2016

Annual report

institutCurie

Together, let's beat cancer.

institut-curie.org

History

1891

Marie Curie leaves Poland for Paris to study physics.

1909

Creation of the Institut du Radium, on the initiative of Institut Pasteur and the University of Paris.

1921

Marie Curie, accompanied by her two daughters Irène and Ève, takes a triumphant trip to the United States. President Warren G. Harding officially presents Marie Curie with 1 gram of radium, provided through the generosity of American women.

1935

Nobel Prize in chemistry awarded to Irène and Frédéric Joliot-Curie.

1995

Opening of a cellular biology division.

1903 and 1911

Pierre and Marie Curie receive the Nobel Prize for physics in 1903.

Marie Curie receives a second Nobel Prize in 1911 for chemistry. She remains the only woman to have won two Nobel Prizes.

1920

Creation of the Curie Foundation.

1925

Albert Einstein and Marie Curie go walking on the banks of Lake Geneva in Switzerland.

1977

Opening of the Pediatrics department.

2015

Launch of the MC[21] strategic plan - for Marie Curie 21st century - . This project is inspired by the model created by Marie Curie in 1909: gathering researchers and physicians together to bring new medications to patients as quickly as possible.

Contents

"Nothing in life is to be feared, it is only to be understood."

Marie Curie

COMMUNICATIONS DEPARTMENT – JULY 2017

Photo credit: - For Institut Curie: Éric Bouvet, Uriel Chantraine, Christophe Hargouès, Nicolas Krief, Alexandre Lescure, Pedro Lombardi, Noak/Le Bar Floréal, Benoit Rajau, Thibault Voisin, Philippe Chavrier – Philippe Massol – Philippe Montcourrier – CNRS, Franck Perez – CNRS, Édith Heard – Marie Clémot, Floris Bosveld, José-Arturo Londoño – CNRS, Damien Gerald – Fatima Mechta-Grigoriou – Institut Pasteur – Inserm, Laurence Desjardins – Livia Lumbroso – Christine Levy DR – ACJC Sacha Lenormans/Musée Curie – Florence Levillain Signatures

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Joint interview

“Our project can be summed up in one word: engagement.”

Prof. Thierry Philip, MD
President of Institut Curie

The President of Institut Curie, the director of the Research Center, and the directors of the Hospital Group take a look back at 2016, which was marked by the launch of the MC[21] strategic plan. It is all about engagement, both nationally and internationally.

“The international dimension of the Research Center gains in momentum as attested by the multinationality represented at all levels and disciplines in our research units. We have welcomed a new round of international PhDs, postdocs and young PIs. Our success in international programs nurtured through ERCs and other selective European H2020 initiatives provide opportunities to advance our research in many areas: uveal melanoma, neurodegenerative diseases…
In 2016, the final meeting of EpiGeneSys, a European network of excellence bridging systems biology and epigenetics, has laid the ground for future initiatives such as EpiGene2Sys and applications for 4DNucleome.
Finally, as part of the EU-Life alliance that brings together 13 European centers in life sciences, we wish to confirm our European engagement for an active open science respecting gender balance and diversity.

Geneviève Almouzni, PhD
Director of the Research Center

“In 2016 we also pursued our international development, welcoming more foreign patients. Furthermore, many of our physicians contribute their know-how as volunteers in Africa, to help train healthcare teams.
In China, they are developing consulting activities for the construction of hospitals, support for the quality strategy and implementation of proton beam therapy and deploying teaching and training with the creation of a Franco-Chinese oncology school.”

Laurence Desjardins, MD
Director of the Paris site of the Hospital Group

How would you describe 2016?

Thierry Philip : 2016 saw the continued implementation of the MC[21] strategic plan. In terms of the medico-scientific program, studies were launched at the Cancer Immunotherapy Center, discussions on breast cancer continued with the international leader Martine Piccart, MD-PhD, and our Scientific Advisory Board validated ophthalmology and pediatrics projects, which have resulted in a proposal for a pediatric center based on the model of the Immunotherapy Center.

How would you sum up the MC[21] institutional project?

Thierry Philip : If I were to give just one word, I would say “engagement.” We have a powerful desire to see Institut Curie engaged with its environment, working within a network and sharing its skills.

How does Institut Curie see its national and international partnership policy?

Thierry Philip : Since its founding, Institut Curie has by definition been a very open, engaged institution. This national and international dimension has continued to grow. Institut Curie is a member of the Organization of European Cancer Institutes (OECI). At European level, the hospital works in conjunction with the European Organization for Research and Treatment of Cancer (EORTC) and European scholarly societies to help disseminate medical know-how and skills. Regarding the Research Center, it has developed a rich network of international relations and is a member of the EU-Life network, which brings together 13 European centers of excellence.


1

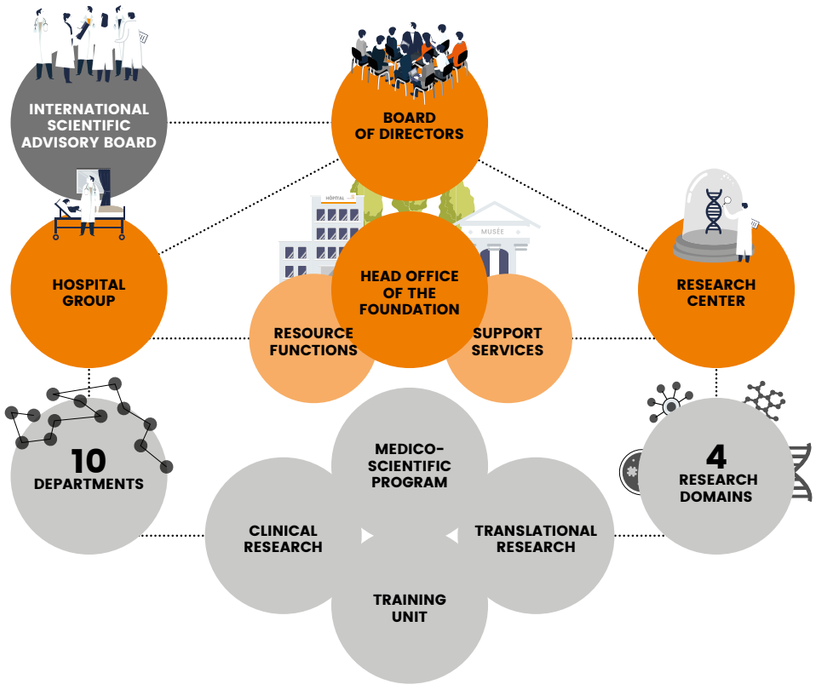

2

1. Prof. Roman Rouzier, MD-PhD
Director of the Saint-Cloud site of the Hospital Group

2. Rémi Dendale, MD
Director of the Orsay site of the Hospital Group

About us

A leading player in the fight against cancer, Institut Curie brings together an internationally-renowned Research Center and an advanced Hospital Group that provides care for all types of cancers – including the rarest forms. Founded in 1909 by Marie Curie, Institut Curie comprises three sites (Paris, Saint-Cloud and Orsay), where more than 3,400 members of staff are dedicated to achieving three objectives: hospital care, scientific research, and the sharing of knowledge and the preserving of legacy. As a private foundation that is recognised as serving the public interest, Institut Curie is supported by donations and grants. This support is used to fund discoveries that will improve treatments and the quality of life of cancer patients. Institut Curie's 2015-2020 strategic plan was directly inspired by the model invented by Marie Curie in 1909 aimed at bringing researchers and physicians together to find new treatments for cancer patients.



CURIE MUSEUM: HISTORY HAS A DATE WITH THE PRESENT

The Curie Museum brings the Institut and its important figures to life. Visitors get to see Marie Curie's office work tools, and to feel her thought processes and passions. It places this birthplace of the fight against cancer within its current context, and offers up its documents and the rich history of its past to researchers, historians and designers wishing to draw inspiration. It also conducts its own research projects in human sciences, history and sociology. Each year, it strives to retain the interest of visitors by holding temporary exhibitions in the museum's garden and on the railings in front of the Institut. In 2016, the "Paillasses et blouses blanches" exhibition thus offered a retrospective in images of a century of research.

Our Scientific Advisory Board

The Scientific Advisory Board comprises researchers of international stature along with physician-scientists in oncology from worldwide renowned institutions. Our institute benefits from their advice for our scientific strategy. Prof. Iain Mattaj is chairman of the Scientific Advisory Board until 2020.

Prof. Iain Mattaj
Chairman of the Scientific Advisory Board
General director of EMBL - Heidelberg, Germany

Prof. Ian F. Tannock
Vice-chairman of the Scientific Advisory Board
Ontario Cancer Institute / Princess Margaret Hospital - Toronto, Canada

Prof. Anton Berns
Sr.Group Leader at The Netherlands Cancer Institute - Amsterdam, Netherlands

Prof. Pascale Cossart
Institut Pasteur, Secrétaire perpétuelle of the Académie des sciences - Paris, France

Prof. Denis Duboule
Director of the Genetics and Evolution department, University of Geneva Ecole Polytechnique Fédérale - Lausanne, Switzerland

Prof. Alain Fischer
Chair of experimental medicine, Collège de France, Inserm, Paris Descartes University, Necker Hospital - Paris, France

Prof. Eileen E.M. Furlong
Head of the Genome biology unit, EMBL - Heidelberg, Germany

Prof. Stanley B. Kaye
Head of the Medicine section at the Institute of Cancer Research and unit director at the Royal Marsden Hospital - Sutton, UK

Prof. William Gillies McKenna
Head of the Oncology department at Oxford University, UK

Prof. Paul Nurse
President of the Royal Society and chief executive, UK Centre for Medical Research and Innovation (UK CMRI) - London, UK; Nobel Prize 2001 in Medicine

Prof. Thomas Tursz
University of Paris XI, Honorary chief executive of Gustave Roussy - Villejuif, France

Prof. Ronald D. Vale
Head of the Cellular and Molecular Pharmacology department - University of California - San Francisco, USA

Prof. Marc Van de Vijver
Head of the Pathology department, Academic Medical Center - Amsterdam, Netherlands

Key figures

3,400
employees

742
students (PhDs, master students, residents, hospital students)

122
foreign PhDs out of a total of 254, including 12 from 9 countries as part of the IC-3i program (for international, interdisciplinary and intersectoral), **co-funded by the H2020 program of the European Union**

200
foreign postdocs out of a total of 298

19
ERC grants underway (31 since the creation of these highly competitive grants) **including four obtained in 2016: ERC + PoC**

1
start-up expanded

777
publications in peer-reviewed journals

12
patents filed in 2016 for a total portfolio of
491

12
mixed research units

€335 M
operating income

Amount of resources coming from private donations:

Private donations **€27.3 M**

Bequests **€22.4 M**

200,000
active donors

70
R&D partnership contracts with companies for an amount of €4.2 million

79
nationalities represented

16
technology platforms

Curie CORE TECH

10
high-priority medico-scientific programs

51,486
patients, including 9,807 new patients

332
patients outside France and its overseas territories

1,431
patients included in a clinical trial

190
clinical trials (150 in adults and 40 in children)

13,210
visitors to the Curie Museum

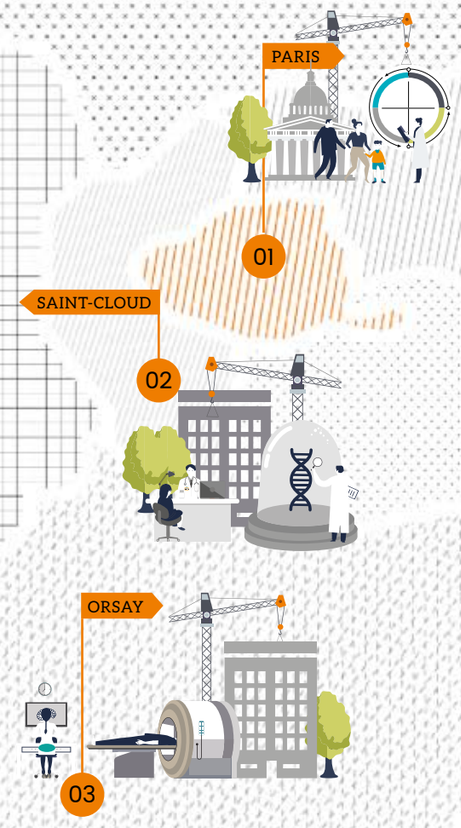
MC[21], becoming the Comprehensive Cancer Center

Building the *Comprehensive Cancer Center* of the future

Pulling out the stops so that all patients can look forward to a future after cancer is the aim of the MC[21] - for Marie Curie 21st century - project. To be led by Institut Curie until 2021, this project is inspired by the model created by Marie Curie in 1909: gathering researchers and physicians together to bring new medications to patients as quickly as possible.

Inventing and implementing new care organizations, assisting the transition to out-patient medicine, and improved coordination between medical practices and hospitals, ensuring patient well-being and helping physicians and researchers to work together on shared projects. These goals require the appropriate premises and flexibility to anticipate future changes.

MC[21]: our project for the future is taking place on three sites
2016 progress report



01 AT PARIS

SYSTEMIC BIOLOGY AND OVERALL CARE OF THE PATIENT

Number 1 Cancer Hospital in Paris
First Immunotherapy Cancer Center in Paris
Number 1 Paris Diagnostic & Theranostic Platform
900 researchers and physician-scientists

→ Opening the first Cancer Immunotherapy Center

→ With 10 operating rooms designed according to a new, entirely integrated model, the center becomes a benchmark for operating suites

→ Modernizing the hospital to adapt to new modes of care (out-patient, day hospital and innovative treatment) and to offer maximum comfort to the patient in a pleasant, reassuring environment, leads to the construction or acquisition of a new building

→ Renovating all research laboratories

02 AT SAINT-CLOUD

PRECISION MEDICINE AND BETTER DEFINITION OF THE PATIENT JOURNEY

Number 1 Cancer Hospital West Paris

Validation of the plan to demolish buildings and build new buildings set to become:

→ A major center for precision medicine and clinical research

→ A diagnostic medicine center

→ A world-class site for industrial development

→ A hospital set at the heart of a dynamic environment, based on partnerships of excellence

→ A leading center in terms of the patient-care context

→ An internationally-scaled data center

→ A human - and social - science center

→ A major clinical bioinformatics and biostatistics center

"Five years of work, €145 million in investment, and 12,000 sq.m in new construction, all at the Saint-Cloud site alone: these numbers are reflective of what is at stake."

Jean-Robert Greslin
Director of operations

03 AT ORSAY

RADIATION BIOLOGY AND RADIATION THERAPY

The world's No. 4 Proton Therapy Center with adjoining research laboratories

8,000 patients since the center opened, including many children, in particular since anesthesia was developed on-site

Providing access to the most advanced radiation therapy, a priority for the birthplace of such therapy

→ By creating an Experimental Radiation Therapy and Radiology platform - RadExp - slated to open in 2018.
The goal: to develop new techniques and protocols to improve the effectiveness of cancer treatments using radiation, and to reduce side effects

→ By opening Pencil Beam Scanning (PBS) at the Proton Therapy Center, which extends the locations that can benefit from this form of ultra-precise radiation therapy, particularly in children

A driver of international projects

A leading international establishment for cancer research and treatment such as Institut Curie needs to interact with its environment in order to extend its reach, enhance the scientific and medical community and remain at the forefront of innovation and basic knowledge. The Curie model has always been one of an organization that is not only integrated but also engaged with the outside world. Institut Curie's goal is therefore to work in partnership with the very best in the following fields: Hospitals, Research and Institutions... at both the national and international level.

To share its expertise with a broad audience, physicians and researchers from Institut Curie are becoming involved in a number of European and international projects.

UM CURE 2020 FOR UVEAL MELANOMA

In 2016, the UM Cure 2020 project aimed to identify therapeutic options for metastatic forms of uveal melanoma. The study involves 11 European partners backed by the European Union as part of the H2020 program, for an amount of €6 million. Although it is the most common form of eye cancer in adults, uveal melanoma remains a rare cancer, for which Institut Curie is an internationally-recognized specialist in both research and treatment.

E-SURGE: 50 EXPERTS PERFECTING THEIR SARCOMA-SURGERY TECHNIQUES AT INSTITUT CURIE

Some 50 internationally-renowned experts in sarcoma surgery came to Institut Curie in November 2016 for training with Sylvie Bonvalot, MD, a surgeon at Institut Curie, and Alessandro Gronchi, MD, from the Italian National Cancer Institute. For two days, the E-surge meeting covered a wide variety of topics related to sarcoma surgery, using very concrete examples. *"This type of training, combining face-to-face meetings with expert seminars and other formats, is very relevant,"* explains Italian surgeon Sergio Sandrucci, MD. *"Being able to talk with experts teaches us more than any other type of training."* And surgery is particularly important since it is the standard treatment for this disease; the patient's subsequent treatment, and in part the prognosis, depend on the quality of the surgery.

RAIDS: MAKING INNOVATION ACCESSIBLE TO ALL WOMEN WITH CERVICAL CANCER

RAIDs (Rational molecular Assessments and Innovative Drug selection) is a project funded by the European Commission and coordinated by Suzy Scholl, MD, of Institut Curie. It aims to improve treatment for women with cervical cancer throughout Europe, where 34,000 women are diagnosed each year. This cancer is more common in eastern Europe, due to the very recent roll-out of a screening program. All participants met at Institut Curie in 2016 for an initial assessment.

"In reality, RAIDs comprises several clinical trials covering diagnostic, therapeutic and cognitive aspects. It is an international, multi-disciplinary collaboration between university hospitals, small and medium-sized enterprises, and translational research platforms in seven European countries: Germany, the Netherlands, Serbia, Moldavia, Romania, Hungary and France."

Suzy Scholl, MD
Coordinator of RAIDs

EPIGENESYS: ANTICIPATING THE RESEARCH OF THE FUTURE

EpiGeneSys is a European network of excellence coordinated by Geneviève Almouzni, PhD, director of the Institut Curie Research Center. This community brought together more than 160 laboratories throughout Europe and continue to live with the EpiGene2Sys CNRS project. This new network provides a springboard for future initiatives like the 4DNucleome, which aims to improve knowledge on the dynamics of the cell nucleus.

MAGNEURON, FOR DEVELOPING NANOMEDICINE

In 2016 the Magneuron project chosen by the European Union as winner of the H2020 call for bids had begun. Its aim is to develop a unique technique to guide neurons produced from the skin cells of patients with neurodegenerative disease, in which magnetic nanoparticles have been added as far as the diseased areas using magnets. The technique has already produced positive results in vitro. Maxime Dahan, PhD, and his colleagues will receive €3 million over four years to continue their work. Furthermore, these studies will be an opportunity to develop new general knowledge in nanomedicine and biomedical imaging that could also be applied to oncology.

LIBRA FOR GENDER BALANCE

Institut Curie is involved in the Libra project. The overarching goal of this European H2020 project is to increase the representation and participation of women in leadership positions in life sciences.

Spirit of engagement

Being engaged with the outside world is a way to achieve greater innovation. Based in France, Institut Curie is part of a rich environment in which it has developed numerous ties with universities, hospitals, institutions and companies, both nationally and abroad. It thus honors the pioneering, humanist spirit of Marie Curie, and her engagement in the world. Its mission of training health professionals and future researchers extends well beyond the borders of France, and it welcomes patients and physicians in training from around the world.

In 2016, Institut Curie boosted its policy of engagement at all levels via:

INSTITUTIONAL PARTNERSHIPS

- Forging ties with our hospital and university partners at our three sites for each of the medico-scientific program's priorities.
- Continuing the territorial partnership policy with other leading hospitals to offer the best treatment for patients in all areas.

OPENNESS TO THE WORLD

- The Research Center involvement in international projects is attested by its role in the EU-Life alliance and the development of the 4DNucleome project, aiming to further knowledge of the dynamics of the cell nucleus, and the initiation of strong collaborations with the NIH/NCI.
- Welcoming foreign patients to benefit from Institut Curie's expertise. In order to improve treatment options for foreign patients, Pierre Anhoury, MD-MPH, was appointed head of international relations at the end of 2016.
- Helping French-speaking African teams to effectively treat children with eye cancer by developing training, clinical research and awareness among the population.

TRAINING AN ELITE GROUP OF ONCOLOGY EXPERTS

- Training of future leaders in oncology, physicians, researchers and physician-researchers, as demonstrated by its engagement in creating a Franco-Chinese oncology school in 2016.
- Recruiting the most promising researchers with the arrival in 2016 of Jean-Léon Maître, PhD, Ines Drinnenberg, PhD and Aurélien Latouche, PhD.

DEVELOPING INNOVATION

- Recruitment of internationally-recognized leaders such as Prof. Philip Poortmans, MD-PhD, who took over as head of the department of oncological radiation therapy in March 2017, and the appointment of Prof. Martine Piccart, MD-PhD, to head the breast cancer program.
- Increasing in the number of partnerships with companies that have international reach so as to boost discoveries and innovations. Appointment of Amaury Martin, PhD, head of technology transfer and industrial partnerships office in January 2016 and participation to Global Care Initiative event in Boston.

Strengthening partnerships and openness

Selected examples

UNITED STATES

→ MIT in Boston.

→ National Institutes of Health (NIH) | National Cancer Institute (NCI).

→ Bristol-Myers Squibb: strategic partnership to accelerate research in immuno-oncology and pediatric oncology.

IN EUROPE

→ Organisation of European Cancer Institutes (OECI).

→ EU-Life, with 13 European centers of excellence in life sciences.

→ European Organisation for Research and Treatment of Cancer (EORTC).

→ Consortium of Innovative Therapeutics for Cancer in Children (ITCC).

→ European Pediatric Soft-tissue Sarcoma study group (EpSSG).

→ European Molecular Biology Organization (EMBO).

INTERNATIONALLY

→ International Society of Paediatric Oncology (SIOP).

UNITED KINGDOM

→ Cambridge Institute for Medical Research.

NETHERLANDS

→ Hubrecht Institute.

BELGIUM

→ Celyad, a leader in cellular therapy engineering, has just signed a partnership with Institut Curie to develop new immunotherapy treatments.

CHINA

→ Export of Curie's know-how by developing its consulting activities for the construction of hospitals, including research activities in Changsha and Shenzhen, China.

JAPAN

→ A consortium agreement signed to promote exchanges between institutes with Nagoya City University.

VIETNAM

→ Ophthalmology training for physicians by the surgeon Laurence Desjardins, MD.

INDIA

→ Signing of a memorandum of understanding underway with the NCBS-inStem, in Bangalore (India): training for PhDs and postdocs.

MALI, DEMOCRATIC REPUBLIC OF CONGO, IVORY COAST, SENEGAL AND MADAGASCAR

→ Implementation of a network of expert centers for treatment of retinoblastoma, a rare childhood cancer, thanks to backing from the Sanofi Espoir foundation, the Rétinostop association and the GFAOP: Mali was also the first country to receive equipment and training for its professionals. The full remission rate for early forms of the cancer has risen from 33% in 2011 to 80% today! The Democratic Republic of Congo, Senegal, Ivory Coast and Madagascar will also soon have these types of center.

KENYA AND TANZANIA

→ Palliative care training in Kenya and Tanzania.
Almost 80% of people at the end of their lives do not have access to palliative care despite their need to. Institut Curie will soon be training physicians and nurses from the Aga Khan Foundation, thanks to backing from the Association française pour le développement and Expertise France.

NEW CALEDONIA

→ Institut Curie helped develop Eliane-Ixeko, the first radiation therapy center in New Caledonia. Its implementation means that 400 to 500 patients do not need to travel to Australia or Polynesia for treatment. Opened in 2016, this center has 70 practitioners and treats 98% of the patients on the island suffering from cancer and requiring radiation therapy.

Member

Advice and development

Partnership

Industrial partnerships

Joining forces

By forming national and international collaborations and partnerships, Institut Curie extends its reach, enhances the scientific and medical community and remains at the forefront of innovation and basic knowledge.
The Curie model has always been one of an organization that is not only integrated but also engaged with the outside world. Thanks to this policy of engagement, in 2016 Institut Curie strengthened its ties with other institutions.

→ Exporting Curie's know-how by developing consulting activities for the construction of hospitals, including research activities (**two projects underway in Changsha and Shenzhen, China**) and support for the quality strategy and implementation of proton beams therapy.

→ Deploying its teaching and training activities with the creation of a **Franco-Chinese school of oncology**. As of 2018, Institut Curie will be hosting some 50 future Chinese physicians for 18 to 24 months to help them achieve European standards of care.

→ Helping **African teams** to effectively treat patients with cancer by developing training, clinical research, and awareness among the population:

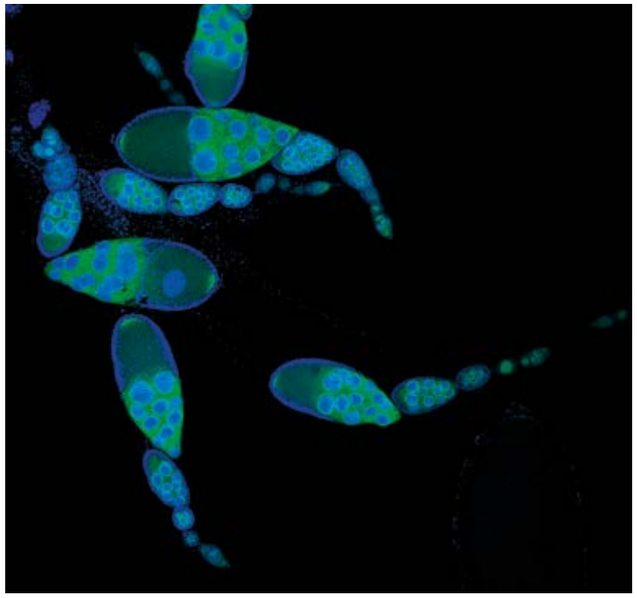
- developing a network of experts in five Sub-Saharan African countries to improve the treatment of retinoblastoma, an eye tumor in children with a recovery rate of more than 98% in France, whereas in Africa the prognosis is very different. The team includes Pierre Bey, MD, former director of the Institut Curie hospital, and Laurence Desjardins, MD, ophthalmological surgeon, retinal specialist and director of the Paris site;

- training physicians in palliative care in Kenya and Tanzania.

→ Being a driver of research: Institut Curie is a member of the **EU-Life alliance** with 12 other European centers of excellence in life sciences. Geneviève Almouzni, PhD, director of the Research Center, is its vice-chairman. Together, the members of EU-Life support and strengthen European research excellence and are a voice for research in European policy. This network has also enabled the implementation of the LIBRA project for gender balance in research (see p. 11).

→ **Celyad,** a leading Belgian-American company in cellular therapy engineering, has just signed a partnership with Institut Curie to develop new immunotherapy treatments.

→ **Bristol-Myers Squibb** and Institut Curie are entering a strategic partnership to step up research in immuno-oncology and pediatric oncology.

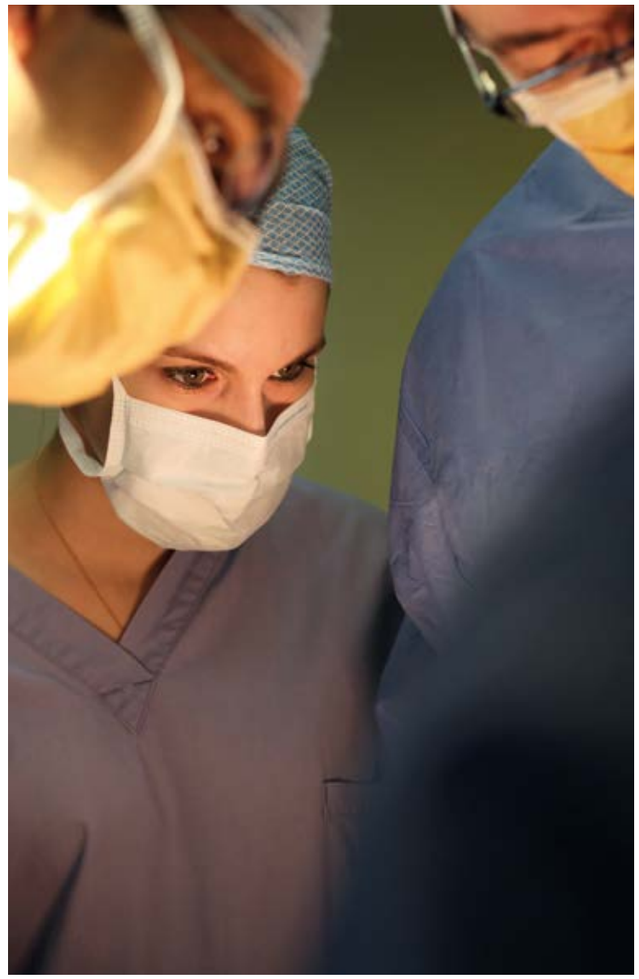


We are proud of this partnership with Institut Curie, which is one of the world's leading research centers. Our NKR-T program is bringing high hopes for cancer treatment and its roll-out will be ambitious. This collaboration demonstrates the interest aroused by our technology in the scientific community. We are delighted to be able to work with the team led by Sebastien Amigorena, PhD, director of the Cancer Immunotherapy Center.

Christian Homsy, MD
CEO of Celyad

THE CURIE MUSEUM EXPORTED OVERSEAS

Loan of the touring exhibit and a story reading at the Lycée Français Marie Curie in Zurich and the Nobel Museum in Stockholm, and the exhibition "La femme cachée de la guerre - Marie Curie Exhibition" at the Vrij Vaderland Experience Center in Veurne, Belgium.



Training the leaders of the future

Today's students will be tomorrow's researchers, physicians, technicians and caregivers. Each year, Institut Curie steps up its investment in the teaching and training of these new generations of professionals.

2016 was also the year of the launch of the IC-3i program (international, interdisciplinary and intersectoral), partly funded by the H2020 program of the European Union. The first call of the program allowed 12 foreign PhD students from nine countries to be recruited. Deepanjan Ghosh from Delhi, India, preferred Institut Curie to the other doctoral options offered in Japan and Germany: *"I was interested in the topic, and the work setting seemed to be the best, with access to the technology platforms. The program took care of everything regarding my move, and I can follow a number of courses offered by Institut Curie and my doctoral school."* The second call of the program recruited 14 new young researchers, who will be arriving at Institut Curie in fall 2017.

International courses have also been ongoing for 10 years: thirteen in 2016, with prestigious experts taking part in training sessions comprising lectures, workshops and discussions. New training tools were also developed last year, such as a grant-writing course to help young researchers improve their applications for the most prestigious European grants (ERC).

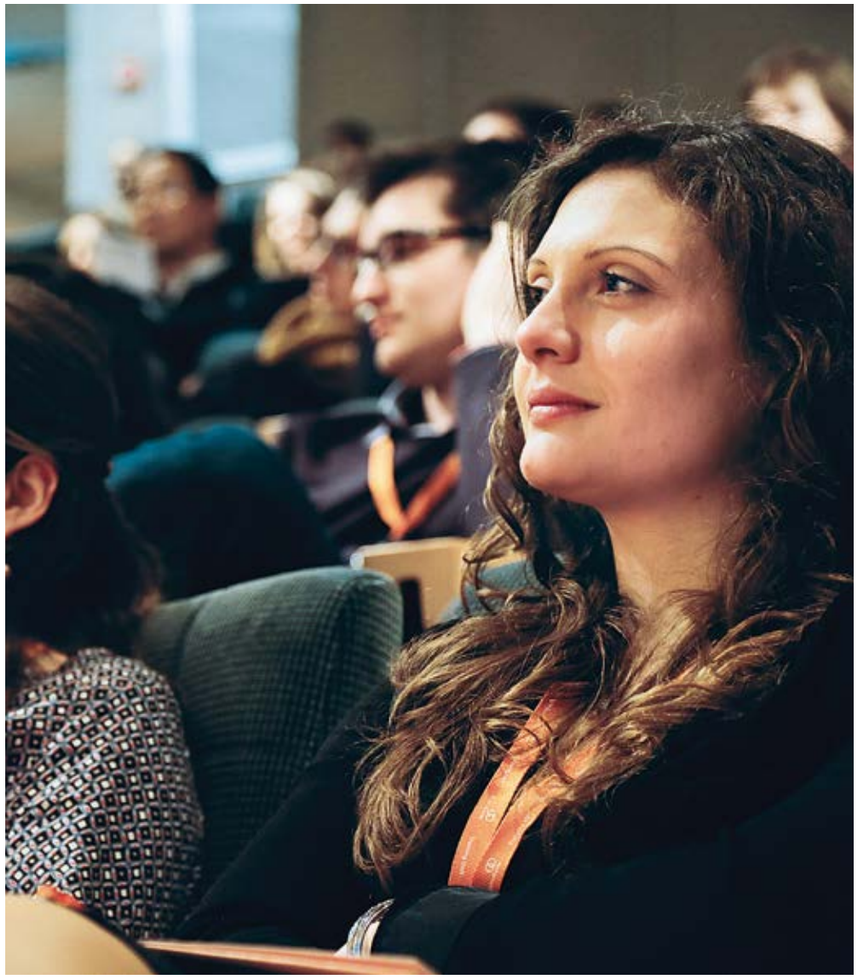
The Training Unit at Institut Curie, headed by biologist Graça Raposo, PhD, and Prof. François Doz, MD-PhD, also worked in 2016 to strengthen interaction between the Hospital Group and the Research Center. With this aim, the medicine/science program created by the École normale supérieure (ENS) last year allowed seven medical and pharmacy students to receive high-level scientific training in addition to their coursework.

Almost
750
students
385
at the Research Center and
357
in the Hospital Group
298
postdocs
75
nationalities

In 2016, 47 PhD students brilliantly defended their thesis at Institut Curie, and, as evidence of the high quality of "Curie students," a young postdoc, Puja Singh, PhD, received a one-off subsidy from the Ligue contre le cancer du comité de l'Essonne, while Mijo Simunovic, a doctoral student, received dual awards: the DIM Nano'K award and the Chancellerie des universités de Paris award.

To encourage recruitment of the most motivated students, the Training Unit attended two major meetings in the United States in 2016: the MIT European Career Fair and the American Society for Cell Biology (ASCB) gathering in San Francisco.

The Research Center is also taking part in international advanced training programs for young researchers, such as the Erasmus + Unipharma-Graduates project (formerly the Leonardo da Vinci program) and the ITN (International Training Networks), within units providing very high-level training to the most specialized young scientists, among others.

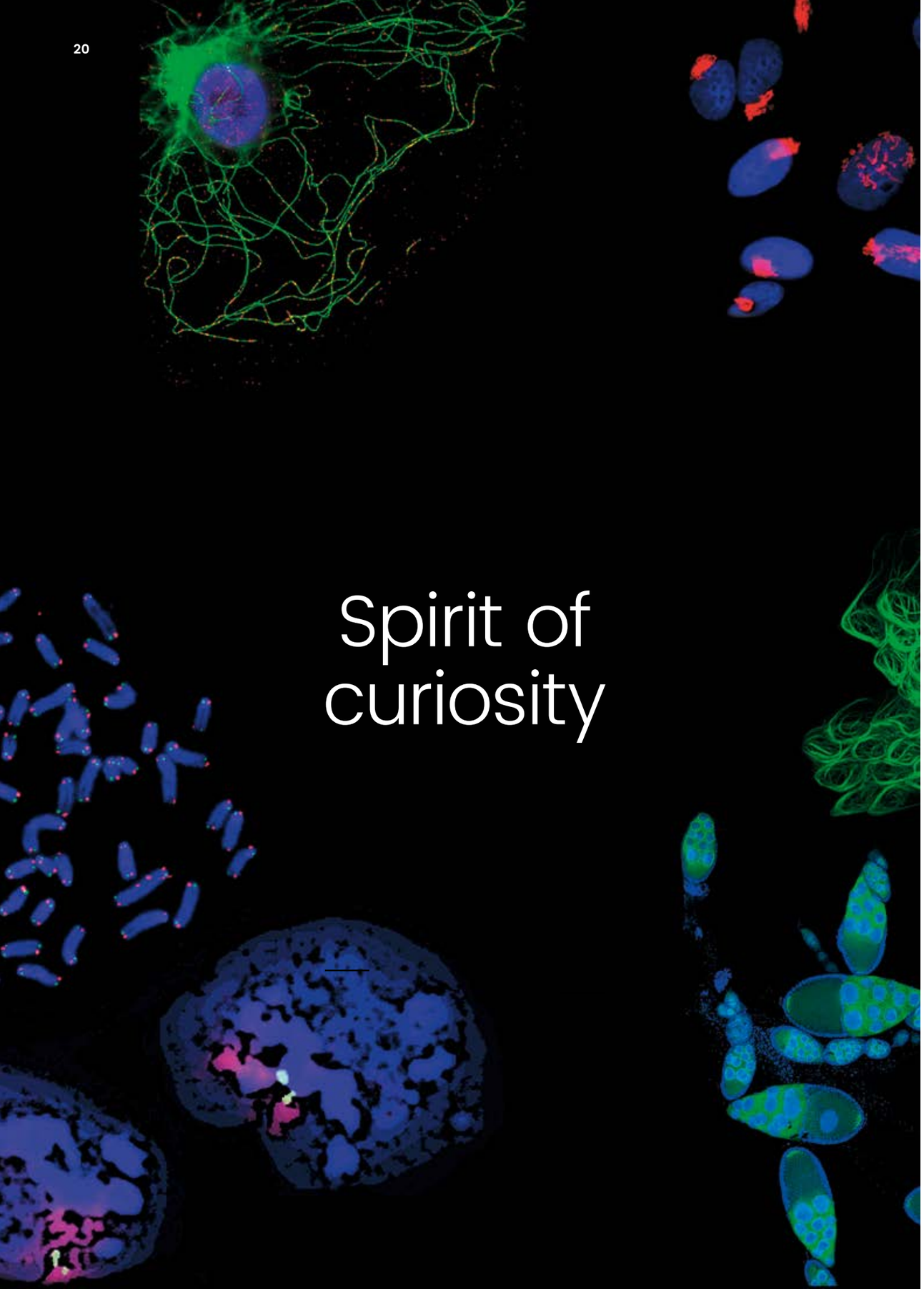


The environment in which I'm working will be crucial for me to establish myself as an independent researcher. The strong ties forged with the European scientific community will no doubt help me to develop collaborations, explore new ideas, and innovate in the health and medical sector, as well as establish connections between industry and the academic world.

Anand Patwardhan
Indian PhD student

Institut Curie offers many opportunities for discussions between teams, which is very important today since the interdisciplinary approach is vital in research. Our association is well-funded to organize its own events, such as the young researchers' retreat, or to take part in events with other associations, such as the young physicians' meeting, the technology forum and professional breakfast meetings, so as to discover new career opportunities.

Guillaume Kulakowski
Third-year PhD student
(Institut Curie Association of PhD students and young postdocs)



Spirit of curiosity

Cultivating the Curie spirit

"*Our Curie'ous motto: to address scientific, technological and medical challenges alike with a curiosity driven spirit with the wish to go beyond the limits of our current knowledge in all disciplines. This is essential for the progress of our society to develop our human and economical potential.*"
Geneviève Almouzni, PhD, director of the Research Center

"*After all, science is fundamentally international*" said Marie Slodowska Curie. The frontiers of knowledge can only disappear along with those of structures and countries. The richness of diversity is the very culture of the institute. The capacity to exchange and network is an essential ingredient for the success of all our research.

An environment that fosters creativity and excellence

At Institut Curie, all efforts are made to ensure that multiple facets of each research field are addressed, from basic to applied research. Whether in Paris or in Orsay, all efforts thrive to ensure constant progress in all disciplines: physics, chemistry and biology.

This set-up helps incubate new ideas, ensuring that society's knowledge improves and helps put discoveries into action. As evidence, in 2016 several Institut Curie researchers were honored with awards. The biologist Fatima Mechta-Grigoriou, PhD, and the bio-physicist Matthieu Piel, PhD, were elected members of the prestigious European EMBO organization. Their mission, and that of the other 17 researchers or former researchers of Institut Curie who are already members of the EMBO, is to promote life sciences, reflect on strategic avenues for research, and help produce a new generation of excellent researchers.

Geneviève Almouzni, PhD, and Vassili Soumelis, PhD, were each awarded a "proof of concept" grant from the European Research Council (ERC). This exceptional award recognizes the strongly innovative potential of their research. The team of Geneviève Almouzni, director of the Research Center at Institut Curie and a specialist in genome dynamics, will now be able to investigate the epigenetic factors that can be used to predict the progress of cancer and the response to chemotherapy. Vassili Soumelis will be studying the integration of several signals within cells.

In 2016, Geneviève Almouzni was also awarded one of the prestigious grants from the European Research Council (ERC), an ERC Advanced Grant, which she will devote to understanding spatio-temporal organization's and DNA compaction's most intimate secrets. Out of 31 grants received by researchers at the Institut Curie since the creation of the ERC, 19 of these highly competitive grants are currently on-going.

439
publications in 2016

86
research teams

16
technology platforms

12
mixed research units

Curie CORE TECH

NEW TEAMS FOR NEW APPROACHES

Research themes are constantly evolving. Institut Curie is focused on these trends, and plans to be a driver of new ideas and fields of research. With this aim in mind, it welcomed three new teams in 2016.

After a postdoc at EMBL in Heidelberg, Germany, Jean-Léon Maître, PhD, CNRS staff scientist, arrived at the Institut Curie as a junior team leader to explore the mechanics of embryonic cells.

While the centromere is already being studied by several teams and projects at Institut Curie, the young Austrian researcher, Ines Drinnenberg, PhD, and her brand-new team are looking into an aspect as yet unexplored: its evolution. *"The development of a tumor resembles an accelerated version of the evolution processes. The difference is that the cell changes do not appear over the course of millions of years, but a lot more quickly in tumor cells,"* Ines explains. Aurélien Latouche, PhD, wich arrived at the end of 2016, and his team develop statistical methodology for the validation of predictive biomarkers, a brick that play a major role in the precision medicine.

SOPHISTICATED TOOLBOXES

Institut Curie provides cutting-edge technology platforms for its researchers and people outside.

The cell and tissue imaging platform, already very well supplied, made an important acquisition in 2016: a lattice light sheet. This microscope, the first of its type in Europe, illuminates extremely thin cell layers.

Microfluidics - another cutting-edge technique – allowed Matthieu Piel, PhD, a leader of a Curie team at the Institut Pierre Gilles de Gennes, to better understand how cells contort in order to move and how they repair the damage that they suffer during these contortions. This discovery was published in the prestigious journal *Science* last year.

STIMULATION AT THE HIGHEST LEVEL

Researcher's creativity is constantly stimulated thanks to our international programs and meetings. On May 3rd, 2016, the visit of Harold Varmus, Nobel Prize in Medicine 1989, was an interesting forum for discussions with the young researchers. His advice "*To understand the complexity of cancer, look for the simplest solutions*" was widely acknowledged.

Institut Curie very quickly became a no-brainer in my search for the ideal place to do research. It offers advanced infrastructures to observe mouse embryos, reputed researchers working on morphogenesis, and the historic excellence of Institut Curie in terms of cell biophysics and mechanics.

Jean-Léon Maître, PhD
2016 Junior team leader at Institut Curie

Pioneering spirit

Looking to the future

The research-care continuum, held dear by Marie Curie and Claudius Regaud, is still the best way to serve the fight against cancer and engage in innovation for the benefit of patients. The medico-scientific program (PMS) at Institut Curie is concrete evidence of this and aims to bring the Curie model into the 21st century.

At the heart of the strategic plan, the medico-scientific program creates a vital interconnection between basic research, translational research, clinical research and care to achieve innovation that serves the patient. It is based on the combined forces and expertise of the Hospital Group and the Research Center. To speed up innovation even further so as to assist patients, Institut Curie has identified priority areas (see next page) for the coming years.

Combining today's care with the treatments of tomorrow

To help physicians and researchers to better understand one another and work more effectively together, Institut Curie is developing the time, space and means for collaboration.

In 2016, the formalization of the Cancer Immunotherapy Center is testimony to this cooperation between researchers and physicians, since it will be accommodating basic and translational research laboratories, clinical research, consultation rooms and hospitals beds on a fully-dedicated floor at the heart of the hospital. With researchers at the patient's bedside and physicians at the workbench, the ideal conditions are met to achieve the desired goals: implementing early clinical trials, studying new treatment combinations, discovering predictive signs of response to these treatments, and understanding all the mechanisms at play in this therapeutic strategy.

These encounters help physicians and researchers acquire a shared culture, teach one another, reveal new scientific questions, become aware of patient needs, and find innovative ideas.

In 2017, the pediatrics specialty will be restructured with the creation of a division to strengthen ties between research teams and the department of the Hospital Group that treats children, adolescents and young adults.

By focusing the strengths and the players involved in immunotherapy in one place, we will achieve an enormous investigative potential to address basic clinical and pre-clinical issues.

Emanuela Romano, MD
Medical director of the Cancer Immunotherapy Center

The medico-scientific program

At its meeting in November 2016, the Scientific Advisory Board validated 10 priority programs of the medico-scientific program. The directors of the Hospital Group and the Research Center defined these priorities, which systematically bring together physicians and researchers, identified a manager for each of them and produce a five-year completion schedule, based on the model of major European projects.

BREAST CANCER

In 2016, structuring and implementation of this program was entrusted to Prof. Martine Piccart, MD-PhD, a Belgian professor and oncologist renowned worldwide for her contributions to breast cancer research. She aims to step up efforts on "triple negative" cancers and to rely more on the basic research of the Research Center in this field.

RADIOTHERAPY AND RADIATION BIOLOGY

The birthplace of radiation therapy, Institut Curie has continued to develop this technique. There are three priorities focused on radiation biology and innovation in radiation therapy developed by the Orsay site.

In 2016, a new director of the department of radiation therapy was appointed – Prof. Philip Poortmans, MD-PhD, – whose arrival in March 2017 will bring a new vision of radiation therapy from a medical and medico-scientific standpoint, thanks to his experience in research projects.

UVEAL MELANOMA

The most common form of eye cancer in adults, uveal melanoma nonetheless remains a rare cancer.

In 2016, the UM Cure 2020 project aimed to identify therapeutic options for metastatic forms of uveal melanoma. UM Cure 2020 involves 11 European partners backed by the European Union as part of the H2020 program, in the amount of €6 million.

IMMUNOTHERAPY

2016 saw the launch of efforts to create the first Cancer Immunotherapy Center (see p. 26).

SARCOMAS

Institut Curie is one of the five leading facilities worldwide in managing soft-tissue sarcoma, a rare cancer tumor.

2016 saw the promising initial results of a clinical trial that used hafnium nanoparticles activated by radiotherapy before surgery for the first time.

PEDIATRIC CANCERS

In 2016, the decision was made to create a division bringing research teams together with the Pediatric, Adolescent and Young Adult department to speed up the arrival of new therapeutic strategies for young patients.

EARLY TRIALS

In 2016, funding from MSDAVENIR was obtained in the amount of €1.6 million over five years for the launch of SHIVA02, a landmark precision-medicine trial (see p. 10-11).

GENETICS AND EPIGENETICS

A pioneer in epigenetic and genetic research, Institut Curie plans to bring the two together so as to obtain more precise mapping of tumors and new therapeutic options.

2016 saw recruitment for the Dynamics of Epigenetic Plasticity in Cancer translational research team, led by Céline Vallot, PhD, who joined Institut Curie in early 2017.

Innovation benefitting patients

The mission of the Hospital Group is to promote innovation through research and training of medical staff in order to constantly improve the effectiveness of treatments, their tolerance and safety, and the quality of care provided to patients.

The institute is a world leader in the fight against breast cancer, eye tumors, pediatric cancers and sarcomas, and in radiation therapy techniques, which, since the institute's inception, remain a field of excellence. Coupled with the availability of increasingly effective techniques, in surgery and in chemotherapy as well as in radiation therapy, the human dimension takes on greater importance. The patient is at the forefront of Institut Curie's new medical strategy, designed with the aim of constantly improving the quality of their treatment. And since its needs are constantly changing, Institut Curie has to adapt by innovating at all stages of the disease.

More than just treating: caring

In its Hospital Group and on its three sites, including one at the heart of Paris, Institut Curie strives to combine innovation with human intervention.

At the forefront of therapeutic innovation, the teams at the Hospital Group do all they can to offer all patients the most effective treatments. To achieve this, clinical research plays an important role in the treatment of many patients.

Physicians and other caregivers (nurses and handlers) may themselves carry out advanced research, and have received funding and various awards for their efforts. Two research projects at Institut Curie obtained funding in 2016 from the French Ministry of Health for developing clinical research projects involving several institutions. One concerns limiting the risk of infection from implantable catheter chambers in pediatrics and the other involves the detection of circulating cancer cells via a simple blood test, a field in which Prof. Jean-Yves Pierga, MD-PhD, and François-Clément Bidard, MD-PhD, medical oncologists at Institut Curie, are internationally renowned.

Moreover, in 2016 clinical research at Institut Curie took on a new dimension with the creation of a clinical investigation unit (UIC) at the Saint-Cloud site. Today, it welcomes all patients participating in a clinical trial at Saint-Cloud, and will soon focus on the introduction of early trials.

190
clinical trials
(150 for adults and 40 for children)

161
children included in clinical trials

2,055
health professionals

302
beds and accommodation

But there is no innovation without a precise diagnosis. In 2016, Institut Curie began to restructure its diagnostic and theranostic division on the Paris and Saint-Cloud sites to improve its strengths and adapt to new approaches that are becoming more common in its activities, such as immunology and genomics, which are needed to implement precision medicine.

The Orsay site is keeping up to speed with the 2016 introduction of a new system of active beam delivery, called Pencil Beam Scanning (PBS), which makes it possible to cover tumor areas to be radiated more precisely.

In 2016, the Hospital Group was certified by the Haute Autorité de santé (HAS) for a period of four years. All high-risk activities (including management of risk of infection) have obtained level A. To maintain this quality level, construction of an entirely new operating suite is underway. In Paris, the 10 operating rooms will be designed according to an integrated model, in direct connection with the associated medical functions, such as imaging, making it one of France's benchmark centers in the field.

For several years, Institut Curie has been welcoming patients from all over the world; it thus provides its expertise to a wide audience. New services were introduced in 2016 to facilitate the arrival of such patients:

• interpreters are available 24/7, covering more than 130 languages;

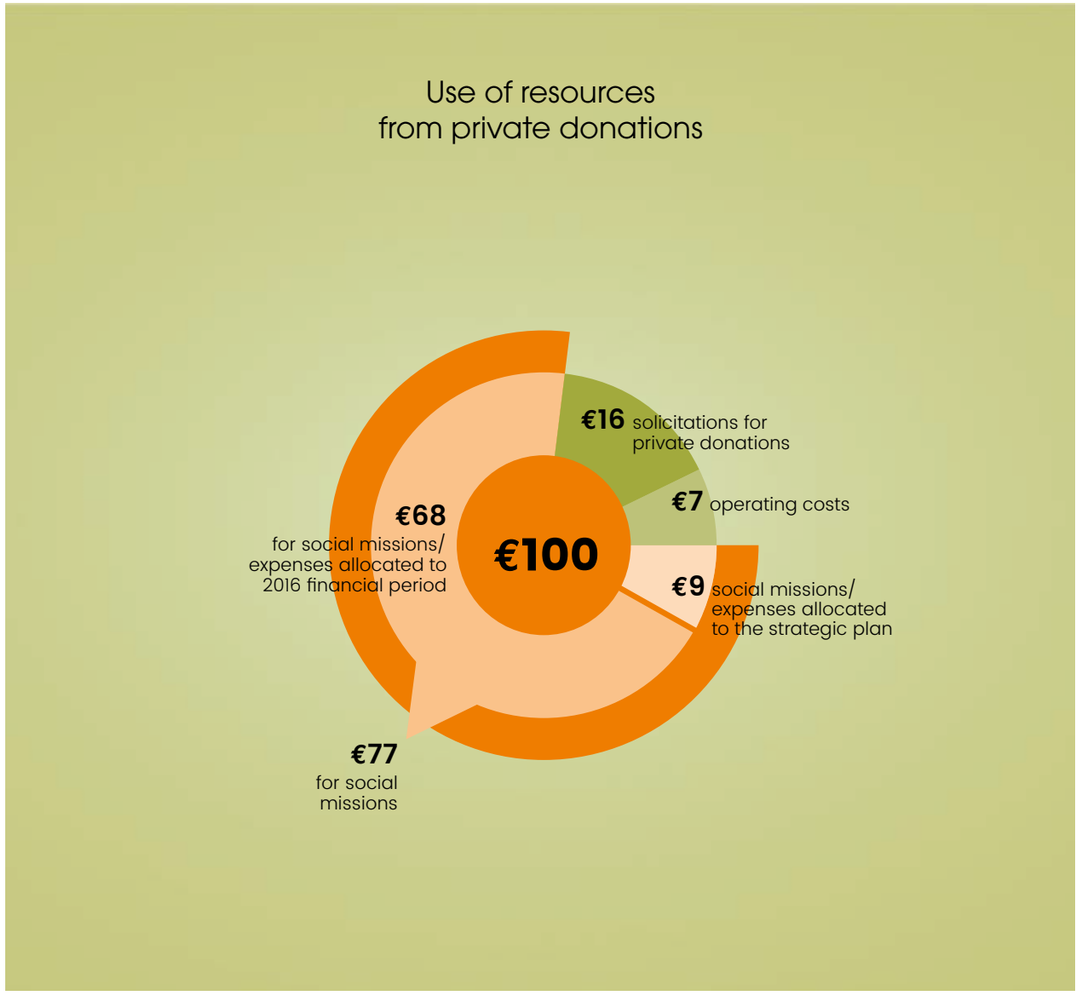
• our web platform will open soon to take in patients' charts and images;

• concierge services are planned to facilitate patients' stay and travel;

• foreign patients' satisfaction is tracked through a continuous survey.

A virtuous alliance of public and private funding

Public donations play a crucial part in the funding of Institut Curie. Private resources such as public generosity and sponsorship bolster this public funding, providing Institut Curie with independence that allows it to initiate innovative programs.



INTERNATIONAL GENEROSITY

A private foundation with public utility status, Institut Curie is authorized to receive donations and bequests. Thanks to the support of its donors, it is able to accelerate discoveries and improve treatments and quality of life for patients. In 2016, Institut Curie was supported by the generosity of 200,000 donors, 38 sponsorship partners and 120 partner charities in France, though this generosity naturally extends beyond its borders.

A patron to Institut Curie since 2011, Gregory Annenberg Weingarten, Vice President and Director of the Annenberg Foundation, decided in 2016 to renew his support for five years to the translational research lab in pediatric oncology, led by pediatrician and researcher Gudrun Schleiermacher, MD-PhD, through his initiative GRoW@Annenberg. This commitment was motivated by *"the urgency and the importance to find new treatments and, thanks to scientific and medical discoveries, to bring new hope to the children facing cancer and their families"*.

€49.7 M
private donations

200,000
donors

Another of Institut Curie's international partners, the Fondation Philanthropia, decided to renew its support in 2016. The Swiss foundation committed for three years to sustain the creation of a therapeutic education program dedicated to pain, to better support and assist cancer patients.

MAJOR PUBLIC DONATIONS

Hospital Group

- Assurance Maladie (the French health insurance fund), as an institution of private care in the public interest
- Billing of treatments to patients without national health insurance
- Industrial players, patrons, charity organizations, and public or semi-public organizations for funding of clinical research and innovation
- Public generosity (donations and bequests) collected by Institut Curie

Research Center

- Research bodies (CNRS, Inserm, Universities)
- Annual subsidiary from the French ministry of Higher Education, Research and Innovation (MESRI)
- Public and quasi-public funding in response to calls for bids
- European Research Council (ERC) and European Commission
- Private funding: patrons, charity organizations that support medical research (Ligue contre le Cancer, Fondation ARC pour la Recherche sur le Cancer, Fondation pour la Recherche Médicale, etc.)
- Industrial funding for licenses, collaborations and partnerships
- Public generosity

Curie Museum

- CNRS (which pays for one permanent position and contributes to operations)
- Public generosity

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