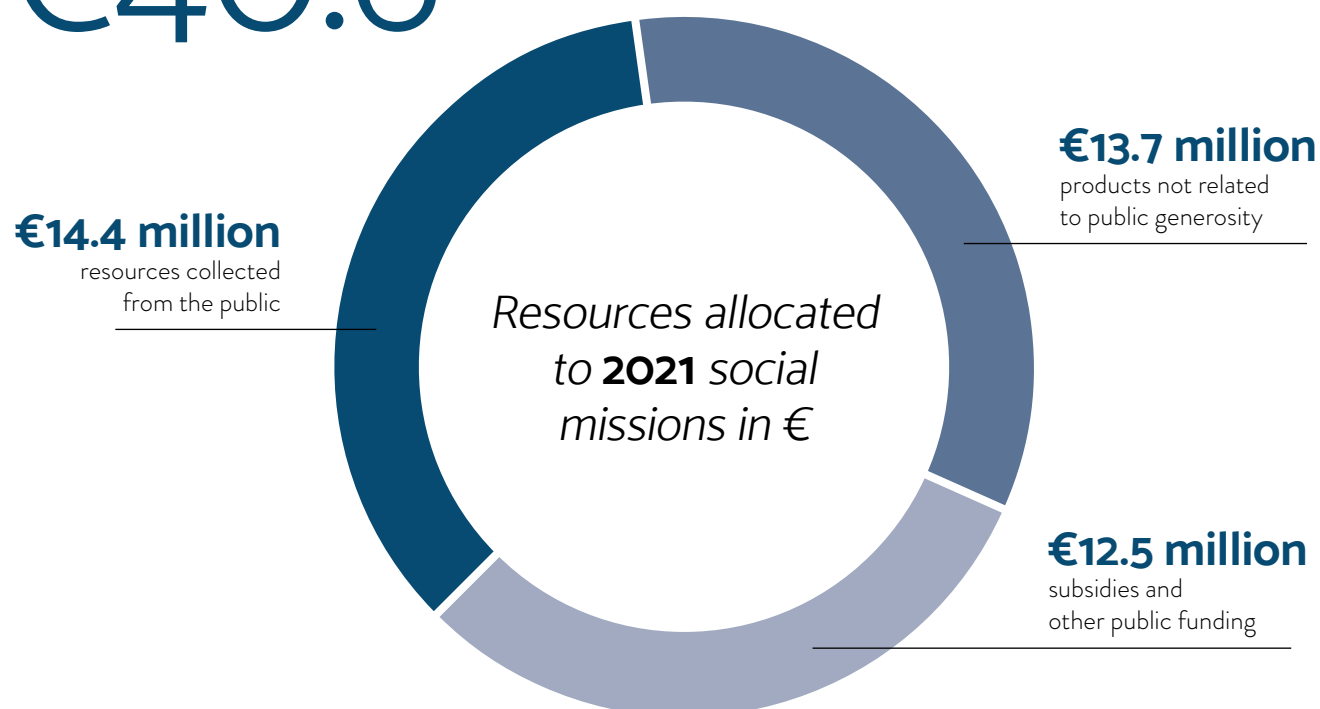
Jobs

€40.9 million



Resources

€40.6 million

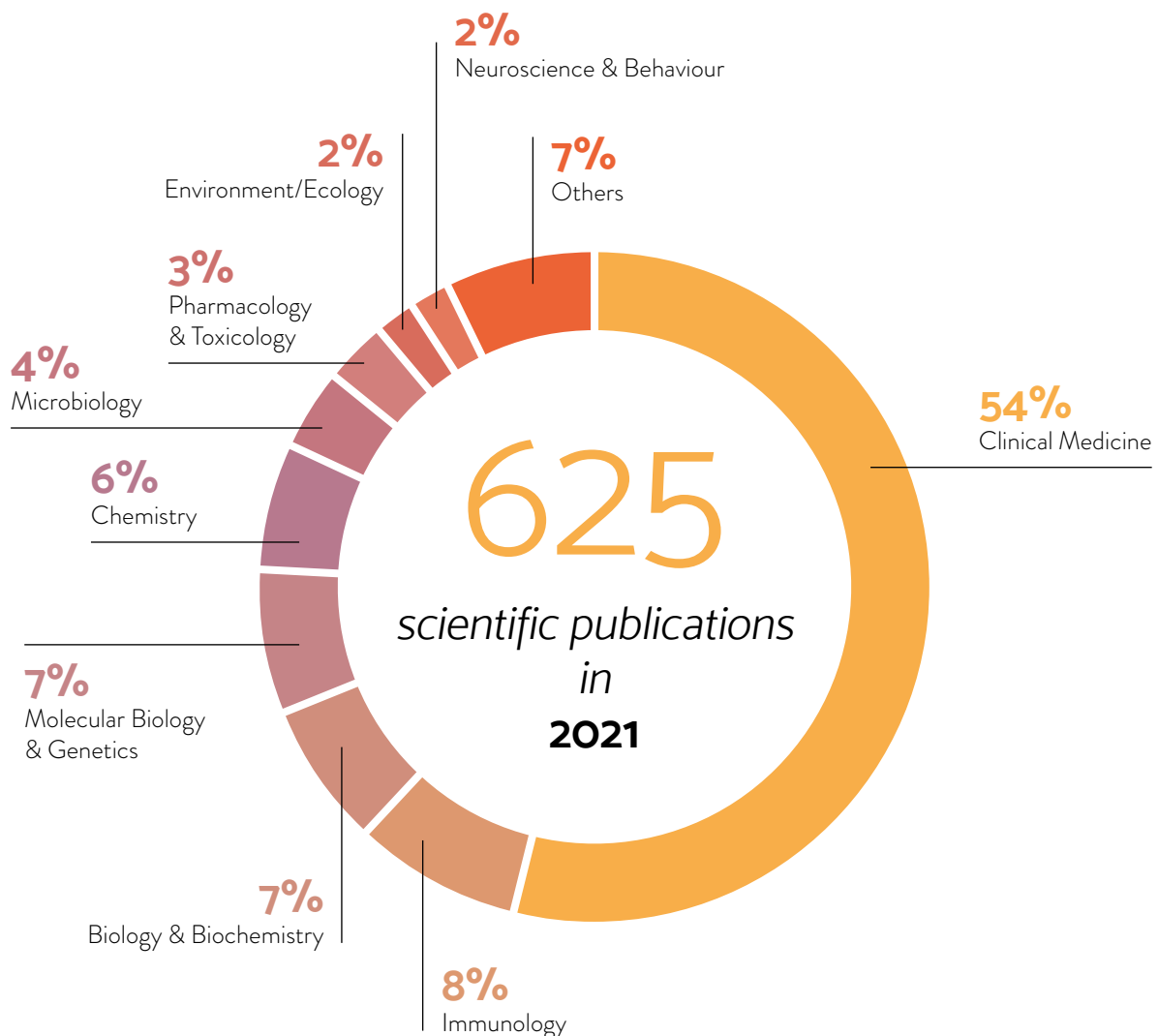


Scientific publications

It is by the quality of scientific publications that the work of researchers is evaluated. These publications in international journals such as Nature, Nature Genetics, the Lancet, PLoS One, PLoS Medicine, Gut, the New England Journal of Medicine... are a reflection of production excellence. Bibliometry, including a quantitative assessment of impact factors in prestigious journals, reflects the interest of the scientific community in the discoveries that are thus taken up and cited.

Bibliometry evaluates research activity by applying statistical methods to scientific publications (bibliography of articles, signatures of articles, keywords and authors, etc.). It measures the scientific output and notoriety of a researcher, laboratory, institution, country or field of research.

Some disciplines are represented by more researchers. The statistics presented are therefore adjusted in relation to the overall production of each discipline.



Year	NB InCites	AVERAGE CNCI	Top 1%	Top 10%
2021	705	2.85	21	95

NB InCites: number of articles found in InCites; database that contains citation-based impact indicators.

Average CNCI: Category Normalized Citation Impact (CNCI). It takes into account the year of publication, disciplinary field and type of documents. A CNCI of 2 indicates that publications are on average 2 times more cited than the world average.

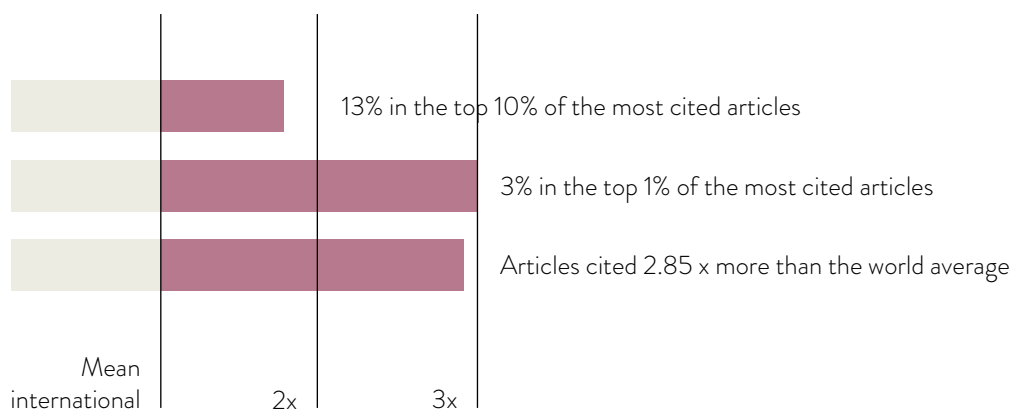
In 2021:

45 %

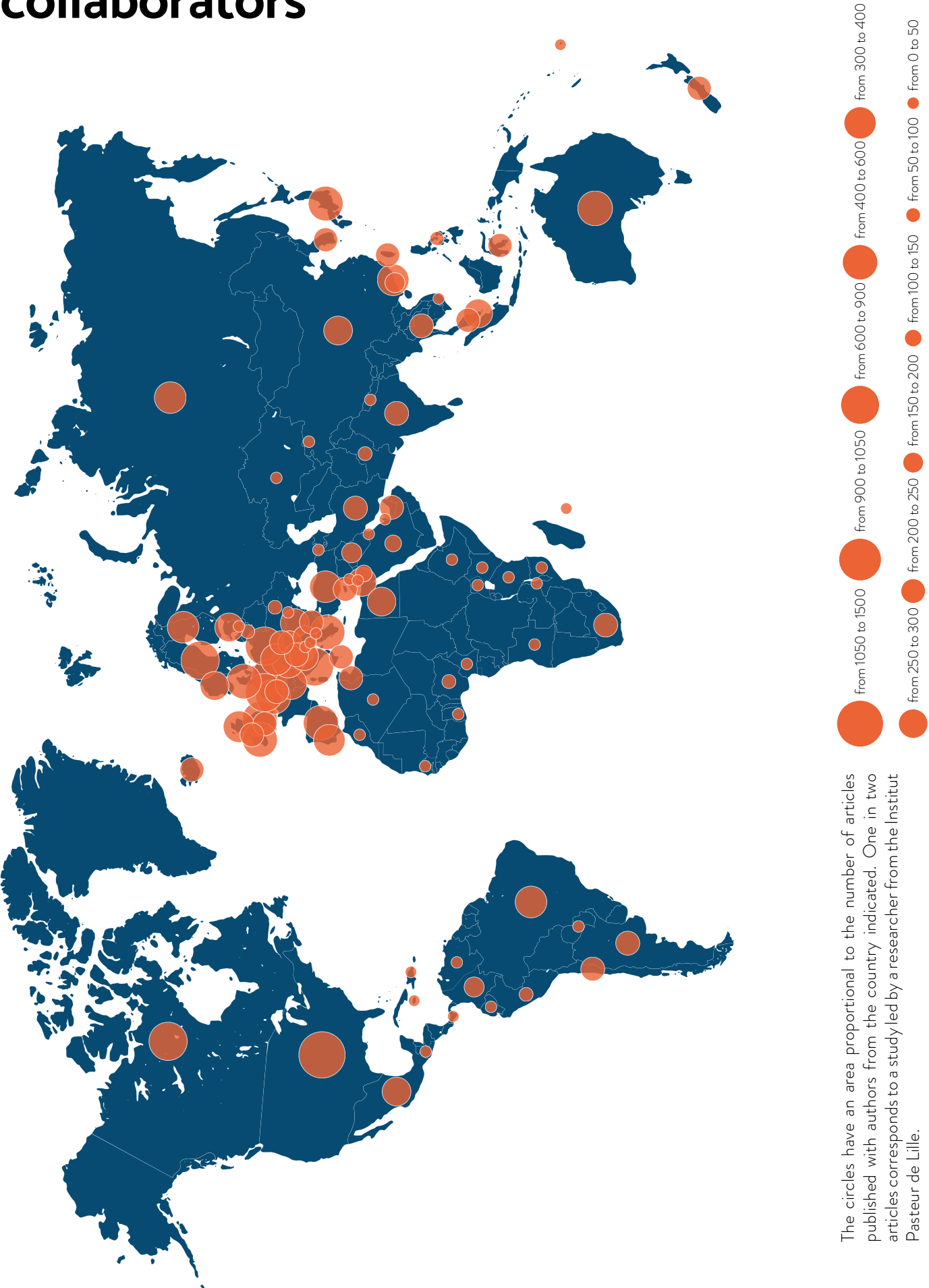
global leadership on
publications

38 %

leadership on publications
in the most prestigious
journals



Global network of collaborators



The circles have an area proportional to the number of articles published with authors from the country indicated. One in two articles corresponds to a study led by a researcher from the Institut Pasteur de Lille.

Partners



Support



Patrons



Accelerating *research* and **acting** for *tomorrow's health:* **All support counts !**

DONATIONS - BEQUESTS - CORPORATE COLLABORATIONS - PATRONAGE
SOLIDARITY EVENTS - VOLUNTEERING



Pasteurlille



PasteurLille



PasteurlilleTv



Institut Pasteur de Lille



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