

ANNUAL REPORT 2019



TOGETHER,
LET'S BEAT CANCER

Institut Curie: memorable moments

1903

Pierre and Marie Curie win the Nobel Prize in Physics for their work on radioactivity discovered by Henri Becquerel, who shares the award.

1909

The Institut du Radium is founded, comprising the Curie laboratory, directed by Marie Curie, devoted to physics research on radioactivity, and the Pasteur laboratory, directed by Dr. Claudius Regaud and dedicated to studying the biological and medical effects of radiation.

1911

Marie Curie receives the Nobel Prize in Chemistry for her work on radioactivity. She remains the only woman to have been awarded two Nobel Prizes.

1921

Creation of the Fondation Curie to fund the Institut du Radium's activities and contribute to the development of its therapeutic component.

1935

The Nobel Prize in Chemistry is awarded to Irène and Frédéric Joliot-Curie for their discovery of synthetic radioactive elements at the Institut du Radium.

1958

The first research teams start working at the Orsay site, which now focuses on radiation biology.

1970

Merger of the Institut du Radium and the Fondation Curie to form "the Fondation Curie-Institut du Radium". In 1978, it will acquire the permanent name of Institut Curie.

1977

A pediatric oncology department opens at Institut Curie.

1993

Opening of a translational research laboratory.

1994

Creation of the first epigenetics research team.

2005

Creation of DISSPO, an interdisciplinary facility for supportive care and outpatient palliative care.

2008

Opening of the Developmental Biology and Cancer Department at the Paris site.

2010

Institut Curie merges with the René Huguenin Cancer Center at Saint-Cloud.

2017

Inauguration of the 1st cancer immunotherapy center and celebration of the 150th anniversary of Marie Curie's birth.

02 KEY FIGURES

05 OUR GOVERNANCE

14 OUR CURIOSITY

24 OUR PIONEERING SPIRIT

34 OUR HUMANITY

44 OUR ENGAGEMENT

52 OUR COMMITMENT

64 ACKNOWLEDGMENTS

"A great discovery never springs from the scholar's brain fully formed, like Minerva burst fully armed from the head of Jupiter; it is the result of a prior accumulation of labor."

Marie Curie

Source: Marie Curie, Pierre Curie, Éditions Odile Jacob, Opus collection.

CONTENTS

Institut Curie in figures

3,648
employees



628
PhD students, master's students, residents and hospital students in training

191
nursing students



84
nationalities represented

No. 1
European center for breast cancer treatment

No. 1
French cancer center in terms of number of patients treated

No. 1
French cancer research center



€373 M
operating budget (excluding any provisions)

Amount of resources from public donations:

€32.5 M
in donations and partnerships

€24.7 M
in bequests and contributions

218,000
active donors

24
ERC grants currently in progress

NF
Certification (NF Sg6-900) for the biological resource center

12
research units affiliated with CNRS and/or INSERM and/or the university

1
translational research department

10
high-priority medical-scientific programs

Comprehensive Cancer Center
Certified in 2018 by the OEIC



56,610
patients, including **11,591** new patients

408
foreign and oversea patients from **72** different nationalities



579
active patents from **159** families

21
start-ups created

93
new contracts for R&D collaborations signed

20,259
visitors to the Curie Museum

COVID-19



During this unprecedented crisis,

all of our resources and all our attention have been focused on protecting and safeguarding our patients and our staff and on pursuing our mission.

The Hospital Group has demonstrated exemplary commitment in helping in the national health crisis and welcoming patients with COVID-19, while ensuring its health professionals were protected, and its patients monitored and treated.

The Research Center also became involved very early on to provide its expertise, skills and technology to assist with research on SARS-CoV-2, while preserving its scientific assets.

Teams at Head Office worked tirelessly to continue essential operations.

As we all know, the human and economic consequences of this crisis are significant.

We will be doubling down on our efforts. And we can be confident in light of the efforts made. Institut Curie will leverage its history and its excellence to get through this ordeal.

Institut Curie furthers the fight against cancer daily by investing in innovative research. Thanks to you, this fight will go on.

**Our heartfelt thanks go to all of you
for your unwavering commitment,
solidarity and support.**

Prof. Thierry Philip,
Chairman,
Executive Board

Prof. Pierre Fumoleau,
Director,
Hospital Group

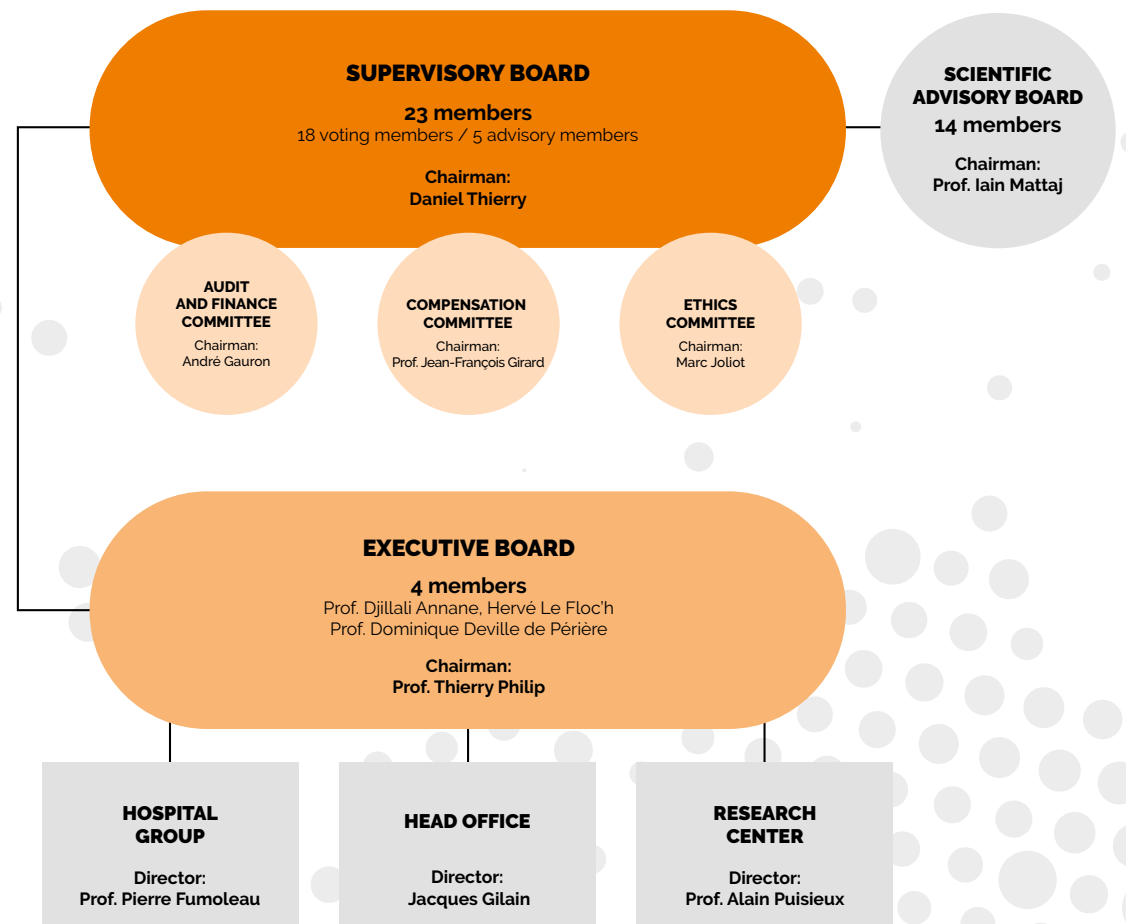
Prof. Alain Puisieux,
Director,
Research Center

Jacques Gilain,
Director,
Head Office

OUR
GOVERNANCE

The Organization

Institut Curie's governance includes a Supervisory Board, a Scientific Advisory Board, an Executive Board, and three entities, namely the Hospital Group, the Research Center and the Head Office.



The Supervisory Board

Set up in 2018, the main purpose of the Supervisory Board is to control the management bodies and ensure the proper management of the Executive Board.

The Supervisory Board fulfills various missions, namely:

- establishes the action program for the Foundation, and in particular votes, upon proposal from the Executive Board, on the budget and its amendments as well as staff projections,
- approves the annual accounts and votes on the allocation of donations and bequests,
- authorizes the purchase of equity stakes and creation of any legal structures, the acquisition and sale of movable assets and property assets, contracts, leases and rental contracts,
- adopts the report presented by the Executive Board every year on the moral and financial situation of the Foundation and of each of its three entities: the Hospital Group, the Research Center and the Head office.

Chaired by Daniel Thierry, the Supervisory Board comprises 18 members with voting rights and five members who serve in an advisory capacity, divided into four colleges: founding members, non-voting members representing general interests and the State, qualified individuals and staff representatives.

The Board is assisted by three committees: a compensation committee, chaired by Prof. Jean-François Girard, an audit and finances committee, chaired by André Gauron, and an ethics committee, created on March 19, 2020, and chaired by Marc Joliot.



The Supervisory Board met three times in 2019. It was required to rule on several matters of interest, namely:

- The signing of the agreement binding Institut Curie and Université PSL, making Institut Curie an associate member of the new university.
- The vote to revise the property project on the Paris site to add an extension to the Hospital Group and an extension to the Pavillon Pasteur devoted to the Research Center.
- The appointment of a new director, Prof. Alain Puisieux, for the Research Center.

The Scientific Advisory Board

Comprised of international experts – particularly in the field of oncology research – from outside Institut Curie, the Scientific Advisory Board provides strategic guidance on the Institute's general focus and agenda.

Institut Curie's Scientific Advisory Board features internationally-renowned researchers and physician-researchers and heads of major foreign institutions who devote most of their time to cancer research.

The Board's meeting on December 5 and 6, 2019, was the last for Prof. William Gillies McKenna and Prof. Ronald Vale, but the first for Prof. Edith Heard and Dr. Luca Gianni.

- Prof. **Edith Heard** served as Director of the Genetics and Developmental Biology Unit (CNRS/INSERM/Sorbonne University/Institut Curie) at the Research Center for over 10 years. She now leads the prestigious European Molecular Biology Laboratory (EMBL).
- Dr. **Luca Gianni**, medical oncologist, is Director of the Department of Medical Oncology at the Michelangelo Foundation in Milan, Italy.



On December 5 and 6, 2019, the Scientific Advisory Board paid tribute to Bruno Goud's acting Directorship of the Research Center and the appointment of Prof. Alain Puisieux as Director of the Research Center. They highlighted the relevance of his 2020-2024 vision, which combines basic research and translational research, and contributes to the development of the future Comprehensive Cancer Center.

A revision to the Hospital Group's Medical Strategy was under consideration. Optimization of the care pathway through early diagnosis, innovation, digital health, introduction of collaborations with other treatment centers, as well as the Partner Patient project are the highlights of this revision.

As for the Medical-Scientific Program, the Scientific Advisory Board was heartened to see a considerable number of clinicians compelled by translational research projects.

The Executive Board

Tasked with the administration and management of Institut Curie in conjunction with the Directors of the Hospital Group, the Research Center and the Head Office, Institut Curie's Executive Board is vested with wide-ranging powers to take action in all circumstances on behalf of the foundation.

MAKE-UP AND MISSIONS OF THE EXECUTIVE BOARD

The Executive Board comprises four members appointed for a six-year term by the Supervisory Board. As a collegiate body, it is responsible for the administration and management of the Foundation and oversees the implementation of the decisions of the Supervisory Board. It also conducts management dialogue with the entity Directors and reports back on the main topics to the Supervisory Board.

Prof. Thierry Philip has been Chairman of the Executive Board since 2018, and represents the Foundation in its third-party relations and in all civil procedures. The three other members of the Executive Board carry out separate and complementary supervision duties. Prof. Dominique Deville de Périère is responsible for relations with Université PSL and for IT security. Prof. Djillali Annane monitors the positioning of Institut Curie in various strategic projects and oversees several medical and scientific policy issues. Lastly, Hervé Le Floc'h is in charge of financial management and representation of the Executive Board on the Audit and Finance Committee.

The Executive Board meets approximately once a month, alongside the Directors of the Research Center, the Hospital Group and the Head Office. In August 2019, a working seminar was held to share feedback on the new governance, which was instituted following revision of the Foundation's bylaws in 2018, and to establish the outlook for Institut Curie for 2030. The Executive Board's internal regulations were approved in December.



HIRING RELATED TO THE EXECUTIVE BOARD

2019 was marked by the arrival of Prof. Alain Puisieux as new Director of the Research Center. To strengthen its policies in terms of IT security and risk management, Institut Curie hired an Information Systems Security Manager and Data Protection Officer (RSSI-DPO) in January, and created a position for an internal auditor, a new hiring that would report to the Executive Board.

HIGHLIGHTS

2019 also saw the start of negotiations as part of the creation of **Université PSL**. The Executive Board wanted Institut Curie to be an "associated member" of PSL, in the same way as the Collège de France. Prof. Thierry Philip and Prof. Alain Fuchs, President of Université PSL, **signed the agreement** on November 28, in the presence of the Chairman of the Supervisory Board, Daniel Thierry.

In terms of social dialogue, 2019 featured discussions on the creation of new representative bodies (CSEE and CSEC) and the organization of professional elections.

In June 2019, the Executive Board approved the **architectural plans for the Research Center** on the Paris site, integrating a plan to extend the Pasteur building, bringing the overall budget for the MC²¹ Research Center property project from €11 million to €17 million.

In October, the Executive Board decided on a **one-off support package of €1 million for the Hospital Group** to develop translational research, and of €500,000 for the Medical-Scientific Program (MSP), led jointly by the Hospital Group and the Research Center. It also approved the creation of a Marie Curie Chair in Chemistry and Biology on January 1, 2020. Awarded to Raphaël

Rodriguez, it was part of the scientific program developed by Prof. Alain Puisieux.

In terms of partnerships, in November the Executive Board approved **the creation of two Health Cooperation Groups (HCG)** with the Institut Mutualiste Montsouris (IMM) in Paris, and the Institut Godinot (Cancer center of Champagne-Ardenne and the southern Aisne region) in Reims.

PURSuing STRATEGIC PLANS

In 2019 a discussion took place on the creation of an **Ethics Committee**, reporting to the Supervisory Board.

Health and safety were also at the heart of the discussions during the second half of 2019, reiterating their centrality to the work of every level at Institut Curie.

Concerning **Europe**, Institut Curie has begun networking with European leaders and has formed a working group on the institute's European strategy. Lastly, the **major partnership agreements** with INSERM, the French National Center for Scientific Research (CNRS) and the French Ministry for Higher Education, Research and Innovation, which formalize the role of the Institut Curie in cancer research on the national scale.

The Entity Directors

Appointed by the Executive Board with the Supervisory Board's assent, Institut Curie's three entity Directors are responsible for managing human resources and scheduling expenses relating to the part of the budget within their scope.



Prof. Pierre Fumoleau,
Director of the Hospital Group

Several important events for the Hospital Group teams stood out in 2019.

I'm thinking in particular of the laying of the first brick in the future building on the Saint-Cloud site, a large-scale property project that will enable it to adapt to developments in oncology, and to consolidate the presence of Institut Curie in the west of Paris. In radiotherapy, 2019 was the year we installed two Halcyon accelerators on the Paris site, and launched an equipment modernization plan. Lastly, two innovative clinical trials were initiated: the first will test the effect of NBTXR3 nanoparticles developed by Nanobiotix, combined with radiotherapy to increase tumor destruction, and the second will explore circulating biomarkers to choose the best treatment for women with certain types of metastatic breast cancer."



Prof. Alain Puisieux,
Director of the Research Center

I am delighted to have joined this wonderful institute where I completed my biology internship, and where I was member of the Research Center's Scientific commission between 2013 and 2019. Despite taking up this position until late in the year, I would like to highlight the introduction of a new project for the Research Center. It maintains our core focus on basic research, clinical research, and care, but has four ambitions: to boost the center's excellence in basic research in the field of life sciences, based on the notions of interdisciplinarity, curiosity and freedom, to develop translational research and stimulate innovation within the context of a Comprehensive Cancer Center, to offer infrastructure to researchers and lastly, to interact with the environment while promoting the Institut Curie model."



Jacques Gilain,
Director of the Head Office

2019 was the first full year of operations for the Head Office, a new entity which became official in 2018. Aside from coordinating shared services, the Head Office oversees the cohesiveness of Institut Curie's business, ensures that its assets are protected and developed, produces the Head Office's specific resources and provides the institute's financial reports. It supports all activities in conjunction with the Hospital Group, the Research Center and the Executive Board. 2019 was devoted to structuring and managing the Head Office departments, strengthening collaborations between entities and social dialog, as well as preparing for the Foundation's Centenary celebrations. The Head Office has also been particularly involved in the introduction of the MC²¹ property project and consolidation of business indicators for the whole of Institut Curie."

Major progress in the MC²¹ property development project

Institut Curie's Institutional Project 2015-2024 is driven by an ambitious property development project on its three sites. It gives Institut Curie the opportunity to pave the way for the Comprehensive Cancer Center of the future, by providing spaces for collaboration between physicians and researchers.

This construction and renovation project is being funded by the Curie Foundation to the tune of €182.5 million, of which 145 million are dedicated to patient care. Its primary goals are to provide patients with the highest quality and safest care and researchers with the best working conditions. The design for the construction and renovation of the Paris site was chosen in September 2019.

PARIS

The Hospital Group

The project aims to optimize the functionality of the Paris hospital by investing in the existing portion site located at 26-32 rue d'Ulm, and building an extension on an adjoining piece of land. This additional wing will have its own entrance, areas for clinical care and a green patio helping to create a welcoming space for patients and employees alike. This new building will increase the Hospital Group's capacity for consultations, inpatient care and outpatient treatment for all conditions treated by Institut Curie.

The Research Center

Alongside the work conducted at the Research Center aimed at fully renovating and upgrading the Pavillon Trouillet-Rossignol, the Research Center's real estate blueprint plan for the Paris site was approved by the Supervisory Board in June. The Research Center's teams and committees are now working to coordinate and



Prof. Pierre Fumoleau,
Director of
the Hospital Group

We believe that this large-scale property development project, spanning four years, is crucial if we are to offer our patients the best possible care and provide our teams with optimal working conditions. A steering committee set up in the Hospital Group's General Management Department monitors its progress and ensures that everyone is consulted and involved."

organize a 2,000 m² extension at the Pavillon Pasteur. Between 2021 and 2024, the Constant-Burg laboratories will also be fully renovated. By February 2024, 80% of all surface area covered by the Research Center's architectural blueprint should be completed.



ORSAY

At Institut Curie's Orsay site in the heart of the Paris-Saclay university campus, a new **experimental radiobiology building** now houses the research teams, a stone's throw away from the Proton Therapy Center. Experiments are facilitated by bringing teams and equipment together in a single place, with high technical and medical performances and near one of only sites offering proton radiation in France.

The experimental radiotherapy platform and part of the Preclinical Investigation Laboratory (PIL) are already in place. In 2020, the experimental radiobiology building will also include a branch of Institut Curie's new imaging platform.

With 1,300 m² spread over three general floors plus a technical floor, the experimental radiobiology building was completed in under five years despite the complexity of the project. Funded through public donations and commitment of the MC²¹ Campaign Committee, this investment of around €5 million will enable Institut Curie – the historic birthplace of radiotherapy and France's top radiotherapy and proton therapy center – to develop new approaches, such as the deployment of flash radiotherapy, new medications or therapeutic combinations that sensitize tumors to radiotherapy and more targeted radiation methods.

SAINT-CLOUD


The cornerstone of the real estate project of Institut Curie on the Saint-Cloud site was officially laid on December 3, 2019 in the presence of many personalities and collaborators. This project will make it possible to respond to changes in patient care and cancer research, but also to secure Institut Curie's position in the new regional dynamics of oncology in the west of Paris. Innovative spirit, a human-centered approach, and a consolidation of expertise are the pillars of this project. The patient's experience will be smoother and whether they are treated in the conventional hospital or the intensive outpatient facility, the conditions under which they are treated will be modernized. This program also pays particular attention to the development of ambulatory care and the reduction of hospital stays.

As a key element in the future strategy of Institut Curie, this expansion and renovation project has a budget of €82.6 million.



Prof. Alain Puisieux,
Director of
the Research Center

The restructuring of the Research Center premises is a major project to allow researchers to work in the best possible conditions and to retain our appeal and competitive edge."



As a multidisciplinary Research Center engaging with the world, Institut Curie is perfectly equipped to advance knowledge in the fight against cancer. Its 1,220 collaborators put their expertise and ability to work to produce original discoveries and innovative applications.

Antonin Morillon, Director, Dynamics of Genetic Information Unit (CNRS UMR 3244/Sorbonne University) and
Aura Carreira, Head, Genome Instability and Cancer Predisposition Team (CNRS UMR 3348/Paris-Saclay University).



OUR
CURIOSITY



The Research Center in figures

4 fields of research

Radiation Biology
and Chemistry, Cell
Signaling and Cancer

Development,
Cancer, Genetics
and Epigenetics

Integrative Tumor
Biology, Immunology
and Environment

Multiscale Physics,
Chemistry, Biology
and Cancer Studies

1 translational research department

12
research units
affiliated with CNRS and/or
INSERM and/or universities

5
new Incentive and Collaborative
Programs – interdisciplinary, interdomain
and/or interinstitutes (PIC3i),
including **3** PIC3i Tandem with the
National Cancer Institute – National
Institutes of Health (NCI-NIH) (USA) and
2 PIC3i Tandem with the Weizmann
Institute of Science (Israel)

86
research teams,
including **19** junior teams
(**4** new junior teams hired
in 2019)

4
SiRIC-certified teams

18
technology platforms

293
PhD students,
including **135** foreign PhD students

285
post-doctoral researchers,
including **184** foreign
post-doctoral researchers

24 ERC grants underway
(**44** obtained since the creation
of these highly competitive grants),
including **3** ERCs obtained in 2019
(**1** Synergy Grant ERC, **2** Proof of Concept
ERCs) + **2** Consolidator ERCs related
to new hires

€40.22 M
in research contracts

519
publications
in international journals,
including **136** in journals
with an impact factor
higher than 10

243
seminars,
including **25** prestigious seminars
(**13** Mayent Rothschild seminars,
11 Marie Curie seminars,
1 Roger Monier day)

Congratulations!

Prizes, awards and nominations in 2019

Yohanns Bellaïche: Richard Lounsbery Award

Émeline Bonsergent (Clotilde Théry's team):
Best Conference Presentation, Meeting of the French
Society of Extracellular Vesicles (FSEV)

Aura Carreira: promotion of her team

Charlène Estrada (Alain Eychène and Celio Pouponnot's
team): L'Oréal-UNESCO For Women in Science fellowship

Daniele Fachinetti: EMBO Young Investigator Award

Silvia Fre: Schlumberger Foundation for Education
and Research (FSER) – Promotion of her team

Bruno Goud and **Nicolas Carpi** (Matthieu Piel's team):
Curie Award

Anne Houdusse: member of the French Academy of
Sciences

Carsten Janke: Forcheurs Jean-Marie Lehn Award

Ludger Johannes: member of the German Academy
of Sciences Leopoldina

Christophe Lamaze: French National Academy of
Pharmacy Award winner

Pierre Léopold: member of the French Academy of
Sciences

Amaury Leruste (Gudrun Schleiermacher's team):
Odile Schweisguth Award

Jean-Léon Maître: Claude Paoletti/CNRS Award –
EMBO Young Investigator Award

Franck Perez: i-Lab winner

Alain Puisieux: Duquesne Award

François Radvanyi: Jacques Néhorai Award

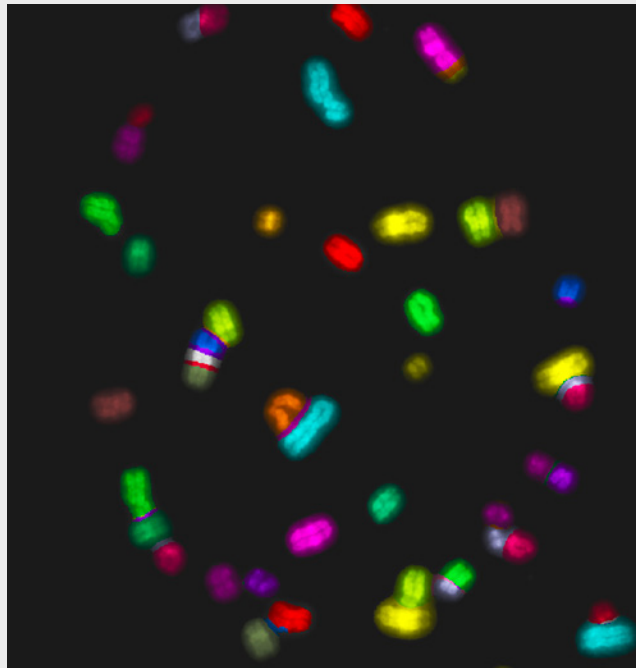
Raphaël Rodriguez: prix Antoine Lacassagne du Collège
de France – Grand Prix de la Fondation Charles Defforey-
Institut de France – i-Lab Innovation Competition winner
– SUNRISE Cancer Stem Cell Award

Graça Raposo: Miller Professorship Award Berkeley

Danijela Vignjevic: Fondation Dandrimont-Bénincourt –
Institut de France Award

Marco Zanini (Olivier Ayrault's team):
best oral presentation, graduate school fellowship

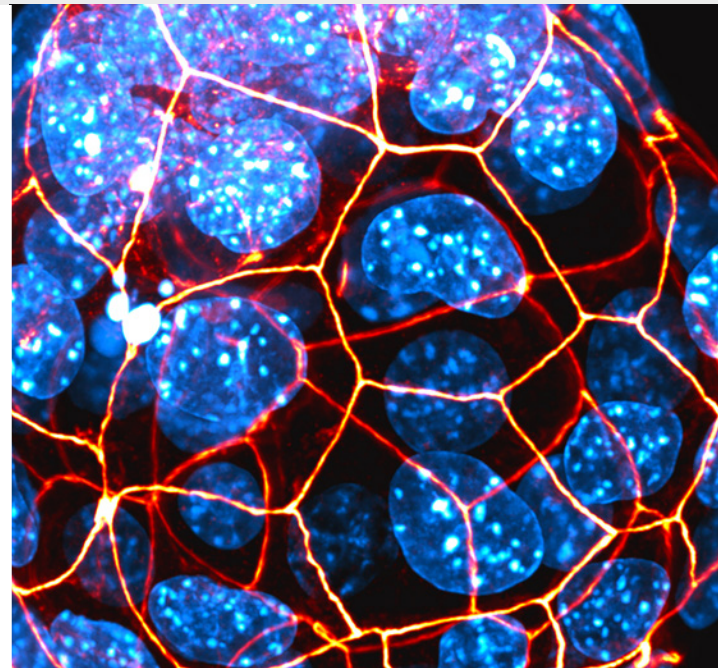
Key achievements from 2019



THE CHROMOSOME CENTROMERE UNVEILS ITS SECRETS

Daniele Fachinetti, Head of the Molecular Mechanisms of Chromosome Dynamics Team (CNRS UMR144/Sorbonne University), devotes himself to studying the centromere, the central point where the arm of each chromosome joins, which plays a key role in cell division and separation of DNA strands in each daughter cell. Cancer cells often have aneuploidy (an abnormal number of chromosomes) due to poor distribution of the genetic material at this stage. Fachinetti managed to determine the most likely conditions for aneuploidy according to the size of the centromere.

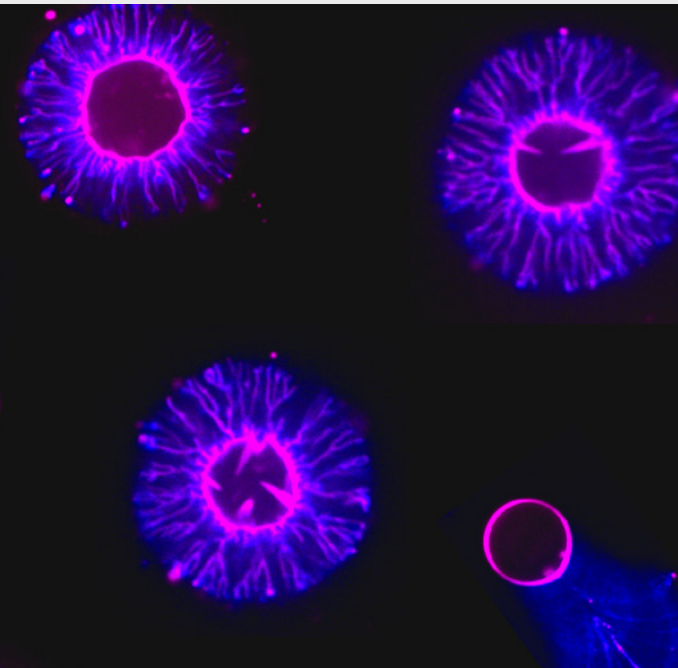
The EMBO Journal, November 2019.
The continuation of this work was also published in *Nature Communications* in 2019.



EMRYONIC CELLS FORM BY "HYDRAULIC FRACTURING"

Jean-Léon Maître's team (CNRS UMR 3215/INSERM U934) collaborated with physicists from the Center for Interdisciplinary Research in Biology (CIRB) to achieve a better understanding of embryonic development. Working on a murine model, the researchers discovered that the blastocoele – a cavity filled with liquid present inside the embryo before it attaches in the uterus – is formed by hydraulic fracturing: the water enters between the cells, with the large pockets attracting the contents of the small ones until only one cavity remains. These efforts could help improve medically assisted reproduction techniques.

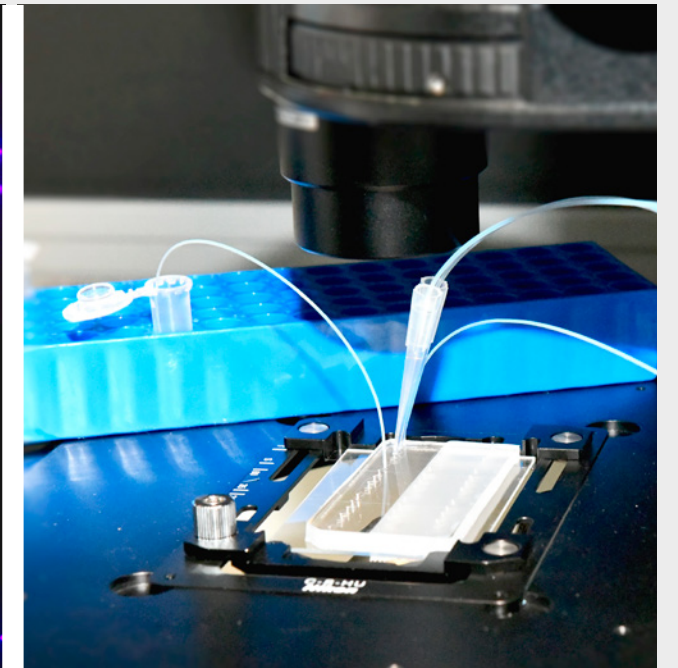
Science, August 2019



ACTIN CAN DEFORM THE CELL MEMBRANE IN BOTH DIRECTIONS

A cell's membrane can become deformed by a protein organized into filaments or a network known as actin. Camille Simon from Cécile Sykes's team, in collaboration with Pierre Sens's team in the Physical Chemistry Unit (CNRS UMR 168/Sorbonne University), succeeded in showing that the same actin networks could form concave as well as convex invaginations, according to their fine architecture and the tension of the cell membrane. These findings help achieve better understanding of how a cell exchanges messages with its environment.

Nature Physics, March 2019



A NEW MICROFLUIDICS METHOD FOR SINGLE-CELL EPIGENETICS

A new microfluidics method has been developed by Céline Vallot's team (Dynamics of Epigenetic Plasticity in Cancer Team, CNRS UMR 3244/Sorbonne University), the ESPCI Paris-PSL, and the company HiFiBio. It applies to epigenetics, otherwise known as the study of the organization of cellular DNA, on cells, but one at a time. With the help of the Preclinical Investigation Laboratory Team at Institut Curie, researchers were able to demonstrate epigenetic diversity of tumor cells, which could explain the resistance of certain cancers to treatments.

Nature Genetics, May 2019

A research center characterized by excellence and an inventive spirit

Basic research provides new knowledge crucial for understanding and fighting cancer. Loyal to the heritage of Marie Curie, Institut Curie's Research Center combines audacity with humility, creativity with attention to detail, freedom with interdisciplinarity, all within an enduring value, that of scientific excellence.



Franck Perez,
Director of the Cell
Biology and Cancer
Unit (CNRS UMR 144/
Sorbonne University)

Our teams are seeking to shed light on the basic mechanisms of cells, but are also firmly committed to the use of biological knowledge acquired to improve our understanding and treatment of cancer."

A mainstay of the fight against cancer, basic research seeks to identify and understand the molecular mechanisms at play in the occurrence and development of cancer. Basic research is what produces conceptual breakthroughs in scientific approaches and paves the way for therapeutic innovation.

For example, in 2019 Institut Curie was able to conduct innovative basic research on a single cell through its involvement in the development of microfluidics techniques. Research on a single cell, and not on populations of cells that may be diverse within the same tumor, provides better understanding of the mechanisms of the tumor's progression or resistance to treatments.

THE SPIRIT OF COLLABORATION TO MOVE SCIENCE FORWARD: PIC3i

In 2019, five Incentive and Collaborative Programs – interdisciplinary, interdomain and/or interinstitutes (PIC3i) came into being, to encourage the development of new partnerships.

Among these are three collaborative partnership projects with teams from the National Cancer Institute (NCI) in the USA. Under this program, **Elisabetta Marangoni** (PIL – Preclinical Investigation Laboratory) assesses the effect of new inhibitors on so-called triple-negative breast



cancers. **Arturo Londoño-Vallejo** (CNRS UMR 3244/ Sorbonne University) studies mutations of RTEL1, a gene involved in maintaining the length of telomeres and repairing DNA lesions, on cells of patients with telomere malfunction. Lastly, **Clotilde Théry** (INSERM U932/Université de Paris) explores the extracellular vesicles released by the cells, which behave like messengers. Using a new method developed by her team, she can compare the functions of different sub-types of extracellular vesicles secreted by the tumor cells and immune cells.

The March 2019 signing an institutional partnership between Institut Curie and the Weizmann Institute of Science (*see p. 50*), saw the launch of two further PIC3i Tandem. **Alena Shkumatava** (CNRS UMR 3215/INSERM U934/Sorbonne University) is collaborating with Igor Ulitsky to explore the functions of long intergenic non-coding RNA (lincRNA). These lincRNA play a role in many diseases - including cancer - and could become a new source of therapeutic targets.

Cécile Sykes (CNRS UMR 168/Sorbonne University) is working with Sam Safran and Talila Volk to analyze distribution of the cellular chromatin, combining experiments, theory and simulation. Indeed, mechanical disturbances suffered by the cell nucleus may modify the organization of the chromatin, and thus the transcription of genes. Under the aegis of this partnership, travel grants have also been awarded to promote interaction with the teams from the Weizmann Institute of Science.

NEW TEAMS FOR NEW APPROACHES

In 2019, Institut Curie hired five teams devoted to innovative research topics, including four junior teams:

- **Hélène Salmon** won an international call for tenders to create the **Stroma and Immunity** Team within the Immunity and Cancer Unit (INSERM U932/Université de Paris) headed by Sebastian Amigorena. Since April 2019, her team has been working on the signal exchanges between stroma cells, the tissue supporting organs and tumors, and the immune cells. The team has received €1.5 million of fundings for the five upcoming years, awarded by the ARC Foundation, as part of its "Recruiting emerging leaders in oncology" grant program.

- **Pedro Hernández** set up the **Development and Homeostasis of Mucosal Tissues** Team within the Genetics and Developmental Biology Unit (CNRS UMR 3215/INSERM U934/Sorbonne University) headed by Pierre Léopold. This young Chilean researcher aims to understand the impact of immune response on the development, integrity and function of the mucous layers of tissues, such as the intestinal epithelium.

- **Yolanda Prezado** joined Institut Curie in the Signaling, Radiobiology and Cancer Unit (CNRS UMR 3347/INSERM U1021/Paris-Saclay University), headed by Simon Saule (*see p. 32*).

- **Florence Cavalli** was hired as junior team leader of the **Computational Biology and Integrative Genomics of**

Cancer Team in the Cancer and Genome: Bioinformatics, Biostatistics and Epidemiology Unit (INSERM U900/ Mines ParisTech) led by Emmanuel Barillot. Using a new technology known as Single Cell, she seeks to discover the reasons for recurrence of certain gliomas (brain cancers). She joined the Research Center in April 2020.

- **Pascal Hersen** arrived in Sept. 2019 at the head of the **Dynamic Control of Signaling and Gene Expression** Team. At the crossroads between biology and physics, his work is devoted to gene expression in cells in real time (cybergenetics) and in space.

APPOINTMENTS 2019

Newly appointed as a team leader during the summer of 2018, **Pierre Léopold** left the University of Nice to take over at the helm of the Genetics and Developmental Biology Unit (CNRS UMR 3215/INSERM U934/ Sorbonne University) on January 1, 2019. This specialist in growth physiology and nutrition took over from Edith Heard, professor at the Collège de France, who left to head up the European Molecular Biology Laboratory (EMBL) in Germany. As for **Antonin Morillon**, Head of the Non-coding RNA, Epigenetics and Genomes Fluidity Team in the Genetic Information Dynamics Unit (CNRS UMR 3244/Sorbonne University), took over from Arturo Londoño-Vallejo. His aim is to pursue projects that study mechanisms to maintain genome integrity. Valérie Borde became Assistant Director of the unit.

Franck Perez replaced Bruno Goud at the head of the Cell Biology and Cancer Unit (CNRS UMR 144/ Sorbonne University). The head of a junior team, which became permanent in 2014, and founder of two platforms, Franck Perez is very much involved in technological transfer and development. Renata Basto took over as Assistant Director of the unit. Lastly, **Pascal Hersen**, CNRS Director of Research in Biophysics, took over as Director of the Curie Physical Chemistry Laboratory (CNRS UMR 168/Sorbonne University) in September 2019, following an international search. He replaced Axel Buguin, acting Director of the unit following the sudden death of Maxime Dahan in 2018.

STATE-OF-THE-ART TECHNOLOGY PLATFORMS

To address the challenge of achieving breakthrough innovations, Institut Curie provides and develops technology platforms that are shared and accessible to the scientific community.



Institut Curie offers 18 platforms with an array of latest-generation tools. The Single Cell platform - created in 2018 - is developing and ramping up. 2019 gave an opportunity to present this innovative technique, dedicated to cancer and allowing the study of single cells, to our sponsors for the Une Jonquille pour Curie initiative, as well as to several donor groups. A new machine - the CellenOne - was added to the platform. It will be used to perform single-cell analysis using precious samples, where the cells are rare, such as biopsies.

Institut Curie decided to support the project to create two landmark basic research start-ups that will ultimately benefit patients: Mnemo Therapeutics and SideROS (*see p. 48*). 2019 was also marked by the inauguration of the new experimental radiobiology building (*see pp. 13 and 33*), which allowed preclinical activities to be carried out for the benefit of patients at the Orsay site.

A MULTIMODAL IMAGING CENTER IN THE PIPELINE

The Multimodal Imaging Center (MIC) was created on January 1, 2020, by its four supervisory bodies, Institut Curie, CNRS, INSERM and Paris-Saclay University, as service unit UMS 2016/US 43, headed by Frédéric Coquelle. The Research Center thus adds a new technological platform to the CurieCoreTech, which comprises Institut Curie's technological and translational research

platforms. The purpose of this service unit is to bring together imaging expertise (photon microscopy, electronic microscopy, ionic microscopy, image processing and analysis) to promote better integration and implementation of a site policy for Orsay. The MIC will help promote the originality and development of analytic imaging and electronic cryo-microscopy expertise (nanoSIMS, cryo-tomography, 3D multiplexing, etc.).

In memory of Maxime Dahan

On October 24 and 25, 2019, a two-day symposium paid tribute to the career and research of **Maxime Dahan**, Director of the Physical Chemistry Unit (CNRS UMR 168/ Sorbonne University) at Institut Curie between 2013 and 2018, and Head of the Light-Based Observation and Control of Cellular Organization Team. Over 25 researchers from many different countries were there to honor his memory and discuss his work. Following this event, the first **Maxime Dahan prize** was awarded to Robert H. Singer, a professor at the Albert Einstein College of Medicine in New York. This day was an opportunity to inaugurate the **Maxime Dahan Library** located in the Pavillon Curie.

Recognized for its oncological expertise geared towards multidisciplinary, translational research and clinical-research interactions, Institut Curie has been an integrated certified Comprehensive Cancer Center since 2018. This European accreditation celebrates the “research-care” continuum dear to Marie Curie.

Fatima Mehta-Grigoriou, Deputy Director of the Cancer, Heterogeneity, Instability and Plasticity Unit (INSERM U830/Université de Paris), and Prof. Yves Allory, Head of the Anatomopathology Department at Institut Curie's Saint-Cloud site.



OUR
PIONEERING SPIRIT

The Medical-Scientific Program in figures

2,113
patients included
in a clinical trial, for
2,433 patients screened

223
clinical trials
currently recruiting
(including 182 in adults
and 41 in children)

196
children included
in clinical trials, for
202 children screened

14.5%
rate of inclusion
in a clinical trial

1
Incentive and Collaborative
Program – interdisciplinary,
interdomain and/or interinstitutes
(PIC3i) Breast MSP

1
translational research department

3
translational research groups

1
INSERM team

4
SiRIC-certified teams

23
Institut Curie
clinical trials
currently recruiting

45
phase I and
I/II trials including
107 patients, for
157 patients screened

72
phase II and
II/III trials including
196 patients, for
346 patients screened

65
phase III trials
including 299 patients, for
400 patients screened

Notable Events 2019

Breast Cancer

Coordinated by Prof. Martine Piccart & Fatima Mechta Grigoriou

- 4th edition of the international Breast Cancer class: From Clinics to Biology. Stem cell biology, metastatic processes, diagnosis of breast cancers.
- PIC3i Breast, Elisabetta Marangoni (*see p. 31*).

Adult Sarcomas and Desmoid Tumors

Coordinated by Dr. Sylvie Bonvalot & Josh Waterfall

- Seven research projects in progress.
- ICGEX funding of €300,000 awarded for study of intratumoral diversity and the search for new molecular anomalies in sarcomas.
- Introduction of collaborations with teams from Institut Gustave-Roussy and Saint-Louis hospital.

Radiotherapy and Radiation Biology

Coordinated by Prof. Gilles Créhange & Marie Dutreix

- From Yolanda Prezado's SiRIC team at the Orsay site.
- Inauguration of the new experimental radiobiology building (*see p. 33*).
- Delivery and preparation of installation of the new eFlash 4000 irradiator (scheduled for August 2020), thanks to two subsidies from the Île-de-France (Paris) region. This equipment will help to develop new therapeutic protocols using flash methodology.

Epigenetics

Coordinated by Geneviève Almouzni & Céline Vallot

- Introduction of EpiProMeS seminars.
- Patent filing in progress.
- Confirmation of Curie Innov'Booster backing for the CENPREDICT project, the aim of which is to develop a biomarker capable of distinguishing advanced local cancers that are curable or not using first-line chemotherapy.

Uveal Melanoma

Coordinated by Prof. Nathalie Cassoux & Sergio Roman-Roman

- Launch of the COMUN project by Anne Brédart, which aims to facilitate communication between the patient with metastatic uveal melanoma and their physician.
- Financing for the Early Together project led by Sophie Piperno-Neumann (starting in 2020), which aims to assess the effect on patient quality of life of supportive care treatment at the start of treatment of metastases.

Urological Cancers

Coordinated by Prof. Yves Allory & François Radvanyi

- An ERC Proof of Concept subsidy granted for the work of Antonin Morillon (*see p. 26*).
- Five major publications on bladder cancer.

Immunotherapy

Coordinated by Sebastian Amigorena & Dr. Emanuela Romano

- More than 1,200 patients treated by the clinical immunology laboratory.
- More than 20 competitive grants obtained, representing over €6.4 million.
- Arrival of Hélène Salmon after her post-doctoral fellowship at Mount Sinai Hospital in New York, to set up her research team at Institut Curie (*see p. 22*).
- Creation of the start-up Mnemo Therapeutics led by Sebastian Amigorena (*see p. 48*).
- Five patents filed.

Lung Cancer

Coordinated by Prof. Nicolas Girard & Olivier Lantz

- Implementation of a translational and clinical research unit to facilitate interactions with the Curie-Montsouris Chest Institute. Over 22 collaborative projects in progress.
- Patient cohorts: over 1,200 patients currently undergoing treatment, 600 new patients suffering from advanced lung cancer and 400 new patients at an early stage.

Pediatric and Young Adult Cancers

Coordinated by Dr. Olivier Delattre & Prof. François Doz

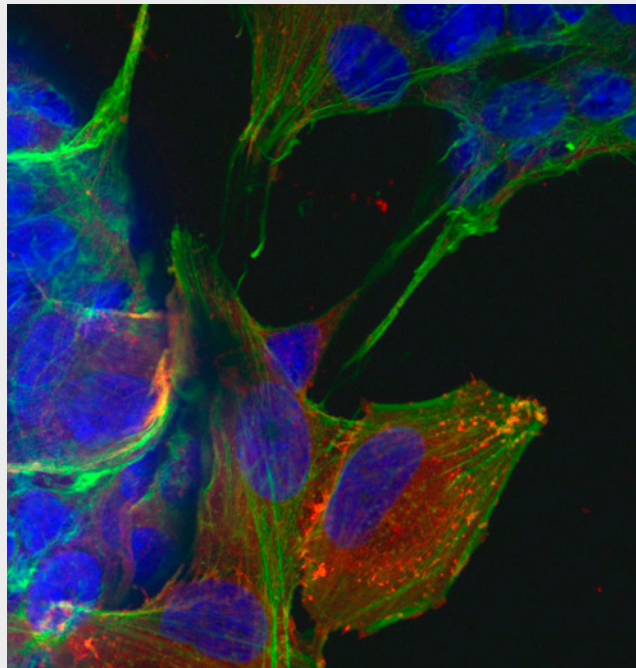
- First international class on adolescent and young adult sarcomas: from Biology to Clinics.
- Six industrial collaboration contracts introduced, and over a dozen consultancy contracts for participation of physicians and researchers from the pediatrics MSP on expert boards for major meetings: ASCO, AACR, ESMO, etc.
- More than 30 publications in high impact factor journals.

Early Trials

Coordinated by Prof. Christophe Le Tourneau & Prof. Aurélien Latouche

- PEVodata project & PEVOSQ trial (*see p. 31*).
- 22 publications in high impact factor journals.

Key achievements from 2019



AN INTERDISCIPLINARY PROJECT BACKED BY THE EUROPEAN RESEARCH COUNCIL (ERC)

Dr. Olivier Delattre, Director of the Cancer, Heterogeneity, Instability and Plasticity Unit (INSERM U830), Director of the SIREDO Oncology Center and Head of the Institut Curie's Cancer Genetic Department, obtained an ERC Synergy Grant for a project intended to unlock the mysteries of the signals between tumor cells and their environment before they become metastatic. The aim of this work is to establish new therapeutic strategies against cancer, with less significant side effects. This prestigious €9 million grant will help finance a collaborative project between Swedish and US researchers.



A URINE TEST TO DETECT PROSTATE CANCER

Head of the Non-coding RNA, Epigenetics and Fluidity of the Genome Team and Director of the Genetic Information Dynamics Unit (CNRS UMR 3244/Sorbonne University), Antonin Morillon was awarded an ERC Proof of Concept grant for his "Prostator" project. This funded project aims to demonstrate that an early prostate cancer diagnostic test is possible via detection in the urine of non-coding NRA specific to this disease. This test will help physicians make decisions and will avoid the prescription of a needless biopsy.

NANOPARTICLES AND RADIOTHERAPY: A PROMISING COMBINATION AGAINST CANCER

Dr. Sylvie Bonvalot was the principal investigator in a clinical trial to measure the effect of the use of NBTXR3 nanoparticles developed by the company Nanobiotix combined with radiotherapy for treatment of soft tissue sarcomas. The first results obtained from 176 patients showed that the NBTXR3 increased destruction of the tumor and did a better job of eliminating the cancerous cells surrounding the tumor, compared with radiotherapy alone, with no additional side effects.

The Lancet Oncology, July 2019



AN ANTI-INFLAMMATORY TO BE AVOIDED DURING CHEMOTHERAPY FOR BREAST CANCER

Dr. Anne-Sophie Hamy-Petit, physician and researcher in the Immunity and Cancer Unit (INSERM U932/ Université de Paris) headed by Sebastian Amigorena, discovered that combining neoadjuvant chemotherapy with Celecoxib – a medication from the family of anti-inflammatories used in certain rheumatological conditions – could harm the prognosis for women with breast cancer that does not express HER2. Celecoxib must therefore be avoided in patients undergoing chemotherapy.

Journal of Clinical Oncology, March 2019

The Medical-Scientific Program: **the link between research and care**

Institut Curie's Medical-Scientific Program (MSP) represents all the links between the Hospital Group and the Research Center. It strengthens the continuum between basic research, translational research, clinical research and care, thereby fostering innovation and advances in oncology.



Véronique Gillon,
Operational Director
of Research – Hospital
Group

"The majority – about 8 out of ten – program directors are physician-researchers, and they are all assisted by a program manager. These professionals are invaluable when it comes to coordinating teams and projects and sticking to the implementation schedule for EU projects."

The Medical-Scientific Program (MSP) is currently organized into research projects involving clinicians and researchers on ten topics. Coordination of the program was entrusted to Sergio Roman-Roman, the Head of the Translational Research Department (DRT), and to Véronique Gillon, Operational Director of Research at the Hospital Group. Prof. Alain Puisieux, Director of the Research Center, and Prof. Pierre Fumoleau, CEO of the Hospital Group, are tasked with overseeing Institut Curie's medical-scientific strategy. All of the MSP projects are being rolled out across Institut Curie's three sites in cooperation with university and hospital partners.

A NEW INTERDISCIPLINARY PROGRAM TO FIGHT BREAST CANCER

The Incentive and Collaborative Programs – interdisciplinary, interdomain and/or interinstitutes (PIC3i) are a remarkable illustration of the interactions between the basic research and translational research conducted at Institut Curie.

Elisabetta Marangoni (Preclinical Investigation Laboratory – PIL) following her response to a PIC3i Breast Cancer call for bids, secured funding in 2019 for her work in collaboration with teams from the Research Center and the Hospital Group, aimed at improving the treatment of so-called triple-negative breast cancer. Over 50% of

patients with this type of cancer treated with chemotherapy still have tumor residues after surgery, which increases the risk of metastatic growth. Elisabetta Marangoni and her teams are therefore going to test the effectiveness of various additional medications, including targeted therapies according to the tumor's genome profile, on residual tumors in patients after chemotherapy, and identify predictive biomarkers of response to treatment. The results of this work could improve personalized therapy for triple-negative cancer.

A EUROPEAN COLLABORATION COMBINING CLINICAL TRIALS WITH DATA

In 2019, Institut Curie kicked off the European PEVOdata project to identify new therapeutic options for patients affected by squamous cell carcinoma recurring in several locations (ENT area, lung, cervix, etc.).

The PEVOdata project aims to assess the combination of immunotherapy and a medication targeting epigenetics, to study the predictive biomarkers for the response to treatment and to develop an algorithmic tool to make it easier to include patients in the appropriate clinical trials. Coordinated by Institut Curie, this innovative project will involve French, Luxemburgish, German, Italian and Hungarian researchers for three years. It was funded to the amount of €1.6 million by the ERA Net-ERA PerMed

European Fund and the French National Research Agency (ANR). PEVOdata will be conducted by Prof. Christophe Le Tourneau and Maud Kamal from the Department of Drug Development and Innovation (D3i) and by Xosé Fernández and Julien Guérin from the Data Division. The project will help gather a large amount of clinical and biological data that will ultimately benefit many patients.

COMMUNICATIONS FOR UVEAL MELANOMA

2019 saw the second annual summit where patients with uveal melanoma and their friends and families could meet researchers and physicians from Institut Curie to learn about innovations in the field and how their biological samples are being put to work. Dr. Manuel Rodrigues, an oncologist and breast cancer researcher from the team of Marc-Henri Stern (INSERM 830/ Université de Paris), along with staff from Institut Curie and other research laboratories, succeeded in producing the genomic description of metastatic spread of uveal

melanoma. They showed that when the MBD4 protein is present the genome remains stable, whereas when MBD4 is absent there is a wide genetic diversity and new “pilot” mutations appear. This work was published in the journal *Clinical Cancer Research* in 2019.

INNOVATIVE APPROACHES FOR RADIOTHERAPY

In 2019, Yolanda Prezado joined Institut Curie in the Signaling, Radiobiology and Cancer Unit (CNRS UMR 3347/INSERM U1021/Paris Saclay University), headed by Simon Saule as well as the Translational Research Department, led by Sergio Roman-Roman. With her SiRIC-certified New Approaches in Radiotherapy Team, and thanks to a European Research Council (ERC) grant, she is focusing on developing methods of dosal spatial fractioning to reduce the side effects of radiotherapy. She tested these new technologies (proton mini-beam radiotherapy – pMBRT) on tumors resistant to radiotherapy, such as certain gliomas; the results were promising.



Congratulations!

**Bruno Goud, Nicolas Carpi,
Dr. Delphine Hequet**
Prix Curie

Samar Alsafadi
Women in Cancer Research Award

Prof. François-Clément Bidard
Ruban Rose Avenir Prize

Dr. Manuel Rodrigues
Charles Oberling Thesis Award

THE IMMUNOTHERAPY CANCER CENTER AT THE HEART OF START-UP CREATION PROJECTS

In 2019, the dynamic of the Immunotherapy Cancer Center – a major component of the Medical-Scientific Program – was consolidated by the incubation of projects to create start-ups or accelerate newly created start-ups based on work by Institut Curie researchers.

Mnemo Therapeutics, founded by Sebastian Amigorena, Director of the Immunity and Cancer Unit (INSERM U932/ Université de Paris), opened in January. The company uses epigenetics to create targeted immuno-oncological treatments. Another company, based on the work of Eliane Piaggio, head of the Translational Immunotherapy Team (INSERM U932/ Université de Paris) was incubated during 2019, and is called **Egle Therapeutics**. The company’s ambition is to become a leading force in research and development of treatments in oncology and auto-immune diseases. Lastly, efforts to accelerate the development of **Honing Biosciences**, founded by Franck Perez, Director of the Cell Biology and Cancer Unit (CNRS UMR 144/Sorbonne University) continued. The aim is to carry out ambitious fund-raising to implement the company’s projects in order to develop and improve cellular therapies, in particular for cancer and other chronic diseases. Start-ups from Institut Curie are supported by a dedicated team (*see p. 48*).

MEDICAL TIME-SHARING

Medical time-sharing is a system allowing clinicians to take part in research projects during their clinical time. In 2019, funding of €1 million from donations supported twelve physicians, enabling them to devote themselves to research. Dr. Sarah Watson, a physician-researcher in oncology, is able to develop her project on the molecular characteristics of pediatric and adult sarcomas, thanks to medical time-sharing. Dr. Delphine Hequet will also conduct a projet on the surgical phase in the overall treatment of breast cancer.

INAUGURATION OF THE EXPERIMENTAL RADIOBIOLOGY BUILDING

The **experimental radiobiology building** was inaugurated in 2019 at the Orsay site (*see pp. 13 and 23*). By strengthening the collaborations between scientists and radiotherapists, it provides new opportunities for research and innovation in radiotherapy for cancer patients. Among the programs that will be conducted there, the Theradnet project coordinated by the University of Zürich (Switzerland) for doctoral training in therapeutic radiation, involving Marie Dutreix, Head of the Recombination, Repair and Cancer Team, alongside Celio Pouponnot, Co-Lead of the Signaling and Cancer Progression Team (CNRS UMR 3347/INSERM U1021/Paris Saclay University).



Sergio Roman-Roman,
Head of the
Translational Research
Department – Research
Center

The Translational Research Department is like a catalyst: it brings doctors and researchers together to accelerate the transition from basic research discoveries to clinical applications.”

Institut Curie greets over 50,000 patients each year. At the core of its hospital strategy: the evolution of care pathways, the development of regional partnerships and the strengthening of ties between the city and the hospital to promote equitable, innovative and high-quality cancer care.

Juliette Bihoreau, a nurse in the Department of Clinical Research at Institut Curie's Paris site and R., her patient.



OUR
HUMANITY

The Hospital Group in figures

955 health professionals, including
418 state-certified nurses
(including IP, IADE and IBODE certifications)
111 nursing aides (including AP)
365 physicians (including 13 university
professors/clinical practitioners PU-PH)

335 PhD students, master's students,
residents and hospital students
in training

191
nursing students

2,181
employees

208
different
professions

392
administrative
staff

49
nationalities

129,439 office visits, including
5,414 genetics consultations

59,473 day hospital stays

181,201 stays, including
168,968 in outpatient care
12,233 in conventional hospital

5 days: average period of hospitalization

49,544
chemotherapy
treatments performed

18,286
surgical
procedures

7,911
outpatient
surgery stays

109,974
radiotherapy
sessions

56,610 patients, including **11,591** new patients

408 foreign and oversea patients from **72** different nationalities

16,511

patients currently receiving treatment, of which **75%** are women and **25%** are men

757
for an **eye** tumor



7,457
for **breast** cancer

1,020
for cancer of
the **respiratory system**



802
for **digestive** cancer

124
for cancer of
the **thyroid**



908
for **gynecological** cancer

112
for cancer of
the **urinary tract**



713
for **blood** or
bone marrow cancer

669
for cancer of
the **male genitalia**



422
for **skin** cancer

422
for a **sarcoma**
or **complex tumor**



79
for cancer of
the **central nervous system**

522
for **ENT** cancer



559
for a **pediatric tumor**

985 patients treated for a benign tumor, including **9** children



Key achievements from 2019



INSTITUT CURIE ACQUIRED THE 1ST HALCYON RADIOTHERAPY ACCELERATOR IN THE REGION OF ÎLE-DE-FRANCE

Halcyon, the very latest radiotherapy machine sold by the manufacturer Varian, was commissioned at the Hospital Group's Paris site on June 13, 2019. More modern, more powerful and more ergonomic, the device offers all the most advanced features, including intensity modulation, 2D and 3D image guiding and volume irradiation, to better treat a wide variety of tumors. Halcyon is the latest addition to a radiotherapy healthcare and research offering that's unique in Europe, and inaugurates the roll-out of a multi-year plan to modernize equipment at Institut Curie within the framework of an agreement with Varian.



A SYSTEMATIC BLOOD TEST BEFORE CHEMOTHERAPY TO SCREEN FOR DPD DEFICIENCY

In France, fluoropyrimidine is widely prescribed for its effective treatment of solid tumors (digestive, breast, ENT). However, this chemotherapy may cause severe toxicity in patients with deficiency of an enzyme – dihydropyrimidine dehydrogenase (DPD) – which prevents the body from properly eliminating the medication. Since July 1, 2019, Institut Curie has been able to screen for partial or total DPD deficiency in patients before any chemotherapy via fluoropyrimidine using a simple blood test. Clinicians can thus adapt doses to reduce the risks of toxicity in the patients in question.

SIX INSTITUT CURIE RESEARCH PROJECTS FUNDED

The French Ministry for Health awarded nearly €4 million to Institut Curie to allow it to conduct six oncology research projects as part of the Cancer Plan 2014-2019 recommendations.

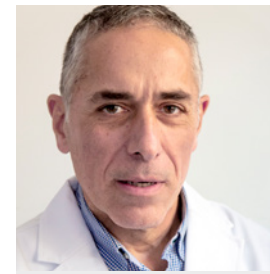
Proposals from four oncology research hospital programs (PHRC-K) were selected by the French National Cancer Institute (INCa). The funding obtained will enable Dr. Anne Tardivon and Isabelle Fromantin to test the effectiveness of the detection of breast cancer at an early stage using sniffer dogs specially trained to recognize volatile compounds secreted by the skin when there is a breast tumor¹. Three studies aiming to improve treatment of cancers and/or reduce the impact for patients will also be conducted. Dr. Carole Soussain's team will assess the relevance of a new strategy for treatment of primitive lymphoma of the central nervous system using a combination of medications comprising targeted therapies². The teams of Dr. Isabelle Aerts (Pediatrics) and Dr. Livia Lumbroso-Le Rouic (Ophthalmology) will compare two intra-arterial chemotherapy strategies for conservative treatment of retinoblastoma and will track the visual function of children treated by traditional chemotherapy³. Lastly, Dr. Aline Albi-Feldzer will measure the effectiveness of a new anesthetic technique for reducing patients' pain after breast surgery⁴.

Two interventional public health research programs (RISP) have also been financed. They will serve to assess the effects of two Hospital Group programs: the therapeutic education for the patient (TEP) program DECLIC, which aims to help patients better manage chronic pain related to cancer and its treatment, led by Dr. Évelyne Renault-Tessier, and the palliative care day hospital whose purpose is to improve the experience of patients in advanced phase as well as their loved ones (HDJ-SPI), led by Dr. Carole Bouleuc.

1. KDOG01: *Transcutaneous screening for breast cancer by sniffer dogs.*
2. LOC-R01: *Randomized phase IB/II study with escalation of lenalidomide and ibrutinib dose combined with the R-MPV in first-line targeted induction treatment for patients ages 18 to 60 with primitive lymphoma of the central nervous system.*
3. RETINO18-01 - *Conservative treatments of retinoblastoma: effectiveness of new strategies and visual result.*
4. MIRs 04: *Randomized, multi-center, double blind clinical trial, assessing the effect of interpectoral (Pecs 1 and 2) nerve block using ropivacaine versus placebo on acute pain after cancer surgery of the breast.*

The Hospital Group building the future together

Each year, the Hospital Group builds on its expertise and improves its healthcare offering. To ensure the best care for its patients, it commits to seeking out collaboration with other hospitals and diversifying its treatment activity. Institut Curie introduced teleconsultations in 2019, and patients and patient experiences remain central to its work – now more than ever.



Prof. Fabrice Lecuru,
surgeon and
Gynecology Unit Head
at the Paris site

"It's very exciting to join such a wonderful institution to develop an oncology research project and a team with whom it will be great to work with."

SURGICAL ACTIVITY IS DEVELOPING AND EXPANDING

In 2019, surgical activity at the Hospital Group increased and continued to diversify with the development of ENT and gynecological surgery.

In Paris, Prof. Fabrice Lecuru joined Institut Curie. He brings with him his renowned expertise in gynecological oncology surgery, in particular for advanced ovarian cancer surgeries or for remedial procedures for recurring cervical or uterine cancer. His arrival consolidates Institut Curie's activity in gynecological surgery and research, especially given his work on the sentinel lymph node in cervical cancer. His aim is to develop clinical and translational research.

At Saint-Cloud, the gynecological surgery activity remains strong and its reputation is growing with the team's increased attendance at national multidisciplinary consultation meetings (MCM) for rare gynecological cancers and the complex treatments, addressed by specialists.

The ENT Department headed by Dr. Olivier Choussy, working on Paris and Saint-Cloud sites, has also seen its surgical activity expand, in particular for complex surgery of the oral cavity, the pharynx, the larynx and the thyroid, with complex reconstructions. This development was stimulated by collaborations with ENT teams from the Institut Arthur Vennes and the Centre de santé du square de la Mutualité in Paris, as well as the Évreux Hospital (Eure-Seine hospital center).

THE SHIFT TO TELECONSULTATION

In 2018 the Hospital Group decided to innovate by offering its patients the benefits of teleconsultations. Following feasibility and validation studies and tests, a pilot phase for introduction of teleconsultation began in June 2019.

The Oncogenetics Department, the Interdisciplinary Support Care Department in Oncology (DISSPO) as well as the Ophthalmology, Oncogenetics and Hematology Departments, were the first to introduce this new system offering a consultation complementary to the in-person consultation, enabling patients to avoid needless travel and wait times while maintaining a connection with their healthcare team.

Around ten physicians carried out some fifty teleconsultations.

Reactions reported by patients were very positive, particularly in terms of the time saved and the comfort of being at home. The quality of the consultation was also found

NEW HOSPITAL COLLABORATIONS

According to its policy of engagement as per its Institutional project 2015-2020, in 2019 Institut Curie signed agreements to form a Healthcare Cooperation Groups (HCG) with the Institut Mutualiste Montsouris (IMM) in Paris and Institut Godinot, a Cancer Center in Reims.

- The Curie-Montsouris HCG consolidates and institutionalizes a long-term partnership between the two organizations in terms of care, with the creation of the Chest Institute in 2017 and a coordinated course of treatment for patients with metastases in the bone in 2018. This represents an opportunity to develop innovative care networks in tandem.
- The Curie-Godinot HCG promotes access to therapeutic innovation, development of new care pathway synergies and structuring of special training courses for the entire population of the Champagne-Ardenne - South Aisne region.

In 2019, Institut Curie also strengthened ties with the Gaston-Bourret Regional Hospital Center in Noumea, New Caledonia. In September, a team centered around Prof. Fabien Reyal, Head of the Department of Breast, Gynecological and Reconstructive Surgery, paid a visit to carry out breast reconstructions, train teams in new techniques and inform women suffering with cancer.



Dr. Sandra Malak,
Hematologist,
Head of Patient Pathway
Optimization

Patients appreciated the opportunity to see their doctor in the comfort of their own home, a familiar and reassuring place."

to be completely satisfactory for Institut Curie's doctors and nurses. Support from technical departments, sharing of experience between health professionals and with patients enabled the Hospital Group to adopt this new tool wisely. Great care was taken in choosing the right technical solution. The conclusions of the pilot phase enabled the Hospital Group to be operational for the roll-out of teleconsultations during the COVID-19 pandemic in 2020.

Additionally, in 2019, Institut Curie introduced online appointment scheduling via Doctolib and provided personalized information and medical reports for patients through the MyCurie patient portal.

FROM INFORMED PATIENTS TO EXPERT PATIENTS

Oncology treatment is changing, as patients increasingly wish to be more involved in their healthcare choices. The Hospital Group is supporting this demand by structuring its therapeutic education for the patient (TEP) offering and developing the Partner Patient project.

Several TEP programs were already in place at the Hospital Group, including Tactic for patients undergoing oral anticancer treatments and DECLIC for patients with chronic pain.

In 2019, the Transversal Patient Educational Therapy Unit (UTEP) was created to harmonize Institut Curie's TEP practices and include the education offer along with the healthcare offering. Headed up by Claire Llambrich-Molines, advanced practice nurse, and Dr. Evelyne Renault-Tessier,

algologist, the UTEP offered workshops throughout 2019 attended by patients and a dedicated facilitator on various topics related to the cancer experience: pain, side effects, self-care, diet, adjustment to change, role of caregivers, etc. The TEP also provided support to development of the activity of "partner patients", who are individuals authorized, due to the skills acquired from the clinical team, to share their experience with caregivers and patients.



Dr Sylvie Arnaud,
Director of Treatment
at the Hospital Group,
Head of the Partner
Patient project

Changes in the treatment of cancer and the involvement of patients mean that we are building the future together."

Headed by Dr. Sylvie Arnaud, Institut Curie's Partner Patient project aims to develop collaborations between healthcare professionals and patients in building care and healthcare pathways. In 2019 it was audited to create a team of representatives from associations, and there was a call for applicants for renewal of the patient committee and preparation of a recurring program to train staff in the "patient experience." Now an expert patient attends the training of all new hires in the healthcare team, and Prof. Dominique Stoppa-Lyonnet has included a patient expert in her oncogenetics university diploma.

Through 2019 the Partner Patient project was rolled out in Jordan with an Institut Curie Patient Expert Master Class at the King Hussein Cancer Center in Amman (see p. 51).

SIREDO: A LEADING ONCOLOGY CENTER FOR YOUNG PATIENTS

Since 2017, the teams at the SIREDO Oncology Center (Care, Innovation & Research in Childhood, Adolescent and Young-Adult Oncology) at Institut Curie, led by Dr. Olivier Delattre, Dr. Gudrun Schleiermacher and Prof. François Doz, provide top-notch care to children, adolescents and young adults suffering from cancer. SIREDO also organizes connections between basic, translational and clinical research to benefit young patients. Today it is one of the leaders in pediatric oncology at the national and European level.

In 2019, SIREDO treated 360 patients under the age of 25, of whom 43% were under the age of 5, suffering mainly from retinoblastoma, sarcoma, neuroblastoma and brain tumors. In March, SIREDO and the Early Clinical Trials and Innovation Department (D3i) at Institut Curie, headed by Prof. Christophe Le Tourneau, were CLIP² certified (certified early phase centers) by INCa for five years. This certification will facilitate the provision of new molecules from pharmaceutical laboratories to young patients at Institut Curie.

In October, the Adolescents and Young Adults Unit received a visit from Angelina Jolie – film maker and humanitarian – who spent a long time with young patients and their families, and paid tribute to the staff present.

I really felt the close relationship that the physician and researcher teams have with patients and their families, who are fighting cancer with so much love and kindness."
Angelina Jolie



By joining forces with top centers in France and overseas, by pursuing a dynamic industrial partnership policy and by disseminating knowledge and practices, Institut Curie improves our understanding of the mechanisms involved in cancer, as well as treatment of patients on a daily basis. This engagement remains the hallmark of Institut Curie.

PhD student at Institut Curie.



OUR
ENGAGEMENT

Transmission of knowledge: interdisciplinary and international

The dissemination of knowledge - one of the three missions of Institut Curie - must evolve in line with the new challenges in teaching, in the university landscape, in oncology research and care, but also with the expectations of those involved. In 2019, Institut Curie continued to expand its offering and enhance its training methods.

Since it was created, Institut Curie has trained researchers and health professionals. It welcomes master's students, PhD students and post-doctoral researchers, students in medicine and nursing, but also interns in medicine and other healthcare and medical/technical professions. The classes taught at Institut Curie do not lead to standalone diplomas or certificates, but form an integral part of the curriculum at our partner institutions.

EURECA*, A NEW INTERNATIONAL DOCTORAL PROGRAM

In 2019, Institut Curie obtained a second funding package from the European Commission – Cofund DP in the amount of €3.2 million – for its new EuReCa (Europe, Research & Care) doctoral program. This is based on the IC3i interdisciplinary, intersector, and international program that enabled us to recruit 34 PhD students at the Research Center between 2016 and 2018. Including the previous European funding package, Institut Curie will

have received almost €6 million in joint funding, making it the leading French beneficiary of this type of funding.

The aim of EuReCa is to offer outstanding multidisciplinary and intersectoral teaching in cancer research and to generate scientific knowledge in a variety of fields, including biology, chemistry and physics. By attracting talented and promising young researchers, Institut Curie's ambition is to build a multidisciplinary community able to interact, build and share its expertise to meet the challenges of cancer research.

Cofund will help increase the number of PhD students welcomed to Institut Curie and recruit 39 PhD students in three years. The first international call for applications began in late November 2019.

Developing skills for their careers

In 2019, 19 classes were made available to all Institut Curie employees on a variety of topics such as new imaging and bio-informatics techniques, writing scientific publications, interview preparation and scientific integrity.

* This project has received funding from the Horizon 2020 Research and Innovation Program implemented by the European Union, as part of the Marie Skłodowska-Curie Grant Agreement No. 847718. Institut Curie, in addition to the DEEP, Cell (n)Scale (formerly CellTisPhyBio) and DC-Biol outstanding laboratories (LabEx) also made this project possible through their respective contributions.



INTERNATIONAL CLASSES GIVEN BY EMINENT SPECIALISTS

In collaboration with researchers and physicians, Institut Curie organizes international classes given by world-renowned specialists for master's students, PhD students and post-doctoral researchers, who often help with the organization (a major experience at the start of their career), as well as for young physicians currently studying a specialty or beginning to practice oncology-related professions. Most of these classes are approved as European university modules and give ECTS (European Credit Transfer and Accumulation System) credits. In 2019, 13 very challenging scientific classes were organized.

WELCOMING INTERNATIONAL PHYSICIANS AND NEW TRAINING AVENUES

The Hospital Group welcomes international students and physicians as interns to train in oncology alongside seasoned specialists and researchers motivated by the progress of cancer care. Participants can receive an immersive theoretical/practical training in one of its 11 departments, and attend a number of seminars.

In 2019, over 100 candidates from 41 different nationalities applied to the program, and 50 have already completed the training.

In September 2019 a contract was signed with a new provider – Invinox – whose platform will enable the Hospital Group, together with the Training Unit, to organize medical training courses on specialized technical procedures, face-to-face and online.

Testimony from PhD students

Doing your PhD in one of the world's most prestigious cancer research centers gives you the opportunity to work with top researchers and physicians, train in advanced technologies, and conduct world-class research projects."

Daniel Ming-Kang Lee

I feel very involved in my team at Institut Curie thanks to the IC3i program that provides both scientific and moral support through professional development training and research-related activities. The IC3i program allows me to enjoy this international and multidisciplinary environment with its internationally-renowned scientific excellence."

Anne-Céline Derrien

PhD students have access to a huge number of seminars and classes to help us build a solid career development plan. The IC3i program has also given me the chance to have this wonderful cultural experience with colleagues from all over the world, organize seminars and lectures and speak in public."

Silvia Benito-Martinez

By allowing me to write my thesis in a research team, the MD-PhD funding program offered by Institut Curie has given me the unique opportunity to work alongside world-class scientists and develop a translational research project in its entirety."

Pierre Romero

Industrial development and partnerships

Since 2016, Institut Curie has had an ambitious strategy for the development of research and partnerships with companies that innovate in oncology. In 2019 it reported the very positive results achieved by promoting innovation and interdisciplinarity, but also by strengthening interactions between research and care.

For the past three years, Institut Curie has optimized its strategy for detecting innovative ideas and bringing them to maturity, and has established a policy for the creation of start-ups based on its technologies. Through its Institut Carnot Curie Cancer certification, it has been able to establish partnerships with companies with global reach in important areas such as immunotherapy, pediatric oncology and artificial intelligence. In 2019, Institut Curie made a commitment to further developing innovation in strategic fields (epigenetics, medical devices, chemistry, healthcare), to strengthening industrial clinical research and to investing in its support of new start-ups.

The Industrial Development and Partnerships Department (DVPI),

headed by Amaury Martin is a team of 15 people working to detect, develop, protect and market researchers' inventions, but also to provide support for start-up creation and coordination of Institut Curie's industrial partnerships. In 2019, Jérémie Weber was hired as manager of the Industrial Partnerships and Start-up divisions within the DVPI. Find out more about Institut Curie's development-related expertise and news, as well as a list of patents seeking partnerships at techtransfer.institut-curie.org

In 2019, the number of collaborations involving Institut Curie rose to record levels, reflecting Institut Curie's growing importance in the socio-economic sphere.

Recognizing the excellence of the work done at the Research Center, manufacturers invested in the teams' ability to convert their discoveries into products useful to clinicians and to patients. Industrial clinical trials proliferated, thereby giving patients greater chances to benefit from effective treatments at the earliest stage. Lastly, two start-ups were created this year, Mnemo Therapeutics ("new-generation" CAR-T cells for treating solid tumors) and SideROS (targeting cancerous stem cells using ironomycin).

SOME PARTNERSHIPS INTRODUCED IN 2019 BY INSTITUT CURIE

February: a partnership with Bioderma leads to the opening of a skin care and study center at the day hospital on the Paris site, to offer patients treatments and advice to reduce skin toxicity related to cancer treatments.

March: renewal of the partnership with the Institut de Recherche Pierre Fabre (IRPF) to identify new therapeutic strategies in immuno-oncology. Molecular targets likely to modulate immunity involved in the control of cancer development will be explored.



Amaury Martin,
Director of Industrial
Development and
Partnerships and
Director of the Institut
Carnot Curie Cancer

"As it seeks to identify, promote and develop all scientific, technological and medical resources in an open innovation approach, Institut Curie becomes a leading player in the transfer of oncology technologies."

April: first partnership with a small French company that develops innovative anticancer molecules as part of the CHICHE! program (CHallenge the Instituts Carnot in cHemistry and hEalth! – CHallengez les Instituts Carnot en cHimie et santE!) for very small/small/medium-sized companies that innovate in health, as part of the FINDMED consortium.

May: collaboration with Predilife for the launch of the new generation of MammoRisk®, a test to predict the risk of breast cancer giving a polygenic score (calculation of high risk associated with the combination of genome variations) using a saliva sample.

May: start of an artificial intelligence (AI) project with LEO Pharma to identify risk factors for thrombosis in patients suffering from cancer, with the aim of improving prevention of these accidents.

Institut Carnot Curie Cancer

The Carnot certification is a recognition of excellence awarded to academic research organizations whose quality and involvement in partnership-based research have been demonstrated. Certified since 2011, Institut Carnot Curie Cancer offers industrial partners the opportunity to implement research collaborations utilizing the expertise of Institut Curie's research teams to develop innovative solutions for cancer, from therapeutic target to clinical approval.

20
new projects in development

30
newly announced inventions

579
active patents from 159 families

21
start-ups created,
100% of them still operating

Almost
€11 M
in worldwide income generated

93
new R&D collaboration contracts signed
(+33% compared with 2018)
for almost €7.5 million
(+15% compared with 2018)

CONGRATULATIONS!

- The NEOVIVA project involving Institut Curie and Transgene, HaliDX and Traaser has been selected by the Future Investment Program (PIA – subsidies granted by the French government). Its aim is to develop an industry for the individualized anticancer vaccine myvac™.

- Two start-ups from Institut Curie were certified by PSL Tech Seed for joint funding by Bpifrance in 2019: Honing Biosciences (secretion of cells – medications for cellular therapy) and Skiagenics (biomarkers and genome signatures for diagnosis and prognosis of cancers).

- Among the winners of the 21st edition of the national i-Lab competition designed to support the creation of innovative technological companies are two start-ups from Institut Curie: Honing Biosciences and SideROS.

Beyond borders

With its international reach and engagement with abroad, Institut Curie has been stepping up its international activities since 2016. It has been developing its facilities for foreign patients, its international partnerships in the fields of teaching, healthcare and research, and its commitment to humanitarian actions.

AN INTERNATIONAL PATIENT POPULATION THAT'S WELL-INFORMED, WELCOMED AND SUPPORTED

Institut Curie strives to meet the needs of foreign patients and treat them in the same way as French patients. The web platform international.patient.curie.fr is their gateway. In 2019, 1,221 international patients created an account on the platform to request assistance from Institut Curie; 408 were admitted to hospital for treatment of their cancer and 118 received a second opinion with no need to travel.

International patients all receive a review of their records in a multidisciplinary consultation meeting (MCM) and also receive a report. The experts at Institut Curie can confirm whether or not their treatment in their own country is appropriate, suggest a more suitable alternative or offer treatment at Institut Curie. In the latter case, patients are supported before, during and after their treatment. Institut Curie's international relations division offers help with their administrative formalities or day-to-day difficulties, and helps with their transport and accommodation so that they can focus on their treatment program.

HUMANITARIAN ACTION: A RETINOBLASTOMA PROGRAM IN AFRICA

Prof. Pierre Bey, former Director of the Hospital Group, with Dr. Laurence Desjardins, is the linchpin of Institut Curie's humanitarian commitment. "We live in a world of privilege and we work in a privileged institute. We have to give back some of what we have been given to help underserved populations," he reminds us. Institut Curie's main humanitarian action in 2019 involves a program spanning 2019 to 2028 on retinoblastoma (eye cancer in young children) in sub-Saharan Africa. The International Network for Cancer Treatment and Research (AMCC) is coordinating this project with the Franco-African Pediatric Oncology Group (GFAOP) and with the backing of Institut Curie, the world leader in the diagnosis and treatment of these ophthalmological cancers.

Expanded collaboration with the Weizmann Institute of Science

In March 2019, the Weizmann Institute of Science (in Rehovot, Israel) and Institut Curie signed a partnership to formalize a long-term collaboration in biophysics. These two research centers can now work more closely on advanced scientific subjects such as mobility of cellular populations, structure and activity of cell nuclei, neuron networks and DNA breakage. Their progress provides unique knowledge on how living organisms function and helps establish new approaches to fighting cancer. This partnership has led to three Incentive and Collaborative Programs – interdisciplinary, interdomain and/or interinstitutes (PIC3i) in tandem between the two research centers, as well as travel grants to promote interaction between the teams (see p. 22).

PARTNERSHIPS ALL OVER THE WORLD

In 2019, Institut Curie developed international collaborations in Africa, the Middle East, Europe, Asia and South America.

EUROPE

Institut Curie was approached by the Papageorgiou University Hospital in Thessaloniki, Greece, for a training in palliative care. It performed a needs assessment and offered an initial training on pain treatment on site.

ASIA

Institut Curie signed a partnership agreement with Vietnam's National Cancer Institute. In 2019, Institut Curie was invited to celebrate the 50th anniversary of the National Institute in Hanoi, and the discussions intensified. The meetings led to two new projects, namely support for creation of a clinical research department and support for radiotherapy modernization.

SOUTH AMERICA

An agreement was signed with the AC Camargo Cancer Center in São Paulo, Brazil. Institut Curie trained its first Brazilian doctors. A three-year collaborative program was founded.

MIDDLE EAST

The King Hussein Cancer Center in Amman, Jordan, introduced a cooperation program with Institut Curie, with two major outcomes: A Partner Patient Master Class under the auspices of the ESA Executive Education - ESA Business School in Beirut, Lebanon (see p. 43), and a Palliative Care Master Class. The Notre-Dame-des-Secours university hospital center in Lebanon signed a cooperation agreement with Institut Curie, paving the way for training programs and shared projects.

AFRICA

Institut Curie was commissioned by the AFD (French Development Agency) to carry out the feasibility study for an oncology care improvement project in Tanzania, with a budget of €10 million awarded to the Aga Khan Foundation. Institut Curie oversaw the choices made in healthcare organization and prevention and diagnostic campaigns. Kenya and Tanzania also continued with their palliative care training program. Lastly, in Morocco, the Cheikh Khalifa university hospital in Casablanca signed a cooperation agreement with Institut Curie further to the partnership with the Lalla Salma Foundation. The Mohammed VI Foundation, which insures more than 5 million Moroccans, forged ties with Institut Curie to provide its partners suffering from cancer with the best response to their needs.

Since it was founded, Institut Curie has been at the forefront of the fight against cancer. This fight takes place not only on the workbenches in the labs and at patients' bedsides, but also throughout society; it is economic, social, political, ethical, legal and international. Since Marie Curie, the women and men who make up Institut Curie take up this fight daily on all fronts.

P., Institut Curie patient at the launch of the Une Jonquille pour Curie event.



OUR
COMMITMENT

Generosity: an essential tool in the fight against cancer

As a private foundation with public utility status, Institut Curie is authorized to receive donations and bequests. Each year, the generosity of individual, corporate and association donors enables researchers and physicians to accelerate their research programs and their medical innovations for the benefit of patients.

In 2019, Institut Curie was supported by donations from 218,000 donors to provide care and conduct research against cancer. A total of €32.5 million was donated to Institut Curie through one-off donations, commitment to regular donations via automatic monthly direct debit, or by sponsorship. Some donors demonstrate their deep devotion by naming Institut Curie in their will: this year Institut Curie received €24.7 million in bequests, a tremendous boost to the institute's battle against cancer. Institut Curie expresses its deepest gratitude to these benefactors. In June 2019, the Nelly Riguët amphitheater was inaugurated in the memory of this donor, who left an extraordinary bequest to Institut Curie in 2015.

DONATIONS: A DRIVER OF RESEARCH AGAINST CANCER

Thanks to the generosity of our donors, 86 research teams and 18 technology platforms received support throughout the year. They all serve one aim: continued progress and a sustained level of excellence that benefits every patient.

In 2019, six new Incentive and Collaborative Programs – interdisciplinary, interdomain and/or interinstitutes (PIC3i) were funded through public donations. Designed to encourage the emergence of innovative research programs, these PIC3i promote discussions between scientists from different disciplines (biologists, physicists, chemists, geneticists, bioinformatics specialists, etc.) and physicians.

These programs allow them to work together to develop innovative projects and validate new concepts for fighting cancer.

MEDICAL INNOVATION, A PRIORITY SUPPORTED BY DONORS

The support of donors gives Institut Curie the means to accelerate medical innovation and provide patients with state-of-the-art treatments.

Institut Curie's strength lies in the close collaborations between its physicians and its researchers. Fully funded by private generosity, the unique "physician-researcher" program has enabled 28 physicians and health professionals to conduct research projects. Based on a clinical observation, with the help of the teams from the Research Center, they were able to explore potential responses, solutions and new treatments to cure even more patients.

Dr. Claire Alapetite, a radiotherapist, conducted research on the evaluation of immunomodulation combined with radiotherapy to treat brain tumors in children.

Dr. Guillaume Bataillon, a pathologist, conducted his research project on the contribution of artificial intelligence to the analysis of slides of breast and gynecological tumors to establish new prognostic and predictive factors in the response to treatment.

€57.2 M
from public donations
and bequests

218,000
active donors



90
acts of generosity
in France

49
partners-patrons

ACTS OF GENEROSITY: ASSOCIATIONS GETTING INVOLVED

Over 90 acts of generosity involving hundreds of volunteers throughout France lent their support to Institut Curie in 2019.

In 2019, the Courir pour Mathieu organization, which has worked alongside Institut Curie for 13 years, organized the latest edition of Courir pour Curie, a fun and family-friendly sponsored race in Mareil-Marly. Led by Laurence Evrard and a team of volunteers, since 2007 the association has raised €360,000 to assist Dr. Olivier Delattre's teams fund research into childhood cancer.

A loyal partner to Institut Curie since 2012, the Princesse Margot association supports research in pediatric oncology and is involved in the running of hospital departments that welcome young patients with cancer by organizing sharing sessions, workshops and events to improve their well-being. In 2019 it helped finance a virtual reality headset for children, broadcasting the content of their choice. This device helps medical teams carry out MRIs stress-free or avoid anesthesia.

The association also supports the CombinaiR3 study, a phase II clinical trial on Ewing tumors conducted by Dr. Valérie Laurence, head of the Adolescents and Young Adults Unit.

Events 2019: solidarity and commitment

March: Une Jonquille pour Curie

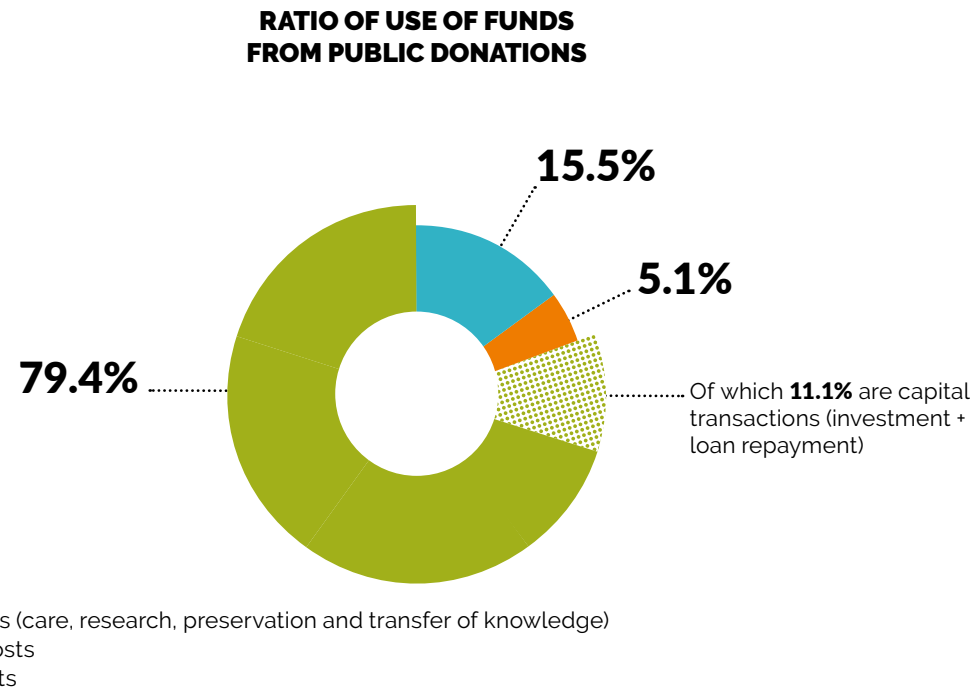
The 15th edition of this national awareness and fundraising campaign saw a wave of generosity spread throughout France. Volunteers, celebrities, donors, but also a number of associations and local authorities, banded together to provide hope against cancer. Through their support and that of institutional partners, companies, shopping malls and media, Institut Curie raised €630,000 to support its basic research, the first essential step in the emergence of new treatment strategies.

October: Golf Open

As part of the Octobre Rose event, and in partnership with the Joyenal Golf Club, Institut Curie organized its 2nd Golf Open with teams from 16 companies committed to supporting the fight against breast cancer. The €100,000 raised helped to fund an innovative clinical trial for women affected by breast cancer.

November: "Course des Lumières" night run

7,500 walkers and runners—a record number—turned out to light up the night against cancer at Place de l'Hôtel-de-Ville in Paris. This inclusive sporting event helped raise €220,000 for research and medical innovation conducted at Institut Curie.



SUPPORT BEYOND OUR BORDERS

Reflecting its international reach, Institut Curie also receives donations from other countries. In 2019, donors and foundations the world over rallied to support Institut Curie:

- **The private foundation Chercher et Trouver in Switzerland**, which since 2015 has supported basic research into understanding tumoral and metastatic mechanisms, particularly in lung cancer, to identify new therapeutic targets.
- **The private Annenberg Foundation (USA)**, which since 2011 has supported the pediatric oncology translational research laboratory, directed by Dr. Gudrun Schleiermacher. A commitment motivated by the “urgency and importance of finding new treatments and providing new hope for children affected by this disease, as well as for their families.”

Institut Curie is deeply grateful to its foreign partners; their support is essential for development of its research projects.

Its gratitude also extends to its partner philanthropic institutions, which collaborate on an international scale to encourage these cross-border donations: The King Baudouin Foundation United States (KBFUS) and the Transnational Giving Europe (TGE) network.

OUR MAJOR DONORS STEPPED UP

In 2019, a number of donors subject to the French real estate wealth tax (IFI) chose to use their taxes to serve the fight against cancer alongside Institut Curie. We'd like to thank them for their confidence and their loyalty. They helped to fund major cancer research programs such as the European PEVodata project, a clinical trial coordinated by Institut Curie which combines epigenetics, immunology and data to care for patients with recurring cancer.

THE MC²¹ CAMPAIGN TO BEAT CANCER

In 2017, 15 heads of major companies, philanthropists, and CEOs met as a committee to launch the MC²¹ Campaign, a fundraising campaign for Institut Curie. Its aim is to help fund four scientific projects in Institut Curie's fields of expertise, through support from major private and corporate donors and foundations. In basic research, the MC²¹ Campaign supports two research projects that attempt to rise to a major challenge in the field of oncology: understanding and fighting the cancerous cells' ability to adapt, which is the cause of resistance to treatment and formation of metastases.



In pediatric oncology, the campaign supports the construction of France's first integrated pediatric oncology platform. Lastly, in the areas of innovation and digital technology, it supports Institut Curie in the development and use of big data in oncology.

This support is crucial to allow Institut Curie to accelerate discoveries and its discoveries and developments in the major areas of oncology, and give it the means to move forward in what will perhaps be the home stretch towards its goal of beating cancer.

CORPORATE PARTNERSHIP AND PATRONAGE: A DRIVER OF INNOVATION

In 2019, Institut Curie was supported by the commitment of companies to develop ambitious projects for the benefit of patients:

- **Swiss Life** renewed its support with Une Jonquille pour Curie, by rallying all of its teams and its distributions networks. With €118,000 raised, Swiss Life remains the top contributor for the event.
- **Mutuelle Bleue**, a loyal and generous patron of Institut Curie, supported socio-esthetic care at the Saint-Cloud hospital for the 3rd consecutive year, and provided electric cars for travel to the operating room and audio headsets for children hospitalized in its departments.

- **Monoprix** made a commitment for the 2nd edition of International Women's Day alongside Institut Curie by creating a capsule collection to benefit an innovative breast cancer research project. In parallel, the brand implemented a “keep the change” campaign in all of its stores, raising more than 620,000 euros.

Salary round-up: in 2019, 11 companies offered their employees this method of supporting the fight against cancer: it was meaningful for the employees and valuable for the continuity of donations that it provides to Institut Curie.

Institut Curie, a citizen committed to the fight against cancer

Loyal to the heritage of Marie Curie, Institut Curie is a citizen that fights to defend scientific and medical innovation as well as equality of access to healthcare.

INSTITUT CURIE - VIAVOICE CANCER OBSERVATORY: INEQUITIES IN CANCER

As part of the 7th Cancer Observatory survey in 2019, Institut Curie addressed the issue of inequity in cancer, which 69% of the respondents to the survey attributed to income level and place of residence.

They are convinced that these inequalities are diverse and that they will grow as time goes by, particularly in terms of access to innovative treatment. These inequalities appear in two areas:

- on the one hand, they are related to the medical experience and to treatment: access to screening, proximity of specialized care centers, access to innovative treatments,
- on the other hand, they are related to individual situations and preexisting disparities between individuals, such as place of residence, income, isolation, level of knowledge or information.

Even though inequalities in cancer outcomes are felt by a large majority of people, the overall perceptions of the disease, and particularly how it progresses and how likely someone is to recover, can in itself create discrepancies. Although six out of ten people believe that

52% of French people state that they don't have adequate information about screening, prevention and treatment of cancer

cancer is a disease with increasingly good outcomes, the rest of the population is more muted on the subject: 28% think that the proportion of patients who recover will remain stable, and 7% of them believe that recovery chances will decrease. Similarly, one of the important lessons learned from the study is that inequalities in cancer outcomes continue in the post-cancer phase. Indeed, the impact of the disease on personal and professional lives does not disappear once treatments stop. The physical and psychological suffering persists: 63.5% of people suffer from the after-effects of cancer or the treatments, and these affect the most vulnerable populations. These populations are therefore at greater risk since the ordeal of cancer further jeopardizes their situation.

Methodology

The 2019 survey was conducted online by the Viavoice Institute for Institut Curie from May 13th to 17th, 2019, among a representative national sample of 1,002 French residents aged 18 and over, and more. The quota method was used to ensure that the sample was representative.

65% of French people feel they are poorly informed about the risk factors concerning work-related cancers



Prof. Thierry Phillip, Chairman of the Executive Board of Institut Curie

The results from the Observatory show that inequalities are a major issue for our fellow citizens, certain aspects of which are well understood whereas others still require further information (including prevention and the cancer-work connection), and are legitimate causes for concern (access to care and courses of treatment)."

INSTITUT CURIE, PARTNER OF THE FIRST CANCER PRIDE

In April 2019, the first edition of Cancer Pride, organized by the nonprofit organization Makesense, was held in Paris. The event included a walk for solidarity, an activity village, concerts and testimonials... aiming to give a voice to expression on the societal aspects of cancer and to deliver advice to facilitate the everyday lives of cancer sufferers. The general public, patients and their loved ones and health professionals were invited to share their cancer stories. Institut Curie was an official partner of the event and set up an information booth on the topic "Taking care of your health after cancer" to raise awareness about the importance of taking care of yourself during and after treatments, and maintaining a balanced and appropriate diet.

The criteria used by French people to assess whether a treatment facility is effective in treating cancer

60% quality of equipment (advanced technologies and equipment)

27% geographic accessibility

49% information given by their doctor

24% its ranking in the media

7 out of 10 French people believe that inequalities in cancer outcomes exist

The inequalities in cancer are perceived through **4 factors**

49% income

45% place of residence

42% the level of information on the subject

39% the fact of being alone or isolated

Source: all figures on this double page come from the Institut Curie - Viavoice Cancer Observatory 2019: inequalities in cancer outcomes.

The Curie Museum lies at the heart of the history of the family with five Nobel prizes

The Curie Museum is a place where knowledge is created and shared for everyone's benefit. Its project ensures continuity of its three main missions: preservation (conservation and management of collections), research (study and development of assets) and communication (cultural action and scientific mediation).

Located in the last laboratory used by Marie Curie, the Curie Museum (CNRS UMS 6425) features a permanent exhibition space and a historic resource center. It offers the general public a chance to discover the history of the Curie family, of radioactivity and of its first applications. 2019 saw record numbers of visitors to the Curie Museum: over 20,000 visitors, a considerable number given that the museum is so small (100 m²).

CULTURAL ACTIVITIES AND EVENTS: AT THE CROSSROADS OF SCIENCE, HISTORY AND ART

The United Nations General Assembly declared 2019 "International Year of the Periodic Table of the Chemical Elements" (IYPT 2019). The discovery of new radioactive chemical elements at the dawn of the 20th century has been marked yearly during the history of the Curie Museum. Several events were IYPT 2019-certified and new activities took place during the year. Note the first public representation at the European Heritage Days of *Anciupocio ou le destin de Mania*, a theatrical piece about Marie Curie by Ambre Reynaud, and the performance of "flash visits" led by the Curie Museum team for the European Night of Museums. For the first time in 2019, concerts were held, and a musical show – *Mam'zelle Radium* – was created to mark the Fête de la musique.



Among the other museum events in 2019 were the signing of a partnership with the Société française de radioprotection (SFRP), but also visits from several foreign delegations (23 different nationalities), political figures (Cédric Villani, member of French Parliament), scientists (Prof. Kohei Tamao, chairman of the executive committee of IYPT 2019) and artists (the actress Angelina Jolie and the visual artist Prune Nourry), as well as an evening organized to mark the donation of Dr. François Baclesse's diary to the museum.

MANAGEMENT AND DEVELOPMENT OF THE CURIE MUSEUM COLLECTIONS

• Conservation and prevention

In 2019, the museum undertook a major process of preparing and inventorying all its objects and furniture and then testing them for radioactivity. The results achieved will help to further knowledge on objects hitherto unknown or not well known, and provide recommendations for conservation and decontamination of the radioactive material. A cultural assets safeguarding plan for the museum was written in 2019, and has yet to be finalized with the parties concerned (security team, fire service, etc.).

• New acquisitions

Several acquisitions enhanced the Curie Museum collections in 2019. The grandchildren of Dr. François Baclesse donated two notebooks written between 1939 and 1965. These unique documents will provide invaluable additional historic knowledge about the Fondation Curie.

History and today's technologies: digital mediation

The Curie Museum obtained a subsidy from the Regional Cultural Affairs Bureau (DRAC) for the production of an animated short on the Curie method (lamethodecurie.fr). This will help to educate the public about the scientific equipment the Curies used and help them better understand their research on radioactivity. Several virtual exhibitions in the Curie Museum have been adapted as part of the partnership with Google Cultural Institute: *Once Upon a Try: stories of inventions and discoveries* (launched in March 2019 on Google Arts & Culture).

The website musee.curie.fr was redesigned with two new features: multilingual content and a reservation calendar.



20,259
visitors

282
requests received and processed by the Historic Resources Department: information, digital reproduction of archives, document searches, appraisals, article proofreading...

1,987
photographs digitized

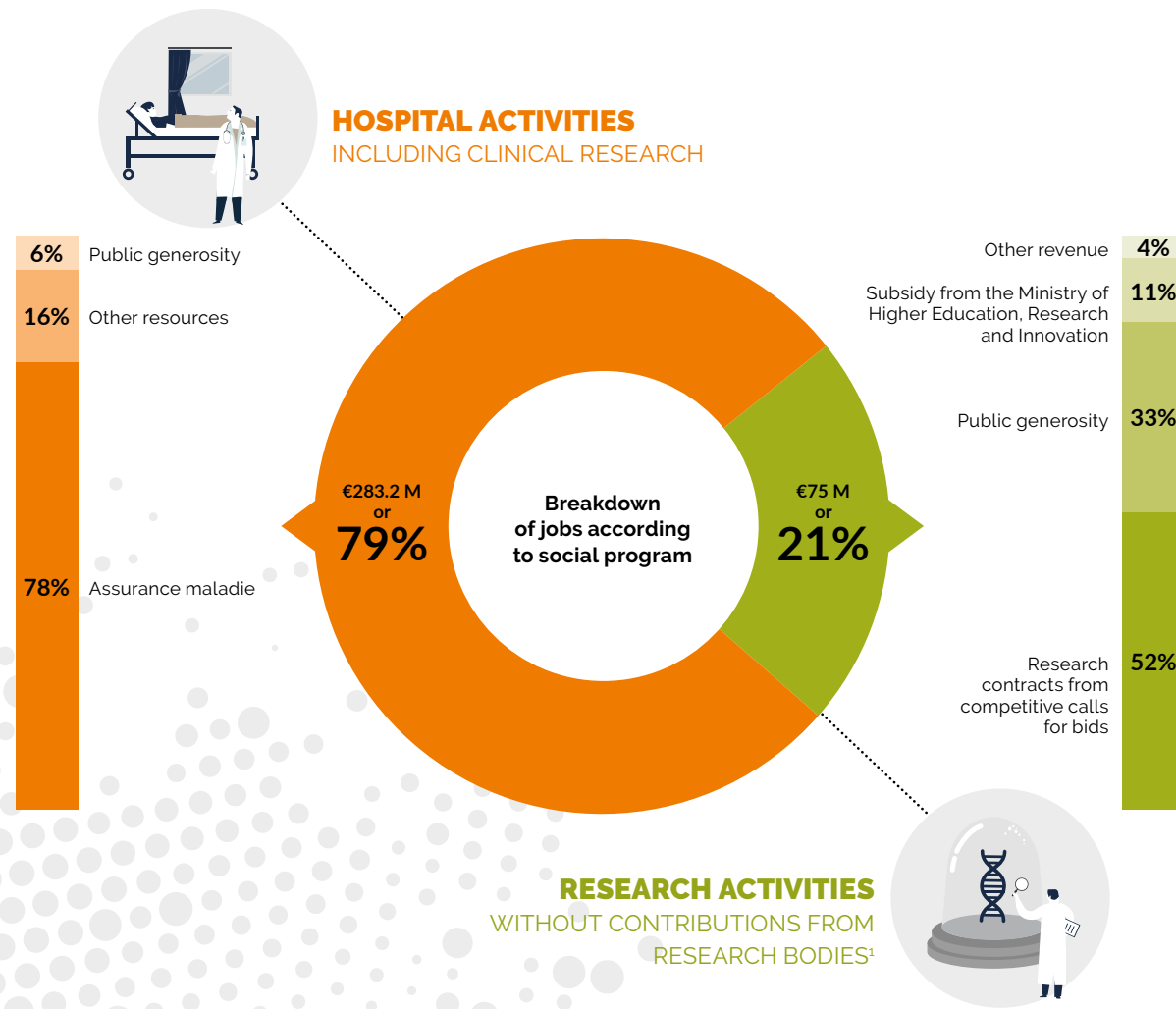
150
visits with commentary from Museum employees

More than 1,300,000
sessions recorded on the website musee.curie.fr.

Our economic model

Public funds play an important role in the funding of Institut Curie, but public donations and bequests also ensure its independence and are a driver of innovation to accelerate discoveries to benefit patients.

RESOURCES AND JOBS ACCORDING TO SOCIAL PROGRAM



1. In 2019, research bodies (CNRS, INSERM and universities) made staff, operating and investment contributions estimated at €32.2 million not included in the above data. With these contributions included, the economic value of Institut Curie's activities rises to €390.3 million.

THE HOSPITAL GROUP'S RESOURCES

- Assurance maladie (the French health insurance fund), as an institution of private care in the public interest, through pricing per activity (T2A), the contribution to the programs of general interest and contracting assistance.
- Billing treatments to patients without national health insurance, copays, and daily flat rates (without patients with national health insurance having out-of-pocket costs).
- Industrial players, CEOs, charity organizations, and public or semi-public organizations for clinical research and innovation.
- Public generosity (donations and bequests).

THE RESEARCH CENTER'S RESOURCES

- Research bodies (CNRS, INSERM, Universities): part of staff costs, operating costs or investment costs.
- Annual subsidy from the Ministry of Higher Education, Research and Innovation.
- Public and quasi-public funding in response to calls for bids: Agence Nationale de la Recherche (ANR), Institut National du Cancer (INCa), Île-de-France regional council, European Research Council (ERC) and Private European Commission: patrons, charity organizations (Ligue contre le Cancer, Fondation ARC pour la recherche contre le cancer, Fondation pour la Recherche Médicale, etc.).

- Industrial players for licenses, collaborations and partnerships.
- Public generosity (donations and bequests).

THE HEAD OFFICE'S RESOURCES

- Financial assets related to Institut Curie's cash resources. Maintaining a certain cash resource threshold allows Institut Curie to finance its support and administrative services, limiting the use of public donations.
- Public donations and the CNRS finance the Curie Museum, one of the foundation's social programs.
- Development income.
- Income related to international consulting business.
- Income related to use of the "Curie" name.

ASSET MANAGEMENT

INTANGIBLE ASSETS

Institut Curie owns a brand portfolio and a patent portfolio. The patent portfolio helps protect inventions that stem from research carried out within the Foundation. These assets cannot be capitalized in the balance sheet. The operating rights attached to the patents are granted to third parties (manufacturers, biotechnology companies) through the granting of operating licenses.

REAL ESTATE ASSETS

Institut Curie owns the buildings on the three sites in Paris, Orsay, and Saint-Cloud where its social programs are carried out. Additional premises are leased to accommodate tertiary business. Institut Curie owns no investment property.

OTHER FIXED ASSETS

Institut Curie is owner, in most cases, of the property required for its activities, including most frequently for heavy equipment for treatment and research. As an exception, four radiotherapy machines were rented and two imaging machines were leased.

FINANCIAL ASSETS

Comprising a portfolio of investment securities, they aim to secure Institut Curie for the long-term while annually deriving resources to shore up its general interest programs. Their management is governed by a reference framework updated in late 2018 following the introduction of Institut Curie's new bylaws. In accordance with the general principles of prudence, a broad diversification of the types of income and investment supports is systematically sought. The investment portfolio is managed by the Executive Board, which comprises a financial commission tasked with tracking investments and making recommendations. Medium- or long-term asset management is assigned to service providers selected from calls for bids. Cash resources management remains internal. The socially responsible investment policy recently introduced will continue, along with real estate diversification carried out through real estate investment trust shares. An annual review of financial management as well as information about investment and management strategies including information about any associated risk, will be submitted yearly for approval by the Supervisory Board.





**Thank you to our
218,000 donors**

THANK YOU TO OUR PARTNERS-PATRONS 2019

Allianz	Fondation L'OCCITANE	Moneta Asset Management
Anthony Garçon	Fondation Swiss Life	Monoprix
AZ Déco	Galeries Lafayette	MSD Avenir
Aubay	GCC	Mutuelle Bleue
Axa Atout Cœur	Groupe Entis Mutuelles	MGEN
Banque Populaire Rives de Paris	Groupe Open	Newrest
Bigot Fleurs	Groupe Pomona	Nuxe
Bioderma	I-Tracing	Pause Fruitée
BG Ingénieurs Conseils	Ingenico Group	Red Hat
Carrément Fleurs	InVivo group	Royal Canin
Casino	Klépierre	Simmons & Simmons
CEW	Malakoff Humanis	Société Générale
CF&R (Compagnie des Fromages & RichesMonts)	La Grande Récré pour l'Enfance	Spie batignolles
CNP Assurances	Le Bon Marché	Suravenir
CybStores	Le Majordome des Lieux de Vie	Truffaut
Éditions Francis Lefebvre	Links Road SAS	V Publications
	Matmut	

THANK YOU TO OUR MC²¹ CAMPAIGN DONORS

CAMPAIGN COMMITTEE MEMBERS

Frédéric Donnedieu de Vabres
Chairman
Philippe Louis-Dreyfus
Honorary Chairman
Laure Baume
Yohann Benard
Anne-Christine Champion
Dominique Hériard Dubreuil
Jean-Marie Fabre
Gérard Hauser
Carlos Heyaca
Bruno Julien-Laferrière
John Mangan
Philippe Marien
Charles Robinet-Duffo
Jérôme Roncoroni
Alain Thibault

DONORS TO THE CAMPAIGN

Cécile Bonnefond
Monsieur et Madame Jean Cassegrain
Michel Clair
Monsieur et Madame Philippe Dischamp
Gilbert Giorgi
Patrick de Giovanni
Jean-Jacques Lestrade
Pierre Pâris
Evelyne Rumpler
Florence Verzelen

CORPORATE PATRONS OF THE CAMPAIGN

Banque Transatlantique
Bessé
Bristol-Myers Squibb
Bouygues
Caravelle
Derichebourg
Groupe Gagneraud
Longchamp
MCS
Vivendi

THANK YOU TO OUR INSTITUTIONAL PARTNERS AND SUPERVISORY BODIES

Agence régionale de santé (ARS)	Unicancer	Université PSL
Assistance publique – Hôpitaux de Paris (AP-HP)	INSERM – French Institute of Health and Medical Research	Université de Paris
CNRS – French National Centre for Scientific Research	Institut Pasteur	Sorbonne University
European Commission	Ministry of Higher Education, Research and Innovation	Paris Saclay University
The French National Cancer Institute (INCa)	Ministry of Solidarity and Health	City of Orsay
		City of Paris
		City of Saint-Cloud

COMMUNICATIONS DEPARTMENT

Cover photo: **Laurie Menger**, researcher in the CD4+ T Lymphocytes, Innate Lymphoid Cells and Cancer Team (INSERM U932/Université de Paris).
Photo Credit: @ Institut Curie: Uriel Chantraine, Manon Matias, Pedro Lombardi, Alexandre Lescure, Thibaut Voisin / @ Francesca Tortorelli, Marie Dumont, Camille Simon, Rémy Kusters, Cécile Sykes, Cécile Thirant, Cécile Pierre-Eugène, Isabelle Janoueix-Lerosey, Olivier Delattre / @ Charlotte Abramow / @ Adobe Stock.

Design and Production: Tom&Fred – **Production:** tcgraphite.

Printed using plant-based ink on paper from sustainably-managed forests, compliant with ecological standards.

Follow us on:

institut_curie  Institut Curie  Institut Curie  Institut Curie  Institut_curie 

26, rue d'Ulm, 75248 Paris Cedex 05, France
Tel.: +33 (0)1 56 24 55 00


institut
Curie