

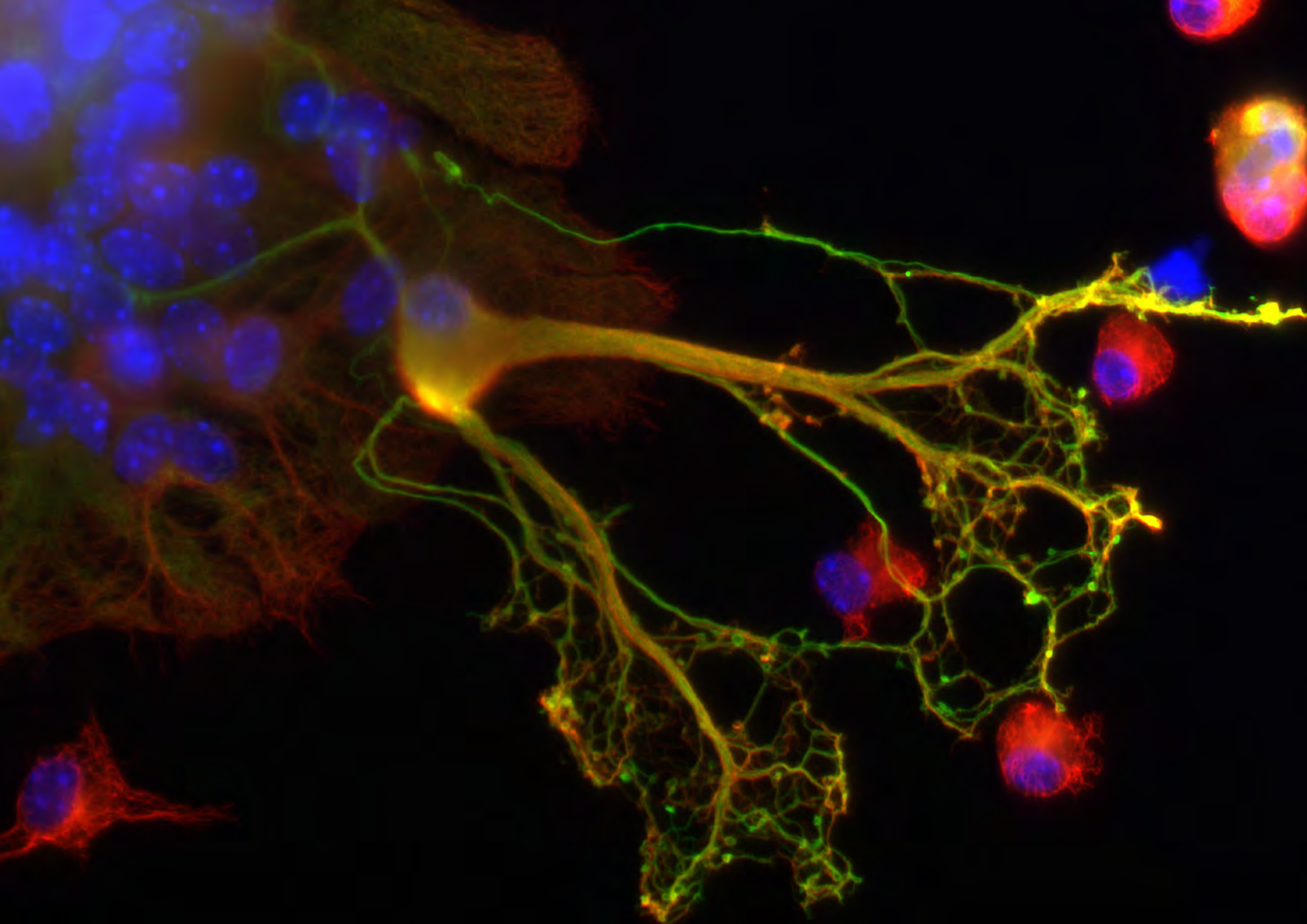
INSTITUT DU CERVEAU  
ET DE LA MOELLE ÉPINIÈRE  
ICM BRAIN & SPINE INSTITUTE, PARIS

ANNUAL REPORT 2016

SEARCH, FIND, CURE, FOR YOU & WITH YOU.









Sharing leads to progress

PROFESSOR GÉRARD SAILLANT, ICM PRESIDENT

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ICM, AN INNOVATIVE AND UNIQUE MODEL

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WHAT DOES IT MEAN TO DO RESEARCH TODAY?

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THANK YOU

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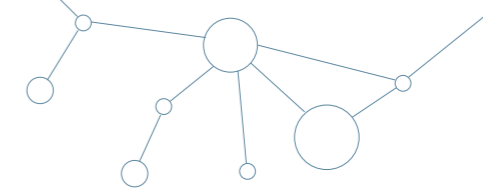
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CONVERSATION WITH  
THE PRESIDENT

PROFESSOR  
GÉRARD SAILLANT

*W To find,  
we must first  
understand.*



The Brain and Spine Institute came to life six years ago. When we first came up with the idea for the Institute with our founding members and institutional partners, we never imagined it would be such a success. It was a truly daring project. Bringing all the key players in research on nervous system diseases together, in one place, illustrates just how involved everyone is, and how talented.

I would like to take this opportunity to thank our partners, our researchers and the entire staff at the Institute for their immense and unwavering support, as well as our donors for their renewed generosity.

Our 2016 Report is more than a look at the past year: it is a tribute to those that made our projects possible.

2016 for ICM proved our Institute's vitality and its involvement in the world's great healthcare challenges. International collaboration, scientific breakthroughs, sharing of knowledge, as well as numerous awards show how multi-faceted this major player of French research really is.

Current stakes in research on brain illnesses are extremely high, especially as our population ages, and society as a whole is faced with the challenge of "ageing well". ICM has a large role to play so that each and every one of us is able to age in the best possible conditions, maintaining a form of freedom in our actions. We do not know all that much about this fascinating yet complex organ we call the brain!

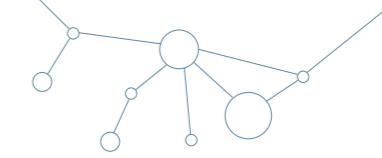
There is so much left to explore. To find, we must first understand. To get there, we need you, and your support.

Thank you, truly.

CONVERSATION WITH  
THE CHIEF  
EXECUTIVE

PROFESSOR  
GÉRARD SAILLANT

*Together,  
we will be able  
to face future  
challenges.*



Our Institute brings together diverse women and men from various horizons, where skills and knowledge intertwine.

This represents an incredible collective wealth. It brings out the best, giving us the opportunity to meet upcoming challenges together.

ICM combines a critical mass of talented researchers and clinicians who, in their synergy, develop a translational approach to research. The Institute's location in Paris, at the heart of the Pitié-Salpêtrière Hospital with over 100,000 patients every year, encourages researchers and clinicians to interact. Thanks to the diversity of our activities and the plurality of our expertise, we can take on the challenge of understanding the nervous system. The multidisciplinary approach developed at ICM, along with our risk-taking and technological innovation, are strong assets for scientific and medical research.

ICM is one of a kind. It is open to visitors from around the world, to students, to researchers, and more.

Today, more than ever, it is time to open up, encourage creativity, focus on cooperation, collaboration, and share our respective territories.

It will not prevent us from rising up to the challenge, and it will not prevent us from stimulating the quest for quality, performance and discoveries. Quite the contrary... What brings us, researchers, students, doctors, technicians, engineers, together is our essential role in this shared mission for the world as a whole.

Results from 2016 give our actions meaning and confirm our community's excellence. These results show that ICM is dynamic, attractive, with exceptional talent, with a demanding strategy and actions taken, in a high-quality work environment. Tangible progress has been made: a balanced budget, on the rise, over 540 scientific publications including 115 with an impact factor over 7, 11 ANR contracts awarded, prototypes designed in our Living Lab, as well as numerous distinctions and awards for our researchers and the hosting of new startups.

2016 also marks the official launch of our roadmap for the years to come. Priorities have been set to maintain, and go beyond, our excellent level. New teams, talented researchers, development of clinical research, instruments for precision medicine, promoting excellence in neuroscience and nervous system illness training and education, new instruments to encourage entrepreneurship, and development of national and international partnerships: these make up the foundation needed to accomplish our missions, reach our goals and to become a vital partner in the development of innovative therapy.

In 2017, we must stay on track and consolidate our community's excellence and skill in producing knowledge as well as breakthrough discoveries.

I would like to extend a very warm thank you to all the individuals who, every single day, contribute to our venture: the 650 women and men at the Institute, our partners, donors, and our volunteers, for their immense support.



CONVERSATION WITH  
THE CHIEF EXECUTIVE  
OF THE IHU-A-ICM

FRÉDÉRIC  
SALAT-BAROUX



*“ We are doing everything we can to increase prevention and treatment of nervous system diseases. ”*

The IHU-A-ICM's mission is to lead a high-level project for patient care, training, and technology transfer in the field of nervous system diseases research. Its priority is to encourage the development of innovative preventive, diagnostic, and therapeutic products and processes. The results of these past four years have been overwhelmingly positive. They allowed us to develop international-level research focused on nervous system diseases, on neurology and psychiatry, to create cutting-edge technological platforms, to implement research partnerships with industry players, to train future healthcare professionals, to implement international teaching programs, to carry out large-scale clinical trials for many nervous system diseases through participation in national, European and international networks and to transfer patient care from the hospital to back home.

Within the IHU-A-ICM mid-term assessment and on request by the International IHU Jury, the IHU-A-ICM developed a roadmap with a long-term action plan. IHU-A-ICM and ICM founding members came to an agreement on a strategic plan, approved by the International IHU Jury and General Investment Commission (Commissariat Général à l'Investissement - CGI) in November 2016 following a site visit on October 18, 2016. This approval allows the IHU-A-ICM to carry out its strategic plan around eight main topics: recruiting new teams, learning and training, neuroinformatics, industrial promotion, clinical research, cellular and molecular imaging, big brain theory program (transversal internal projects with high potential) and fundraising to meet its ambitious goals.

2016 was a year filled with success, including ambitious clinical trials. The INSIGHT study in partnership with Pfizer, an innovative study on Alzheimer's disease, is one of the first worldwide to monitor at-risk healthy individuals, with high hopes in gaining a better understanding of the disease. The ICEBERG cohort is at the heart of the IHU's Parkinson's project, which aims at studying predictive conversion and progression factors of Parkinson's disease. We are making progress in major projects on Alzheimer's disease, Parkinson's disease, multiple sclerosis to identifying myelin repair strategies, epilepsy to understand and anticipate seizures and behavioral disorders that come into play in many neurological illnesses.

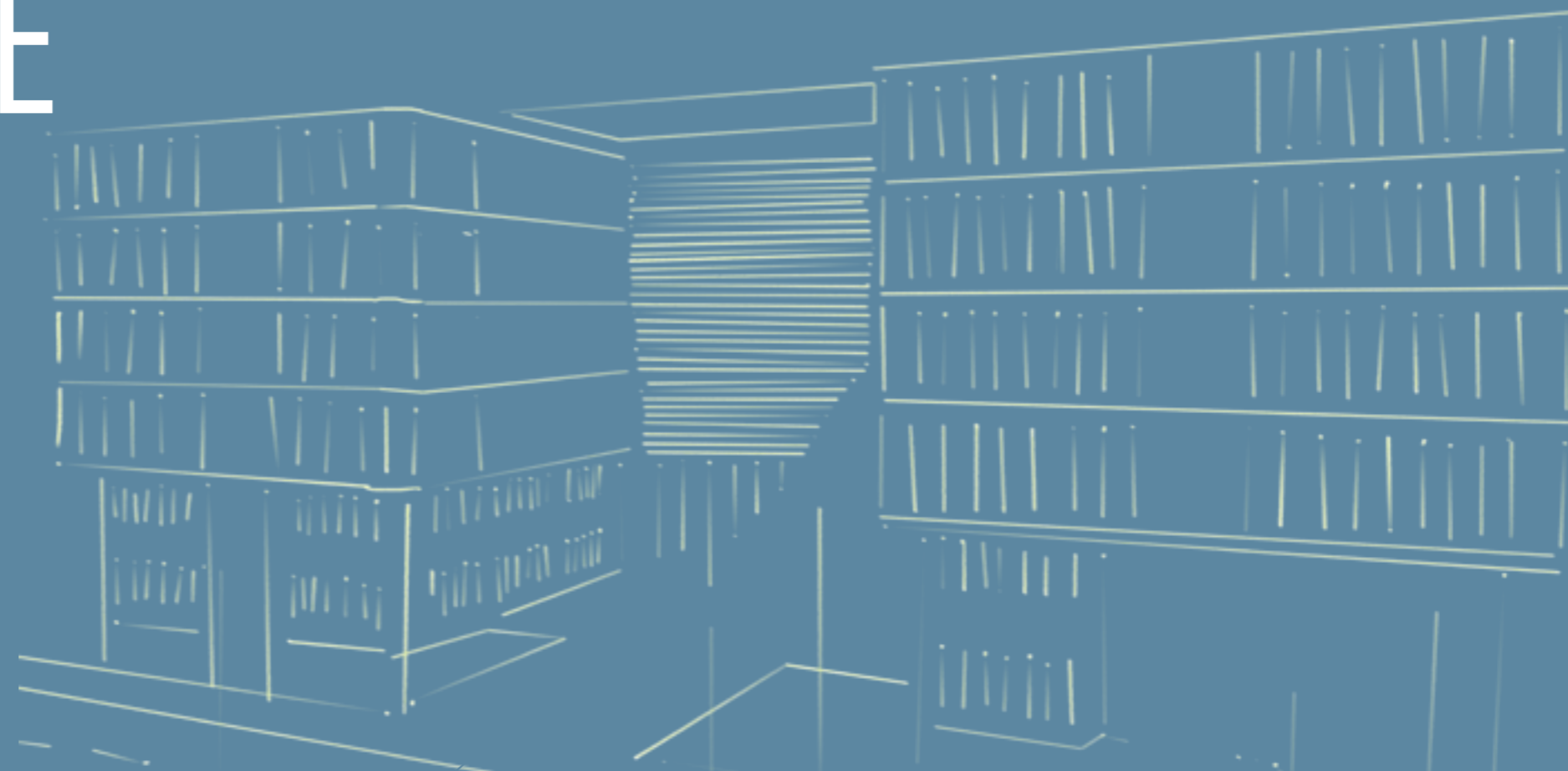
Finally, this year a joint ICM and IHU-A-ICM internal call for high-risk projects made it possible to develop fifteen innovative and unique transversal projects, among which the DYNAMO project that aims at creating a digital model for cerebral evolution in Alzheimer's disease. With time, the project hopes to develop a high-precision predictive medicine instrument. Another noteworthy project is the IncPD project, that is exploring unknown parts of DNA involved in Parkinson's disease.

#### IHU-A-ICM FOUNDERS



# THE INSTITUTE

THE BRAIN AND SPINE INSTITUTE (ICM) IS AN INTERNATIONAL RESEARCH CENTER, ONE OF A KIND THROUGHOUT THE WORLD THANKS TO INNOVATION AT THE HEART OF ITS DESIGN AND ORGANIZATION. THE INSTITUTE'S GOAL, AS IT BRINGS TOGETHER PATIENTS, PHYSICIANS, RESEARCHERS AND ENTREPRENEURS IN ONE PLACE, IS TO ALLOW RAPID DEVELOPMENT OF TREATMENT FOR NERVOUS SYSTEM DAMAGE IN ORDER TO MAKE IT AVAILABLE TO PATIENTS AS EARLY AS POSSIBLE. THE WORLD'S BEST SCIENTISTS, HAILING FROM A DIVERSITY OF BACKGROUNDS AND COUNTRIES, ARE IN CHARGE OF DEVELOPING CUTTING-EDGE RESEARCH AT THE INSTITUTE. TO GIVE RESEARCHERS THE OPPORTUNITY TO TAKE THEIR WORK TO THE NEXT LEVEL AND PROVIDE HOPE TO PATIENTS.



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ICM, an innovative and **unique** model *p.14*

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Our **missions** *p.16*

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Our **values** *p.18*

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Our scientific **priorities** *p.20*

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Highlights and **major breakthroughs** in 2016 *p.22*

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**Women and men** *p.24*

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**Governance** *p.28*

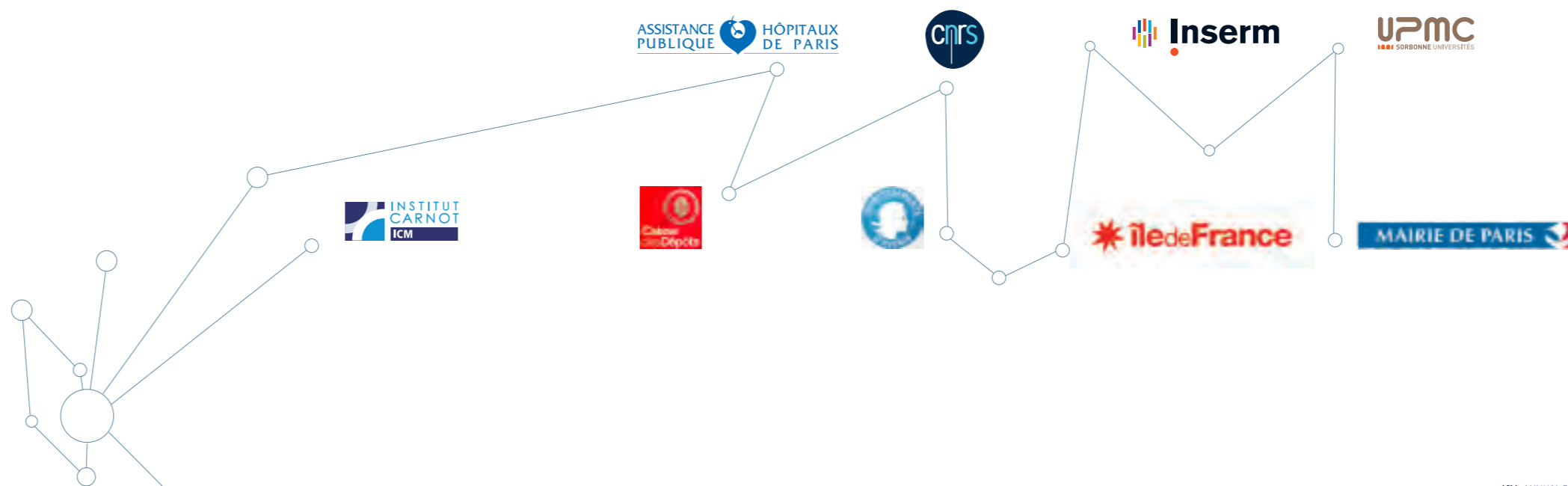
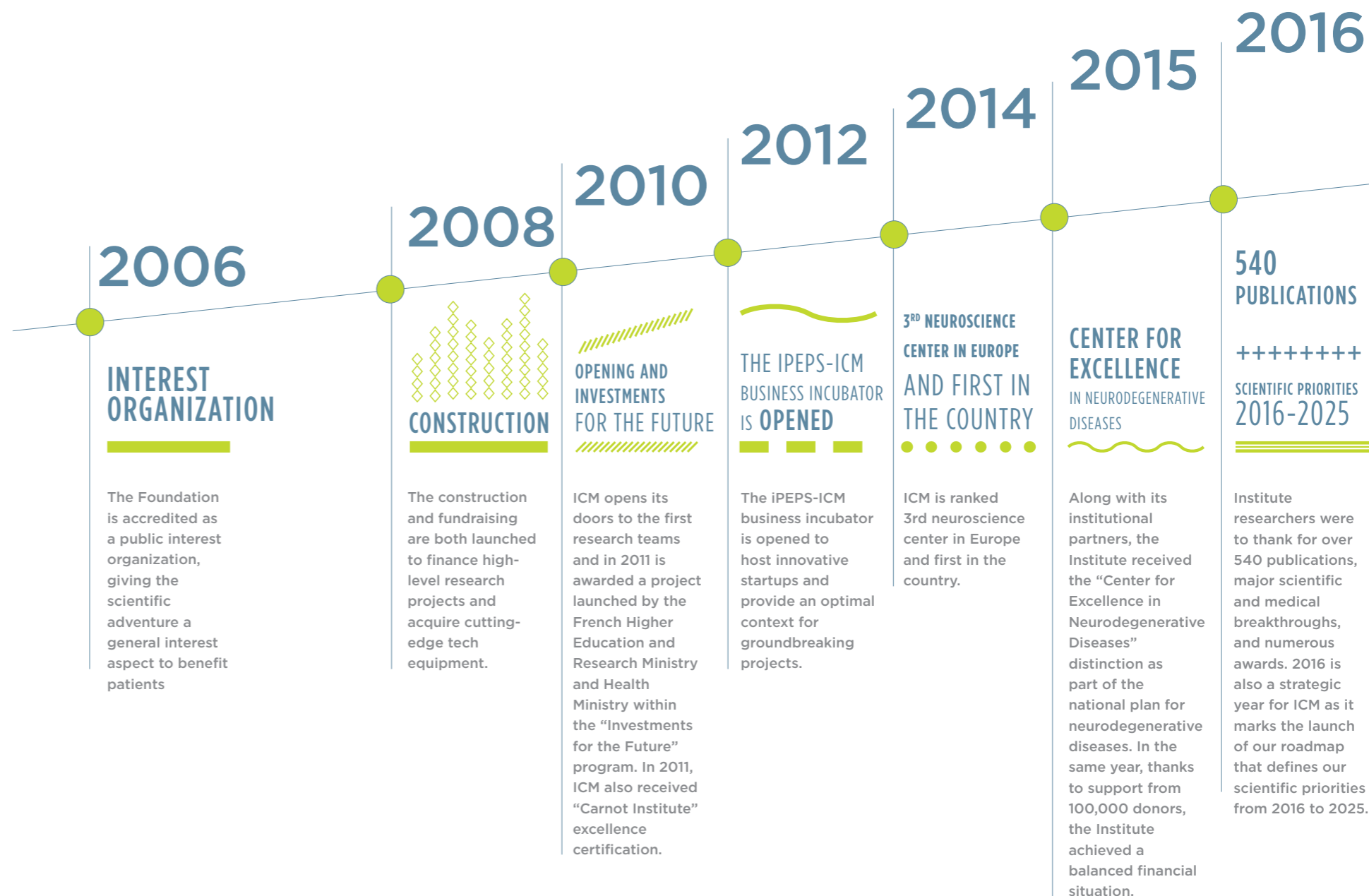
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## ICM STORY OVER THE YEARS...

FACED WITH WORLD HEALTHCARE CHALLENGES IN THE FIELD OF NERVOUS SYSTEM DISEASES AND TRAUMA, WITHOUT EFFECTIVE TREATMENT TO ERADICATE THEM, AND GIVEN THE RISE IN LIFE EXPECTANCY, INNOVATION IS A NECESSITY.

VISIONARIES EAGER TO CREATE A NEW KIND OF ECONOMIC MODEL BASED ON STRONG PUBLIC AND PRIVATE PARTNERSHIPS CAME TOGETHER: THE FOUNDING MEMBERS OF ICM, INCLUDING CURRENT PRESIDENT PROFESSOR GÉRARD SAILLANT, JEAN TODT, PROFESSOR LYON-CAEN, AND PROFESSOR YVES AGID, EMBARKED WITH OUR PARTNERS ON THE INCREDIBLE ADVENTURE OF DESIGNING A NEUROSCIENCE INSTITUTE CAPABLE OF FACING THIS MAJOR CHALLENGE OF OUR TIME.





# RESEARCH WHERE INNOVATION DRIVES ORGANIZATION

FROM A SCIENTIFIC STANDPOINT, ICM APPROACH IS INNOVATIVE WITH A SEAMLESS, OPEN APPROACH TO RESEARCH. RESEARCH TEAMS ARE INDEPENDENT YET LINKED TOGETHER THANKS TO TRANSVERSAL RESEARCH PROGRAMS THAT ALLOW FOR SKILL SHARING.

### FROM THE INFINITELY SMALL...

Fundamental research is research turned towards a discipline's fundamental fields. This encompasses scientific research that does not have a pre-determined financial goal when it is conducted. However, this approach is essential: it is what allows us to learn about and understand how bodily systems function.

### ...TO THE INFINITELY LARGE

Clinical research places individuals at the heart of this all-too-rare approach. Subjects, whether ill or healthy, take part in protocols that help us increase our knowledge of a certain pathology or treatment.

### ONE SINGLE DIRECTION

Translational research is the essential link between fundamental and clinical research. It allows patients to benefit from diagnostic and therapeutic innovation more quickly. Translational research forms the basis of all research conducted at ICM. Bringing these three activities under one roof, in one single direction, means quicker discovery of new treatments.

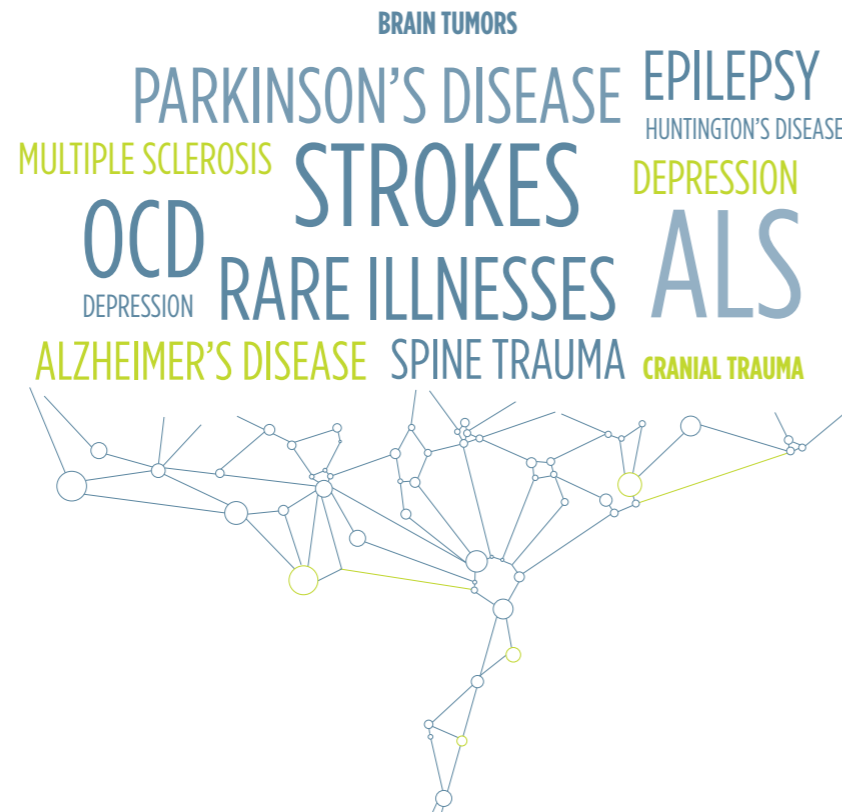
### 4 MAJOR SCIENTIFIC FIELDS

Molecular and Cellular Neuroscience  
Integrated Neurophysiology  
Cognitive Neuroscience  
Clinical and Translational Neuroscience

### ALONGSIDE TRANSVERSAL TOPICS

Neurogenetics  
Neuroimmunology  
Stem Cells and Repair  
Motor Neurons: from cell bodies to synapses  
Study of organelles in neurodegenerative illnesses  
Study of proteinopathies and propagation mechanisms  
Multimodal data analysis  
Rare neurological disease treatment methodology

GLOBAL RESEARCH THAT COVERS THE EXPANSE OF BRAIN AND SPINE DISEASES



## KEY FIGURES FOR 2016

1 LIVING LAB



649 researchers and clinicians

22 000 SQM

17 CUTTING-EDGE TECHNOLOGICAL PLATFORMS

8 floors

26 RESEARCH TEAMS

147631 DONORS

13 INNOVATIVE STARTUPS

276 doctoral and post-doc students



32 countries represented

65 clinical trials

## 2016 HIGHLIGHTS



Over 540 publications in major international journals

BASSEM HASSAN

INTERNATIONALLY-RENOWNED RESEARCHER joins ICM

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INSTITUTE RESEARCHERS rewarded for excellence in their work

ICM RECEIVES "CARNOT 3" CERTIFICATION



3<sup>RD</sup> PLACE IN THE 2016 BIG DATA INNOVATION TROPHY

BRAIN TO MARKET SUMMER SCHOOL IS A SUCCESS

VISIT OF ICM BY THE FRENCH PRESIDENT

# OUR VALUES

THE DRIVING VALUES OF ICM,  
THE FOUNDATION OF EVERYTHING WE DO,  
ARE AN APPROPRIATE RESPONSE  
TO THE NEED FOR CUTTING-EDGE RESEARCH  
ON NERVOUS SYSTEM DISEASES.



## SCIENTIFIC EXCELLENCE

The best researchers are involved with a common goal: to discover

## FIRST AND FOREMOST FOR THE PATIENT

Bringing patients, physicians researchers and entrepreneurs  
together to advance more rapidly than illness

## FLEXIBILITY

To let scientific creativity express itself

## OPENNESS

Create a place for sharing, to encourage interaction  
with the greater community and industry partners

## PASSING ON KNOWLEDGE

On a national and international level

## ACCELERATE

To apply tomorrow's solutions as early as possible



## SCIENTIFIC PRIORITIES TO DELIVER ON CHALLENGES

**PREVENT** MEANS INHIBITING ILLNESS AND ITS APPEARANCE.

**TREAT** MEANS SLOWING DOWN OR STOPPING PATHOLOGICAL EVOLUTION.

**REPAIR** MEANS REBUILDING NEURAL CIRCUITS AFTER DAMAGE TO THE NERVOUS SYSTEM.

**RELIEVE** TO ALLEVIATE OR ELIMINATE SYMPTOMS SUCH AS MEMORY LOSS, LANGUAGE DISORDERS, PAIN, ANXIETY, DEPRESSION...

THE GOAL IS TO PRODUCE INTERNATIONAL-LEVEL RESEARCH BY COMBINING SCIENTIFIC CREATIVITY AND THERAPEUTIC PURPOSE

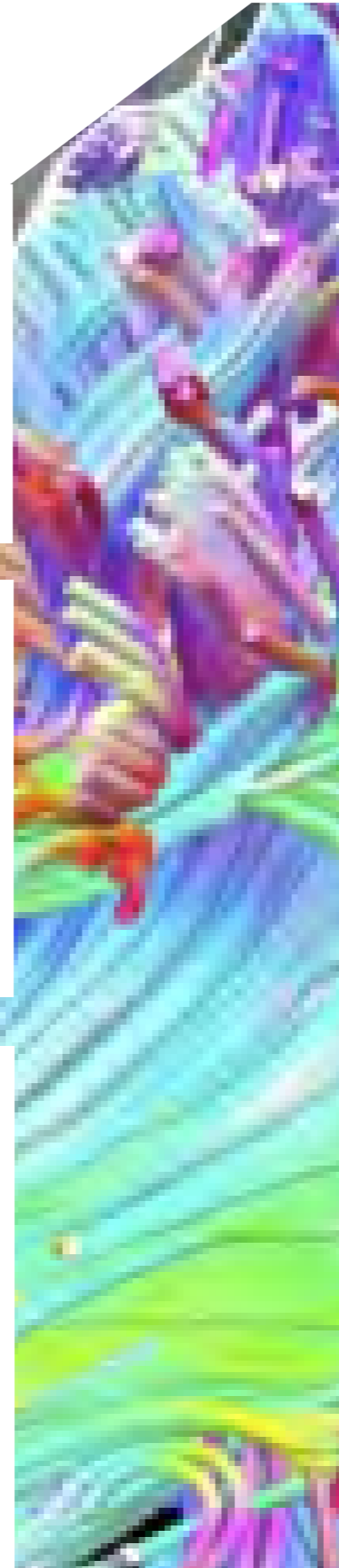
ICM'S SCIENTIFIC PROGRAM IS BASED ON THE FOLLOWING VALUES:

- Create a research "strike force", leading to recruitment of the best French researchers ranked by the High Council of Research Evaluation and Higher Education (HCERES) and the best international investigators evaluated by the International Council for Science
- Make cutting-edge technology research platforms available as well as a high-performance Center for Biological Resources
- Develop multidisciplinary "translational" research, in collaboration with industry partners and the best research centers throughout France and the world.
- Define priority research areas.

### YOUR BRAIN, OUR PRIORITY

TOGETHER, ICM'S 650 RESEARCHERS, ENGINEERS AND TECHNICIENS ARE WORKING TO:

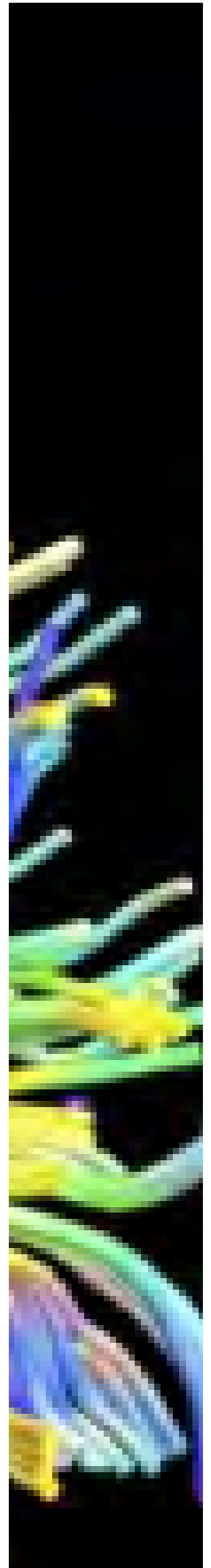
- Diagnose neurodegenerative diseases earlier
- Predict their progress and improve treatment
- Develop new diagnostic instruments
- Detect new markers
- Model disease progression to diagnose illness earlier and anticipate treatment
- Offer personalized treatment
- Delay disease progression
- Repair affected cells
- Explore new research on causes and mechanisms involved in neurodegenerative diseases
- Study neural development mechanisms to answer the following question: why do some brains lose their homeostatic capability, setting the stage for neurodegenerative diseases?



## OUR SCIENTIFIC STRATEGY

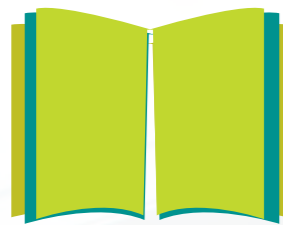
### 8 PRIORITY AREAS FOR 2016-2025

- RECRUIT new teams
- DEVELOP COLLABORATION amongst teams and ENCOURAGE A MULTIDISCIPLINARY APPROACH to test new scientific hypotheses in an open-minded setting
- EMPHASIZE CLINICAL RESEARCH to succeed, within 3 years, in offering new clinically-approved treatment options to patients
- ACCELERATE DEVELOPMENT OF NEUROINFORMATICS and implement tools for a more predictive form of medicine, with a more quantitative approach in diagnosis, prognosis and treatment
- PROMOTE eXCELLENCE IN EDUCATION AND KNOWLEDGE TRANSFER in neuroscience and the field of nervous system diseases. Our ambition is to create a place of learning when interactions are transdisciplinary
- REINFORCE SERVICES FOR INCUBATED STARTUPS to help them with more rapid financing to get products to market more quickly
- MAKE CUTTING-EDGE EQUIPMENT AVAILABLE TO RESEARCH TEAMS as needed for their research to remain competitive on an international level, stay ATTRACTIVE to build NATIONAL AND INTERNATIONAL PARTNERSHIPS needed to carry out our missions and meet our goals
- REINFORCE FUNDRAISING ACTIVITIES



# 12 MONTHS OF PROGRESS AND DEFINING MOMENTS

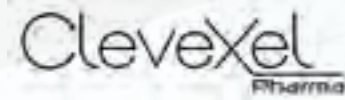
## WHAT TO TAKE AWAY FROM OUR KEY MOMENTS



**PUBLICATIONS ON THE RISE!**  
540 publications in major international journals

### A WORLD-CLASS RESEARCHER JOINS ICM

**Bassem Hassan**, neuroscientist, joined ICM in January 2016. He leads the "Brain Development" team and is focused on genetic mechanisms that control early nervous system development, from cell specification to neural network development, and on processes involved in neurological diseases.



### CLEVEXEL PHARMA PHARMA AND ICM IN THE FIGHT AGAINST PARKINSON'S DISEASE

ICM and pharmaceutical company Clevexel Pharma, directed par Christian Bloy, signed a partnership deal to develop **new treatment** against central nervous system diseases and, more specifically, **Parkinson's disease**.

### A GOOD RECORD FOR ANR PROJECTS

ICM teams were awarded **11 ANR projects**: 3 as coordinator and 8 as partner in 2016 for a total of 2,806,588 € versus 2 projects awarded in 2015. Additionally, **30 projects** were submitted this year, versus 23 in 2015.

**2 806 588 €**

### THE FRENCH PRESIDENT VISITS ICM

French President **François Hollande** was present at ICM during International University-Medical Center Institute (IHU) Day. He attended a presentation of ICM by the management team and a presentation of the research done by three researchers and clinicians: **Claire Wyart, Lionel Naccache, and Carine Karachi**. He also visited the **Magnetoencephalography (MEG)** platform with **Nathalie George**.



### ICM RECEIVES "CARNOT 3" CERTIFICATION

ICM received Carnot certification renewal, as part of the "Carnot 3" program. Carnot Institutes are major players when it comes to supporting public research institute development and relationships with businesses. This certification will increase exposure in order to implement **large-scale research projects** at ICM and **accelerate discovery and commercialization** of patient treatments.



### LIVING LAB AT THE PARIS VIVA TECHNOLOGY CHALLENGE

The **uCIL Living Lab**, launched at ICM in 2015, participated in the first edition of the Paris Viva Technology Challenge that aims to bring **investors and managers** of innovative companies together along with startups from around the world. The uCIL Living Lab is involved in coming up with **innovations, technology, products, and services** to assist with real-life needs in healthcare in the fields of **neurology and psychiatry**.



### BRAIN TO MARKET SUMMER SCHOOL

The "Brain to Market" Summer School, from August 29th to September 2nd 2016 at ICM, combined **translational neuroscience** and **entrepreneurial learning** in an intensive training program. This year, participants worked on **epilepsy**.

### THE BRITISH MINISTER FOR LIFE SCIENCES VISITS ICM

**George Freeman**, British Minister for Life Sciences, was welcomed to ICM by **Alexis Brice**, ICM and IHU-A-ICM Chief Executive. During their meeting, Minister Freeman and Professor Brice covered ICM's **model and organization** as well as research and **development topics, Big Data, industry relations and accelerated access to the innovative products market**.



### 3<sup>RD</sup> PLACE IN THE 2016 BIG DATA INNOVATION TROPHY

**BioSerenity**, specialized in smart healthcare solutions and connected medical equipment and **Dataiku**, **producer of Big Data project acceleration program Dataiku DSS**, won third place for their Metadata. Lab project in the 2016 Big Data Innovation Trophy. The project, developed with support from the **Brain and Spine Institute -ICM** and **Télécom ParisTech**, aims at speeding up diagnosis of epilepsy patients: it uses smart clothing developed by BioSerenity to collect patient health data, which is then analyzed using the predictive analysis platform developed by Dataiku.



### 2016 – 2025

#### LAUNCH OF OUR ROADMAP

ICM's strategy is focused on 8 major areas: **recruitment of new teams, learning & training, neuroinformatics, commercialization, clinical research, cellular & molecular imaging, big brain theory program, and fundraising**.



# A COMMUNITY DEDICATED TO NEUROSCIENCE

ICM IS, FIRST AND FOREMOST, A HUMAN ADVENTURE, A COMMUNITY OF EXPERTS THAT ARE ACTIVELY INVOLVED IN FIGHTING AGAINST NERVOUS SYSTEM DISEASES ON A DAILY BASIS.

Researchers, doctors, biologists, pharmacologists, mathematicians, engineers, physicians, programmers, technicians, paramedical staff, support staff... ICM brings together multidisciplinary individuals who work hand in hand. Thanks to close collaboration between researchers and doctors, patients benefit from diagnostic and therapeutic innovations more rapidly. ICM's strength lies in the interaction between experts of different fields and the pooling of their skills to discover treatments as fast as possible.



**"I develop far-reaching translational research projects.** I discovered just how enriching it could be to bring fundamental and clinical research together. I decided to join ICM after several years doing research in a major London lab. The quality of my work changed drastically, because I now interact with neurobiologists and pharmacologists on a daily basis who bring different approaches to the table. I'm passionate about this kind of interaction. By bringing their knowledge on fundamental mechanics with my clinical results, I have the opportunity to develop actual translational research projects with quicker progress. ICM is truly unique!"

**BENEDETTA BODINI,**  
INSERM NEUROLOGIST  
AND RESEARCHER AT ICM



**I work with patients with spinal damage. The future seems to lie in the ability to blend energy and knowledge.** ICM is at the heart of the hospital, a couple feet away from the orthopedic and trauma department I am in charge of. This geographical proximity is very practical: it's that simple! Given how complex my schedule is at the hospital, it allows me to participate in fundamental research on the spinal cord developed at ICM. Surgeons and researchers are mutually enriching thanks to our knowledge and different approaches towards science and progress. It's exceptional to be able to go from the operating room and patient appointments to laboratory study of the spinal cord. I am absolutely positive that our interactions will benefit patients."

**PROFESSOR HUGUES PASCAL-MOUSSELD,**  
ORTHOPEDIC SURGERY AND  
TRAUMATOLOGY DEPARTMENT CHIEF  
AT PITIÉ-SALPÊTRIÈRE HOSPITAL



**"I develop innovative instruments for tomorrow's medical world.** With the Dynamo (DYNAMIC Models) project, in collaboration with Professor Hampel, our teams are striving to create numerical modelling of brain evolution during Alzheimer's diseases, in hopes of creating a precise medical instrument, both predictive and personalized. Data comparison between patients and the model will allow teams to personalize the diagnosis and predict disease progression to put appropriate care in place as early as possible and implement tailored treatment. This innovative and interdisciplinary project was possible at ICM thanks to the constant interaction with clinicians made possible at the Institute."

**STANLEY DURRLEMAN,**  
INRIA RESEARCH MATHEMATICIAN  
AT ICM



**"I am in charge of care management and development in the neurology department and am involved in the University Medical Center's three-fold mission:** care, learning and training, and research. ICM-A-IHU helped train Nursing and Paramedical Research Committee members on how to develop a research project, allowing us to win a national call for projects with the Neurosex project. The project will implement nursing consultations in sexual health for patients with neurological diseases, and it motivated me to do a thesis supported financially by ICM-A-IHU. Thanks to ICM-A-IHU, the department developed a shared scientific culture and opens the door to innovation and research for hospital staff. It's a fantastic way to bring meaning back into what we do!"

**SANDRINE LEFEBVRE,**  
SENIOR HEALTHCARE MANAGER  
IN THE NERVOUS SYSTEM DISEASES  
DEPARTMENT AT PITIÉ-SALPÊTRIÈRE  
HOSPITAL



**"I develop statistical analysis instruments and help users with the CENIR MEG-EEG platform.** The unique side of ICM is that it puts equipment, infrastructure and staff under one roof, allowing us to pool resources, build collaborations, and help innovative projects come to light. I now work with everyone at ICM: researchers, doctors, engineers... on projects not only linked to the MEG-EEG but that also pertain to functional MRI, spectroscopy and TMS. ICM trusted me to organize a statistics course with Professor Hervé Abdi from Dallas University: it was a success, and I hope to get the opportunity again."

**LYDIA YAHIA-CHÉRIF,**  
RESEARCH ENGINEER  
ON THE MEG-EEG PLATFORM

## WOMEN AT ICM

THE INSTITUTE WAS FOUNDED ON THE IDEA THAT FEMALE SCIENTISTS PLAY A FUNDAMENTAL ROLE IN RESEARCH AND OUR SOCIETY. A THINK TANK WAS IMPLEMENTED AT THE INSTITUTE TO FOCUS ON CURRENT AND FUTURE CONCERNS OF FEMALE RESEARCHERS WITHIN THE INSTITUTE.

The goal of the think tank, named XXInitiative and made up of women and men dedicated to promoting the role of women in science, is to come up with and execute effective action to:

- Encourage female scientists and their career
- Promote access to high-level scientific positions for women
- Drive governing bodies and scientific events towards gender parity



## ICM BY THE NUMBERS

**56** HOSPITAL PRACTITIONERS AND PARAMEDICAL STAFF

**135** RESEARCHERS

**55** POST-DOCTORAL RESEARCHERS

**92** DOCTORAL RESEARCHERS

**181** ENGINEERS AND TECHNICIANS

**88** ADMINISTRATIVE STAFF

**32** DIFFERENT COUNTRIES REPRESENTED

## SO MUCH HAPPENING AT ICM

Les Ajités, ICM Youth Organization and Associates, was founded in 2012. It organizes all sorts of activities from yoga, salsa dancing, Science-Pizza, Happy Hours to practice for oral presentations and doctoral and post-doc workshops, an opportunity to develop interdisciplinary

research projects. The organization aims at developing communication, interaction and collaboration among ICM staff. It is frequently updated, bringing a strong internal motivation and forward drive to the Institute. For those constantly on the lookout for new projects and who enjoy

meeting new people, ICM is a unique opportunity to think differently, open up our approach and ways of working, and to innovate. Working at ICM means belonging to something greater: a community dedicated to Neuroscience.



## GOVERNANCE FOCUSED ON EFFICIENCY AND FLEXIBILITY



ICM's governance is based on a strong partnership between the public and private sectors, as illustrated by its board members and governing bodies. They ensure that structures and resources properly match scientific goals. The Executive Committee implements monitoring to ensure efficient management is in place, as well as ongoing evaluation of work done by the teams and their results, to guarantee continued excellence. Through its Annual Report, ICM is dedicated to providing information on its mission and results for total transparency in its partnerships.

In March 2011, ICM signed, with academic partners AP-HP, CNRS, Inserm and UPMC, an agreement which governs the modalities of work in common of research teams under the direction of ICM general director. This agreement provides the creation of a Coordination Committee (which stem from the Executive Board of ICM), whose role is to make proposals to the Executive Board of ICM on the research strategy of the Institute.

In 2016, the Director of ICM was appointed General Director of the IHU-A-ICM to ensure both entities benefit from one single governing body as their social mission shares numerous traits, with a common roadmap. The Board of Directors also approved the merger of both entities, planned for 2017.

### THE BOARD OF DIRECTORS

The board of directors manages Institute affairs through its proceedings. It weighs in on strategic directions presented by the Chief Executive, adopts budgets and approves accounts.

The Foundation is governed by a board made up of fifteen members including:

- 5 founding college members;
- 3 members of the college of qualified persons;
- 4 ex officio members;
- 3 members of the college of friends of the foundation.

The college of founders includes not only the founders themselves, but also members selected by the founding college and renewed by it.

The college of qualified persons includes individuals chosen for their competency in the foundation's field.

The college of ex officio members includes representatives from AP-HP, CNRS, INSERM and Pierre et Marie Curie University.

The college of friends of the foundation is comprised of individuals appointed by the Circle of Friends of ICM.

With the exception of founding members, all board members are appointed for a three-year term with one third renewed annually. Their term can be renewed.

The bureau meets at least four times per year at the initiative of the President of the Foundation in order to:

- Make arrangements, acting on authority of the Board of Directors when applicable, to ensure the foundation runs smoothly between board meetings;
- Manage preparation and monitoring of decisions made by the board of directors.

### BOARD OF DIRECTORS MEMBERS

**Gérard SAILLANT**  
Professor of orthopedic and trauma surgery, President of ICM

**Jean TODT**  
President of the FIA, Vice-President of ICM

### COLLEGE OF FOUNDERS

**Serge WEINBERG**  
**Jean GLAVANY**  
**Jean-Pierre MARTEL**  
**Gérard SAILLANT**  
**Jean TODT**

### COLLEGE OF QUALIFIED PERSONS

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Collège de France  
**Richard FRACKOWIAK**  
École Polytechnique Fédérale de Lausanne  
**Elisabeth TOURNIER-LASERVE**  
Université Paris Diderot

### COLLEGE OF EX OFFICIO MEMBERS

**Bernard POULAIN**  
Representative of the National Center for Scientific Research (CNRS)  
**Thierry DAMERVAL**  
Representative of the National Health and Medical Research Institute (INSERM)  
**Bruno RIOU**  
Representative of Pierre et Marie Curie University (UPMC)  
**Ali FERHI**  
Representative of Assistance Publique - Hôpitaux de Paris (AP-HP)

### COLLEGE OF FRIENDS OF THE FOUNDATION

**Maurice LÉVY**  
**Jean-Philippe HOTTINGUER**  
**David de ROTHSCHILD**

### GOVERNMENT COMMISSIONER

**Philippe RITTER**

### FOUNDING MEMBERS

**Gérard SAILLANT**,  
Professor of orthopedic and trauma surgery, President of ICM

**Jean TODT**  
President of the FIA, Vice-President of ICM

**Yves AGID**  
Honorary Professor of neurology and neuroscience  
**Luc BESSON**  
Director

**Louïs CAMILLERI**  
President of Altria

**Jean GLAVANY**  
Former Minister, Representative of the Hautes-Pyrénées  
**Maurice LÉVY**

President of the Board of Publicis Group, Co-President of the Friends of ICM Committee

**Olivier LYON-CAEN**  
Professor of neurology, former Director of the Nervous System Diseases department at Pitié-Salpêtrière University Medical Center

**Jean-Pierre MARTEL**  
Lawyer,  
**Max MOSLEY**

Former President of the FIA  
**Lindsay OWEN-JONES**

Honorary President of L'Oréal, Honorary President of the Friends of ICM Committee

**David de ROTHSCHILD**  
President of Rothschild & Cie bank,

Co-President of the Friends of ICM Committee

**Michael SCHUMACHER**  
Formula 1 Pilot

**Serge WEINBERG**  
President of Weinberg Capital Partners, ICM Treasurer

### FRIENDS OF ICM

**Lily SAFRA** Honorary President, President of the philanthropic Edmond J. Safra Foundation

**Gérard SAILLANT** Professor of orthopedic surgery and traumatology, President of ICM

**Jean TODT** President of the FIA, Vice-President of ICM  
**Lindsay OWEN-JONES** Honorary President of L'Oréal, Honorary President of the Friends of ICM Committee

**Maurice LÉVY** President of the Board of Directors of Publicis Group, Co-President of the Friends of ICM Committee

**David de ROTHSCHILD** President of the Rothschild & Cie Bank, Co-President of the Friends of ICM Committee

**Jean-Pierre MARTEL** Lawyer

**Serge WEINBERG** President of Weinberg Capital Partners and ICM Treasurer

### AUDIT COMMITTEE

**Serge WEINBERG**  
Audit Committee President

**Thierry DAMERVAL**  
Deputy Chief Executive of INSERM

**Jean GLAVANY**  
Former Minister, Representative of the Hautes-Pyrénées

**Jean-Pierre MARTEL**  
Lawyer, Founding Member of ICM

### COORDINATION OF FOUNDATION AND PUBLIC PARTNER RELATIONSHIPS COMMITTEE

**Gérard SAILLANT**  
Professor of orthopedic and trauma surgery, President of ICM

**Ali FERHI**  
Representative of AP-HP

**Bernard POULAIN**  
Representative of CNRS

**Thierry DAMERVAL**  
Representative of INSERM

**Bruno RIOU**  
Representative of UPMC

### AMBASSADORS

**Jean RENO**  
Acteur  
**Michèle YEOH**  
Actrice

### THE SCIENTIFIC ADVISORY BOARD

The International Scientific Advisory Board (SAB) assists the Board of Directors or Chief Executive on strategic directions, programs, or scientific strategies for the Institute. Its members are top international neuroscience experts. Every five years, ICM is assessed, as a Mixed Research Unit (UMR), on the quality of its research, its organization, strategy, and five-year scientific plan.

Research projects are assessed by the SAB, with the mission of advising the Institute and helping it define its overall approach. Following a period of discussions, the SAB provides input that is taken into account to build the file for assessment by the Committee for Assessment of Research and Higher Education (HCERES).

*"Our challenge is to create an Institute for Excellence in Research that is an international leader in Neuroscience".*

**Professor Alexis Brice**,  
Chief Executive of ICM

**Michael Shelanski** -  
President

**Dimitri Kullman**

**Gabor Tamas**

**Peter Brown**

**Brad Hyman**

**Stephen Hauser**

**Bill Richardson**

**Helen Mayberg**

**Christian Buchel**

**Arnold Kriegstein**

**Masud Husain**

**Michael Heneka**

# MISSION

UNDERSTANDING THE NERVOUS SYSTEM IMPLIES HAVING A HUMAN SKILL SET AND THE INSTRUMENTAL AND ORGANIZATIONAL CAPACITY TO OBTAIN RELEVANT DATA FOR EACH LEVEL OF RESEARCH, TO ANALYZE FUNDAMENTAL DATA AND TO CORRELATE AND INTEGRATE IT TO GIVE RISE TO A COHERENT VISION, FROM THE MOLECULAR AND CELLULAR LEVEL UP TO COGNITIVE AND BEHAVIORAL LEVELS.



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Awards and distinctions *p.52*

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**Knowledge** sharing & **innovation**

Research & Technology Development Office *p.62*

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iPEPS-ICM incubator *p.66*

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SUPPORT **our mission**

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# A KEY PLAYER AT THE HEART OF 21<sup>ST</sup> CENTURY CHALLENGES

NEARLY ONE BILLION INDIVIDUALS WORLDWIDE ARE AFFECTED BY NEUROLOGICAL OR PSYCHIATRIC ILLNESS, AND 80% OF THESE INDIVIDUALS DO NOT BENEFIT FROM APPROPRIATE OR ADEQUATE TREATMENT. THE CHALLENGE IS HUGE. FOR YEARS, THE INDUSTRY HAS FACED INCREASING FAILURE RATES IN INNOVATIVE DRUG DEVELOPMENT: 15% OF CANDIDATE DRUGS THAT UNDERGO CLINICAL TESTING ARE PUT ON THE MARKET, YET THIS FIGURE DROPS TO 7% FOR THE NERVOUS SYSTEM. ADDITIONALLY, IN THIS EXTREMELY COMPLEX FIELD OVER 12 YEARS ARE NEEDED FOR A DRUG TO BE READY VERSUS, FOR EXAMPLE, 6.5 YEARS IN THE FIELD OF CARDIOVASCULAR ILLNESS.

## WHY IS IT TAKING SO LONG TO DEVELOP TREATMENT FOR NERVOUS SYSTEM DISEASES?

There are several reasons. First of all, the major neurodegenerative diseases share a late appearance of clinical symptoms. For example, the first signs of Parkinson's disease appear when over 80% of dopaminergic neurons in the substantia nigra have already been destroyed. In the same manner, the brain can be flooded with amyloid plaques without a patient showing any clinical symptoms of Alzheimer's yet. Treatment is administered late in the disease, so its efficacy is limited due to irreversible damage already experienced by the brain. One of the most promising approaches to reach very early detection - at the infraclinical stage - of the disease consists in multimodal biomarker research on individuals with a high risk of developing the disease. These high-risk individuals are those related to patients with a genetic form of the disease.

A second reason lies in the fact that the design itself of candidate drugs to treat nervous system diseases is complicated by the "Great Wall of China" that is the blood-brain barrier, which prevents drugs from passing through. The chemical and protein engineering required to ensure that a specific therapeutic molecule reaches the appropriate target cell is colossal. The third major obstacle in developing drugs that work is the relevance of new targets. Action directed against a certain cellular target can have completely antagonistic effects from one area of the brain to another, increasing the risk of side effects. Finally, lack of knowledge surrounding disease physiopathology and the inexistence of satisfactory preclinical modelling leads to dramatic failures in drug development.



*"In Europe, 1 in 8 individuals is affected by nervous system illness"*

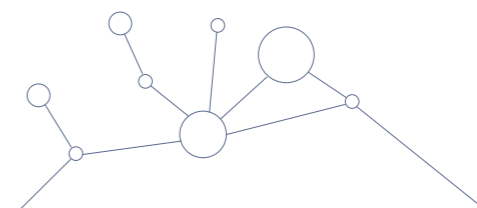
## ICM: A HIGH-LEVEL INSTITUTE FACED WITH EVEN HIGHER STAKES

ICM's defining strength is its ability to take into account the whole healthcare process rather than drugs alone. This approach brings together research, platform and expert support, startup technology and national and international network involvement.

Moreover, success - in particular that of the Center for Clinical Investigation, housed in ICM - was obtained through the creation of a collaborative environment between researchers, doctors and patients. Industry partnerships between the public and private sector at ICM helped accelerate and turn discoveries into practical treatment solutions for clinical use, while lowering academic

constraints often found in research. The Nervous System Diseases department opens its doors to 80,000 patients every year, who have access to the latest treatment breakthroughs and are active participants in research. Positioned at the crossroads of various fields, ICM asserts a global approach to illness, and is lowering the barriers separating pharmacy, technology and humanities to design integrated healthcare that starts with prevention, leading up to management of disabilities, using technology as a dedicated instrument. This strategy is implemented with the development of a startup accelerator, currently hosting 16 businesses, the new living lab

dedicated to tech solutions, and the neuroinformatics project that aims at implementing instruments to encourage more predictive and quantitative medicine when it comes to diagnosis, prognosis and therapy. Finally, the creation of a hospital living lab helps accelerate development of shared early-stage projects with "medtech" companies as well as business focused on telemedical services. One of the main goals is to increase the number of French startups in the field by dedicating the necessary resources to designing functional prototypes approved for patient use.

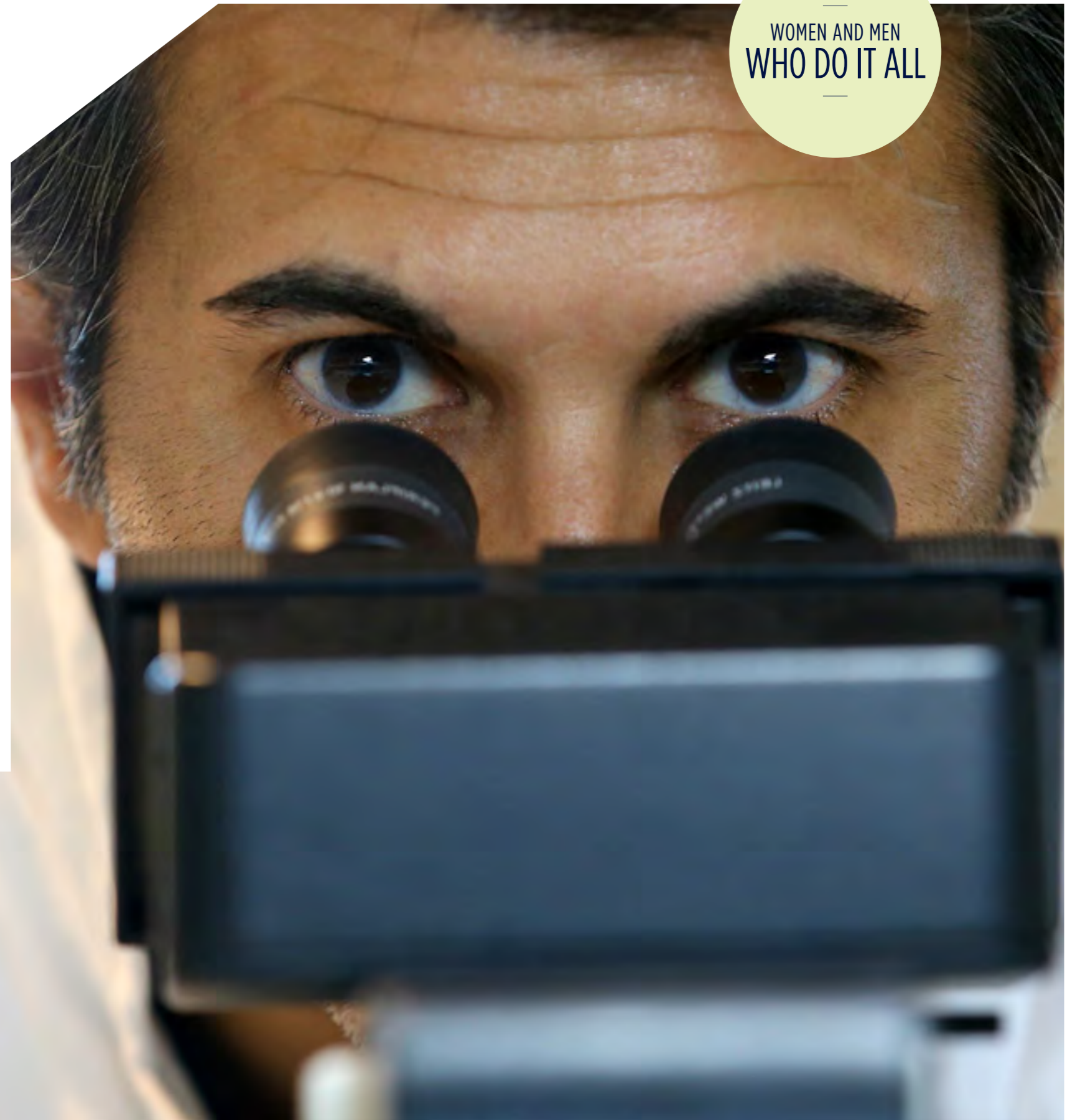


## BEING A RESEARCHER TODAY

Researchers today are women and men who do it all: to recruiting top talent, building a multidisciplinary and multicultural team and securing financing. Being a researcher today means solving scientific problems, sharing results with scientists and the general public while keeping an eye on research elsewhere around the world. Being a researcher is motivating, but also very demanding!

For researchers and experts, ICM is the ideal place to come up with new ideas, nurture broader reflection, and build projects. The diversity of talent and unique interactions at the Institute enrich the everyday work of research team. To work on a project together, potential partners need to be available and the timing has to be just right. Building a suitable environment is of prime importance.

Scientific research is a long-term endeavor and requires financial, human, technological and environmental investment. Some research that may go under the radar could possibly reveal its full potential on the long term.





# RESEARCH PROGRAMS AT THE HEART OF HEALTHCARE

## 4 RESEARCH PRIORITIES

### FOCUS 1 : UNDERSTANDING THE BRAIN'S MAJOR FUNCTIONS

#### BEHAVIOR AND COGNITION

Perception, language, motivation, reasoning, emotions, creativity, memory, attention, and conscience form the basis of human behavior. To describe and understand the brain's major functions, ICM teams rely on experimental methods from the most subtle clinical analysis, electrophysiological testing, to brain imaging. Thanks to this approach, Institute researchers study the relationship between genetics, brain function, and behavior in healthy individuals as well as patients with neuropsychiatric disorders (depression, OCD, trauma, apathy, dementia...) in order to identify new markers of behavior and cognition both normal and abnormal. The goal is to offer diagnostic tools and treatments tailored to each patient.

### FOCUS 2 : UNDERSTANDING NEURAL INTERACTION

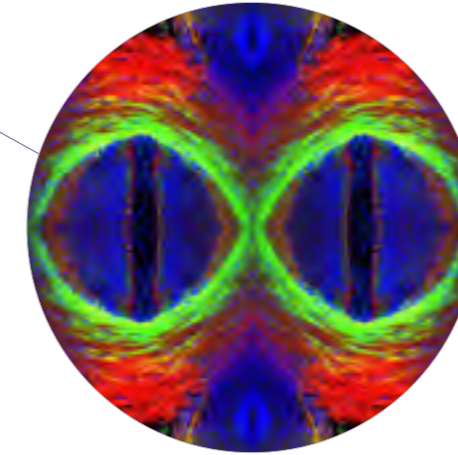
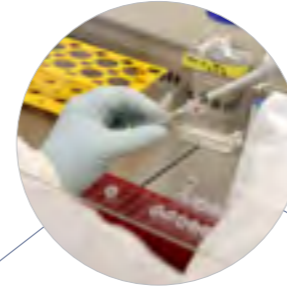
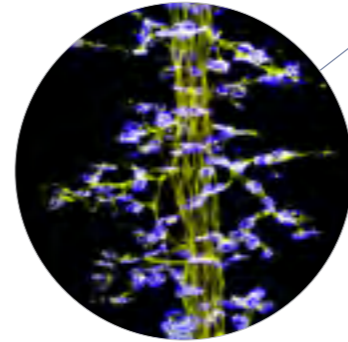
#### NEUROPHYSIOLOGY

Nerve impulse transmission in the various neural networks is the basis of nervous system activity. It relies on excitability, conduction, and transmission of the nerve impulse generated by each neuron and on network plasticity. Brain and spinal cord neurophysiology, from single cells to the whole network, help understand the principles through which neural activity leads to specific functions that induce normal or abnormal behavior. The study of neural networks is a foundational aspect of therapeutic research for various illnesses: epilepsy, trauma, neurodegenerative illnesses, psychiatric disorders. The goal, on the one hand, is to reach a better understanding of neural and network physiology to improve disease treatment. On the other hand, it is to better understand the role played by neural activity during development and repair in neurodegenerative illnesses. Surface electrophysiology (transcranial magnetic stimulation) and intracerebral electrophysiology (deep brain stimulation) in humans are one of ICM's greatest strengths. They make it possible to treat certain illnesses such as Parkinson's disease, OCD, essential tremor, to encourage rehabilitation after a stroke and to monitor severe forms of certain diseases such as epilepsy.

**FOCUS 3 : DECRYPT UNDERLYING CELLULAR AND MOLECULAR MECHANISMS OF BRAIN FUNCTION IN NORMAL AND PATHOLOGICAL CONDITIONS**

**CELLULAR AND MOLECULAR BIOLOGY**

ICM teams working in molecular and cellular neuroscience are involved in a collaborative effort to understand normal brain and spinal cord development as well as the reasons behind dysfunction in the case of aging and neurological illness (neurodegenerative diseases, multiple sclerosis, epilepsy, brain tumors). ICM's strategy is focused on evaluating the influence of genetics, dissecting the molecular process behind intracellular signalling, understanding the role of various cell types and the complex cell interactions in normal and pathological states. Understanding the molecular and cellular basis of nervous system disorders is key to figuring out what the underlying mechanisms of disease are and to developing new diagnostic and treatment approaches.



**FOCUS 4 : TRANSFERRING KNOWLEDGE TO IMPROVE PREVENTION AND TREATMENT OF NERVOUS SYSTEM DISEASES**

**CLINICAL AND TRANSLATIONAL RESEARCH**

Clinical and translational research dedicated to neurological and psychiatric illnesses aims at developing innovative therapies for nervous system diseases. By bringing patients, doctors and researchers together in one place, ICM's goal is to encourage rapid development of treatments for nervous system damage in order to pass it along to patients as early as possible: from treatment identification on simple models in a laboratory setting to clinical trials on patients at the Center for Clinical Investigation at ICM. ICM's strength also lies in the iPEPS-ICM incubator that creates a pathway between research and resulting real-life medical applications. The implementation of a living lab (UCIL) where patients, developers and healthcare professionals meet to generate ideas and apply them is the ultimate link in the chain created to meet patient needs. The goal of this research is to develop instruments that will help with early disease diagnosis and to explore innovative therapeutic options. Therapy means drugs to fight the disease and slow its progress, but it also means medical techniques such as deep brain stimulation to help patient well-being or digital solutions that improve patient independence like smartphone apps, connected devices or therapeutic games.



# 26 TEAMS TACKLING THE NERVOUS SYSTEM LESIONS IN 2016

ICM'S 26 RESEARCH TEAMS WORK HAND IN HAND TO UNDERSTAND NORMAL AND PATHOLOGICAL BRAIN FUNCTIONS, TO DIAGNOSE NEUROLOGICAL ILLNESS AS EARLY AS POSSIBLE AND TO IDENTIFY POSSIBLE TREATMENTS.

## CELLULAR PHYSIOLOGY OF CORTICAL MICROCIRCUITS

Team leader(s) : Alberto BACCI

**Principal investigators**  
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Xavier DREVELLE

GENEROUS SUPPORT GRANTED BY :  
ANR - Agence nationale de recherche DGCS - Ministère de l'Égalité des Territoires et du Logement  
ENP -Ecole des neurosciences Paris Ile de France  
FRM - Fondation pour la Recherche Médicale

## CELLULAR AND MOLECULAR APPROACHES FOR MYELIN REPAIR

Team leader(s)  
Anne BARON VAN EVERCOOREN  
Brahim NAIT OUMESMAR

**Principal investigators**  
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Brahim NAIT OUMESMAR  
Lamia BOUSLAMA  
Violetta ZUJJOVIC

GENEROUS SUPPORT GRANTED BY :  
AFM - Association Française contre les Myopathies  
ANR - Agence nationale de recherche ARSEP - Aide à la Recherche sur la Sclérose en Plaques  
ELA research foundation  
ENP -Ecole des neurosciences Paris Ile de France  
Fondation Jérôme Lejeune  
FRC - FEDERATION POUR LA RECHERCHE SUR LE CERVEAU  
NMSS - national Multiple Sclerosis Society  
OCIRP  
UPMC

## PICNIC LAB: PHYSIOLOGICAL INVESTIGATIONS OF CLINICALLY NORMAL AND IMPAIRED COGNITION

Team leader(s)  
Paolo BARTOLOMEO  
Laurent COHEN  
Lionel NACCACHE

**Principal investigators**  
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Laurent COHEN  
Lionel NACCACHE  
Jacobo SITT

GENEROUS SUPPORT GRANTED BY :  
ANR - Agence nationale de recherche  
CEE - European Commission  
ENP -Ecole des neurosciences Paris Ile de France  
Fondation Voir et Entendre  
FRM - Fondation pour la recherche médicale  
LesHanot Haim Foundation  
McDonnell Foundation  
Sylvain Héfès

## GENETICS AND PHYSIOPATHOLOGY OF EPILEPSY

Team leader(s)  
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Eric LEGUERN

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Eric LEGUERN  
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GENEROUS SUPPORT GRANTED BY :  
Ambassade de France au japon  
ANR - Agence nationale de recherche  
APHP  
CEE - European Commission  
FDF - Fondation de France  
FMR - Fondation Maladies Rares (ex GIS)  
FRC - FEDERATION POUR LA RECHERCHE SUR LE CERVEAU

## ALS : CAUSES AND MECHANISMS OF MOTOR NEURON DEGENERATION

Team leader(s)  
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Danielle SEILHEAN  
François SALACHAS  
Vincent MEININGER

GENEROUS SUPPORT GRANTED BY :  
ACE - Association pour l'étude de la culture d'embryon  
AFM - Association Française contre les Myopathies  
ALS association  
ANR - Agence nationale de recherche  
ANSES - Agence Nationale de Sécurité Sanitaire de l'Alimentation de l'Environnement et du travail  
ARMC - Aide à la recherche des Maladies du Cerveau  
ARSLA - Association pour la Recherche sur la Sclérose Latérale Amyotrophique et autres maladies du motoneurone  
Fondation Thierry Latran  
Institut Pasteur  
Medday  
Amélie FAYET  
Edith DEBOUDE

## MOLECULAR BASIS, PHYSIOPATHOLOGY AND TREATMENT OF NEURODEGENERATIVE DISEASES

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Fanny MOCHEL  
Annie SITTLER  
Giovanni STEVANIN  
Hamid ELHACHIMI  
Morwena LATOUCHE  
Claire PUJOL  
Caroline NAVA

GENEROUS SUPPORT GRANTED BY :  
ADRMGNP - Association pour le Développement de la Recherche sur les Maladies Génétiques Neurologiques et Psychiatriques  
AFH - Don  
AHF - Association Huntington France  
ANR - Agence nationale de recherche  
ANSM - Agence Nationale de Sécurité du Médicament et des Produits de Santé  
APHP  
ASL - Association Strümpell-Lorrain  
BOLLORE  
CEE - European Commission  
Centre Hospitalo-Universitaire Régional de Lille  
CHDI Foundation  
CSC- Association Connaître les Syndromes Cérébelleux  
DIM Cerveau et Pensée Manifestations Scientifiques  
Elisabeth Badinter  
ENP -Ecole des neurosciences Paris Ile de France  
F-CRIN  
FDF - Fondation de France  
FMR - Fondation Maladies Rares (ex GIS)  
Fondation Carlo Besta  
Fondation Edmond J. Safra  
Fondation Jacques et Gloria Gossweiler  
Fondazione Istituto Neurologico Carlo Besta  
France Parkinson  
FRM - Fondation pour la recherche médicale  
HUNTINGTON ESPOIR OUEST  
INSERM -COSSEC  
ULM - University Hospital of ULM  
VERUM FONDATION  
Ultragenyx Pharmaceutical Inc.

## EXCITABILITY AND DYNAMICS OF NEURONAL ASSEMBLIES

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GENEROUS SUPPORT GRANTED BY :  
ANR - Agence nationale de recherche  
FRC - Fondation pour la Recherche sur le Cerveau  
Institut Universitaire d'Ingénierie pour la Santé (IUIS)  
OCIRP

## ARAMIS: ALGORITHMS, MODELS AND METHODS FOR IMAGES AND SIGNALS OF THE HUMAN BRAIN

Team leader(s)  
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Sophie DUPONT  
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GENEROUS SUPPORT GRANTED BY :  
ANR - Agence nationale de recherche  
APHP  
CEE - European Commission  
Tous les donateurs du projet DYNAMO

## FRONTLAB: FRONTAL SYSTEMS, FUNCTIONS AND DYSFUNCTIONS

Team leader(s)  
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Raffaella MIGLIACCIO  
Michel THIEBAUT  
Antoni VALEROCABRE  
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Harald HAMPEL  
Marc TEICHMAN

GENEROUS SUPPORT GRANTED BY :  
Association PSP France  
ANR - Agence nationale de recherche  
APHP  
CEE - European Commission  
DIM Cerveau et Pensée Petits et Moyens Equipements  
FRM - Fondation pour la recherche médicale  
NIH - National Institutes of Health  
Edouard et Martine de ROYERE

## GEN-PHYS: NEUROGENETICS AND PHYSIOLOGY

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Mohamed EL BEHI  
Isabelle REBEIX  
Laure STROCHLIC

GENEROUS SUPPORT GRANTED BY :  
AFHA - Association Française de l'Hémiplégie Alternante  
AFM - Association Française contre les Myopathies  
ARN - Association pour la recherche sur les Nicotianées  
ARSEP - Aide à la recherche sur la sclérose en plaques  
DIM Cerveau et Pensée Manifestations Scientifiques  
FMR - Fondation Maladies Rares (ex GIS)  
Fondation de l'Avenir  
Université Claude Bernard Lyon 1  
GeNeuro SA

## SOCIAL AND AFFECTIVE NEUROSCIENCE

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Philippe FOSSATI  
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GENEROUS SUPPORT GRANTED BY :  
ANR - Agence nationale de recherche  
DIM Cerveau et Pensée Petits et Moyens Equipements  
Fondation des Geules Cassées  
Fondation Pierre Deniker  
FRM - Fondation pour la recherche médicale  
Purdue University North Central

## ALZHEIMER'S DISEASE, PRION DISEASES

Team leader(s)  
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Marie-Claude POTIER  
Benoit DELATOUR  
Nicolas BIZAT  
Charles DUYCKAERTS  
Stéphane EPELBAUM

Serge MARTY  
Jean-Philippe BRANDEL

GENEROUS SUPPORT GRANTED BY :  
ANR - Agence nationale de recherche  
CJD Foundation  
France Alzheimer  
GIS - IBISA  
Institut Pasteur  
InVs - Institut de veille sanitaire  
LECMa - Ligue Européenne  
contre la Maladie Alzheimer  
LFB Biomédicaments  
Les Laboratoires Servier  
Sanofi-Aventis Recherche  
et Développement  
Medday

**NEURAL DEVELOPMENT**

Team leader(s)  
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Bassem HASSAN

GENEROUS SUPPORT GRANTED BY :  
The Paul Allen Family Foundation

**EXPERIMENTAL THERAPY IN PARKINSON'S DISEASE**

Team leader(s)  
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Stephane HUNOT  
Patrick MICHEL  
Marie-Laure WELTER  
David GRABLI  
Rita RAISMAN  
Annie LANNUZEL  
Chantal FRANCOIS

GENEROUS SUPPORT GRANTED BY :  
PSP  
ANR - Agence nationale de recherche  
BPI France financement  
CEE - European Commission  
CR IDF  
FRC - FEDERATION POUR  
LA RECHERCHE SUR LE CERVEAU  
FRM - Fondation pour la Recherche  
Médicale  
IETF - International Essential Tremor  
Foundation

MJFOX - THE MICHAEL J FOX  
FOUNDATION  
Air Liquide Santé International

**MOLECULAR AND CELLULAR MECHANISMS OF GLIOMA GENESIS**

Team leader(s)  
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Principal investigators  
Emmanuelle HUILLARD  
Isabelle LE ROUX

GENEROUS SUPPORT GRANTED BY :  
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CEE - European Commission  
INSERM - ATIP AVENIR  
La Ligue nationale contre le Cancer

**TREATMENT OF AMYOTROPHIC LATERAL SCLEROSIS: FROM GENETICS TO ZEBRAFISH**

Team leader(s)  
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GENEROUS SUPPORT GRANTED BY :  
AFM - Association Française contre  
les Myopathies  
ANR - Agence nationale de recherche  
CEE - European Commission  
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sur le Cerveau  
FRM - Fondation pour la recherche  
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Anavex Life Sciences Corp.

**EXPERIMENTAL NEUROSURGERY**

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GENEROUS SUPPORT GRANTED BY :  
ANR - Agence nationale de recherche  
CEE - European Commission  
France Parkinson  
Simons Foundation  
Jean-Louis DUFLOUX

**ABNORMAL MOVEMENTS AND BASAL GANGLIA: PHYSIOPATHOLOGY AND EXPERIMENTAL THERAPY**

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GENEROUS SUPPORT GRANTED BY :  
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recherche médicale  
AFHA - Association Française  
de l'Hémiplégie Alternante  
ANR - Agence nationale de recherche  
APHP  
APTES - Association des personnes  
concernées par le tremblement essentiel  
Campus France - Campus Prestige  
ENS - Ecole Normale Supérieur  
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Fondation NRJ  
Fonds PATRICK DE BROU DE LAURIERE  
France Parkinson  
INSERM  
Institut de Recherche sur la Moelle  
Epinière et l'Encéphale (IRME)  
MDS France  
PSP  
Quintiles Benefit France  
Fondation EDF  
Fonds de dotation PIERRE BERGE  
Fondation AREVA  
Edouard et Martine de ROYERE  
ORKYN'  
Institut de recherches internationales  
Servier

**MECHANISMS OF MYELINATION AND REMYELINATION IN THE CNS**

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GENEROUS SUPPORT GRANTED BY :  
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ARSEP - Aide à la Recherche sur la  
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FRM - Fondation pour la recherche  
médicale  
INSERM - interface  
MSIF - Multiple Sclerosis International  
Federation  
NMSS - national Multiple Sclerosis  
Society  
Fondation MARIE-ANGE BOUVET  
LABRUYERE

**BEHAVIOR, EMOTION, AND BASAL GANGLIA**

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GENEROUS SUPPORT GRANTED BY :  
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Fondation Fondamental  
FRM - Fondation pour la recherche  
médicale  
Fondation Philippe et Maria Halphen

**CORTEX AND EPILEPSY**

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GENEROUS SUPPORT GRANTED BY :  
CEE - European Commission  
ANR - Agence nationale de recherche

**MOTIVATION, CERVEAU ET COMPORTEMENT**

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CEE - European Commission  
DIM Cerveau et Pensée Manifestations  
Scientifiques  
ENP -Ecole des neurosciences  
Paris Ile de France  
FRM - Fondation pour la Recherche  
Médicale  
Ministère Français des Affaires  
Etrangères  
Claude FELIX

**BIOTECHNOLOGY AND BIOTHERAPY**

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Rolando MELONI  
Helene CHEVAL

GENEROUS SUPPORT GRANTED BY :  
CEE - European Commission  
FMR - Fondation Maladies Rares  
(ex GIS)  
Fondation E. J. SAFRA  
Les Laboratoires Servier

**EXPERIMENTAL NEURO-ONCOLOGY**

Team leader(s)  
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Michel KALAMARIDES  
Khe HOANG-XUAN  
Ahmed IDBAIH

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sur le cancer  
Institut national du cancer (INCa)  
La Ligue nationale contre le Cancer  
Plan Cancer  
Transgene  
Gecko Biomedical  
Eli Lilly and Company

**OLIGODENDROCYTE DEVELOPMENT AND NEUROVASCULAR INTERACTIONS**

Team leader(s)  
Jean-Leon THOMAS (Boris ZALC)

Principal investigators  
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Boris ZALC  
Charles CALVO  
Carlos PARRAS  
Michel MALLAT

GENEROUS SUPPORT GRANTED BY :  
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ANSES - Agence Nationale de Sécurité  
Sanitaire de l'Alimentaion de  
l'Environnement et du travail  
ARSEP - Aide à la recherche  
sur la sclérose en plaques  
NMSS - national Multiple Sclerosis  
Society

**PROBING DYNAMIC SENSORY-MOTOR INTEGRATION IN SPINAL CIRCUITS**

Team leader(s)  
Claire WYART

Principal investigators  
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Pierre-Luc BARDET  
Hugues PASCAL MOUSSELARD

GENEROUS SUPPORT GRANTED BY :  
CEE - European Commission  
EMBO  
ENP -Ecole des neurosciences  
Paris Ile de France  
FRM - Fondation pour la recherche  
médicale  
Fondation MICHELIN  
HFSPo- The Human Frontier Science  
Program Organization  
RIF - Région Ile de France  
RTRA - ENP



# 2016, A YEAR OF BREAKTHROUGHS

## ON THE RESEARCH SIDE

### ALZHEIMER'S

Hope for early patient care through discovery of brain lesions due to the illness 20 years prior to onset.

*By Harald Hampel part of the team led by Bruno Dubois*

Jansen W.J. et al. Prevalence of cerebral amyloid pathology in persons without dementia: a meta-analysis. *Jama, The Journal of the American Medical Association*, 19 mai 2015; 313(19):1924-38

### PARKINSON'S

Development of a new molecule involved in the disease.

*From the team led by Etienne Hirsch*

New 6-Aminoquinoxaline Derivatives with Neuroprotective Effect on Dopaminergic Neurons in Cellular and Animal Parkinson Disease Models. Gael Le Douaron, Laurent Ferrié, Julia E. Sepulveda-Díaz, Majid Amar, Abha Harfouche, Blandine Séon-Méniel, Rita Raisman-Vozari, Patrick P. Michel & Bruno Figadère. *J. Med. Chem.* 14 juillet 2016, 59(13):6169-86

### AMYOTROPHIC LATERAL SCLEROSIS, ALS

Discovery of a new mechanism.

*From the team led by Edor Kabashi*

THE MOST PREVALENT GENETIC CAUSE OF ALS-FTD, C9ORF72 SYNERGIZES THE TOXICITY OF ATXN2 INTERMEDIATE POLYGLUTAMINE REPEATS THROUGH THE AUTOPHAGY PATHWAY. Ciura S, Sellier C, Campanari ML, Charlet-Berguerand N, Kabashi E. *Autophagy*. 2016 Aug. Loss of C9ORF72 impairs autophagy and synergizes with polyQ Ataxin-2 to induce motor neuron dysfunction and cell death. Sellier C, Campanari ML, Julie Corbier C, Gaucherot A, Kolb-Cheynel I, Oulad-Abdelghani M, Ruffenach F, Page A, Ciura S, Kabashi E, Charlet-Berguerand N. *EMBO J.* 2016 Jun.

### ALS

Highlighting similarities between ALS and hereditary spastic paraplegia to allow clinicians to improve diagnosis.

*From the team led by Alexis Brice*

Motor neuron degeneration in spastic paraplegia 11 mimics amyotrophic lateral sclerosis lesions. Denora PS, Smets K, Zolfanelli F, Ceuterick-de Groote C, Casali C, Deconinck T, Sieben A, Gonzales M, Zuchner S, Darios F, Peeters D, Brice A, Malandrini A, De Jonghe P, Santorelli FM, Stevanin G, Martin JJ, El Hachimi KH. *Brain*. 2016 Jun;139(Pt 6):1723-34.

### EPILEPSY

Proof in "real time" of a process involved in the interruption of conscious perception during absence seizures.

*From the team led by Stéphane Charpier*

Integrative properties and transfer function of cortical neurons initiating absence seizures in a rat genetic model. Williams Mark S., Altwegg-Boussac Tristan, Chavez Mario, Lecas Sarah, Mahon Séverine and Charpier Stéphane. *The Journal of Physiology*, June 17, 2016, 594(18):1-19

### COGNITION

The more tired we feel due to intense work, the more impulsive we get during financial decision-making.

Neural mechanisms underlying the impact of daylong cognitive work on economic decisions.

Bastien Blain, Guillaume Hollard, and Mathias Pessiglione. *PNAS*, 2016.

### BRAIN ORGANIZATION

Decoding the frontal lobe's architectural organization.

*By Michel Thiebaut de Schotten from the team led by Richard Lévy and Bruno Dubois*

Rostro-caudal architecture of the frontal lobes in humans. Michel Thiebaut de Schotten, Marika Urbanski, Benedicte Batrancourt, Richard Lévy, Bruno Dubois, Leonardo Cerliani, Emmanuelle Volle. *Cerebral Cortex* (2016).

### BRAIN DEVELOPMENT

Discovery of a new process.

*From the team led by Bassem Hassan*

Post-translational Control of the Temporal Dynamics of Transcription Factor Activity Regulates Neurogenesis. *Cell*, Xiao-Jiang Quan et al. 28 janvier 2016, 164(3): 460-75.

### RARE DISEASES

Highlighting the role of protein calpain 1 in ataxia, its neuroprotective activity and key role in brain development and neuroplasticity.

Defects in the CAPN1 gene result in alterations in cerebellar development and in cerebellar ataxia in mice and humans. Yubin Wang et al., Cell Reports, 28 juin 2016, 16 (1): 79-91.

### GILLES DE LA TOURETTE SYNDROME

Decoding the mechanisms leading to tic appearance and persistence.

*From the team led by Marie Vidailhet and Stéphane Lehericy*

Enhanced habit formation in Gilles de la Tourette syndrome. Delorme C, Salvador A, Valabrègue R, Roze E, Palminteri S, Vidailhet M, de Wit S, Robbins T, Hartmann A, Worbe Y. Brain. 2016 Feb;139(Pt 2):605-15.

### SPINAL CORD TRAUMA

Renewed hope with the identification of new movement-regulating neurons.

*From the team led by Claire Wyart*

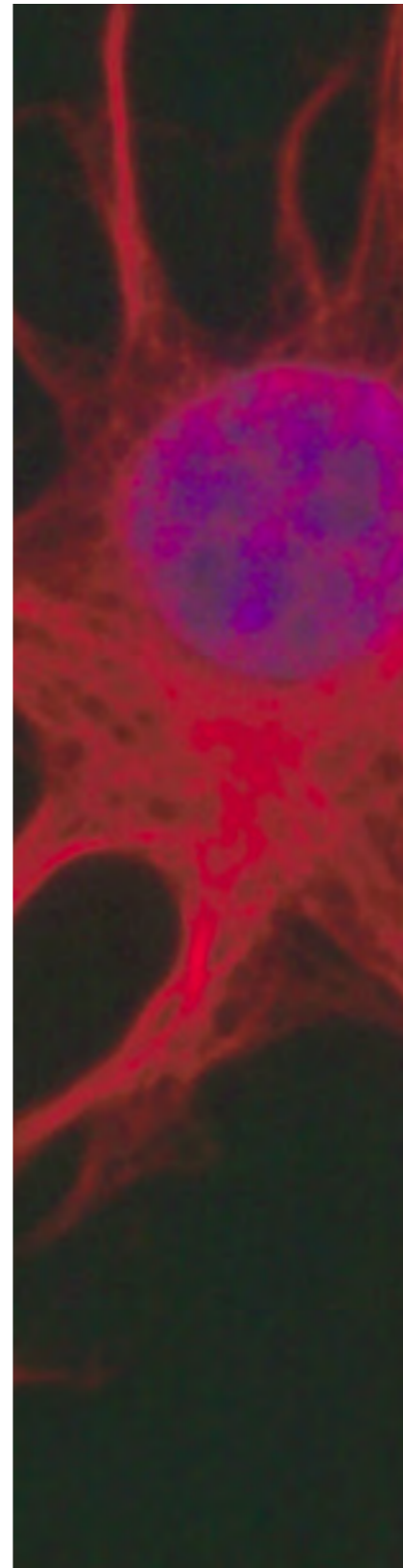
CSF-contacting neurons regulate locomotion by relaying mechanical stimuli to spinal circuits. Urs Lucas Böhm et al. Nat Commun. Nature Communication, 2016 Mar 7

### MEMORY

Slow-wave sleep may play a part in memory consolidation when the brain replays what it experienced the previous day.

*From the team led by Stéphane Charpier*

High-frequency oscillations [...] during the wake-sleep cycle. Le Van Quyen M, Muller LE, Telenczuk B, Halgren E, Cash S, Hatsopoulos NG, Dehghani N, Destexhe A. Proc Natl Acad Sci U S A. 2016 Aug 16.



## ON THE CLINICAL SIDE

### ALZHEIMER'S

An imaging study coordinated by Marie Sarazin, is the first to highlight the early protective role of the brain's immune cells

Early and protective microglial activation in Alzheimer's disease: a prospective study using 18F-DPA-714 PET imaging. Hamelin L, Lagarde J, Dorothée G, Leroy C, Labit M, Comley RA, de Souza LC, Corne H, Dauphinot L, Bertoux M, Dubois B, Gervais P, Colliot O, Potier MC, Bottlaender M, Sarazin M; Clinical IMABio3 team. Brain. 2016 Apr; 139(Pt 4):1252-64.

### PARKINSON'S

Discovery of new gene VPS13C in an early form of the disease that may support implementation of a diagnostic instrument

*from the team led by Alexis Brice*

Suzanne Lesage et al., Loss of VPS13C Function in Autosomal-Recessive Parkinsonism Causes Mitochondrial Dysfunction and Increases PINK1/Parkin-Dependent Mitophagy, American Journal of Human Genetics, Mars 2016, 98(3): 500-513.

### PARKINSON'S

Relationship between the brain stem and cardiac disorders highlighted thanks to cutting-edge imaging.

*From the team led by Stéphane Lehericy and Marie Vidailhet*

Medulla oblongata damage and cardiac autonomic dysfunction in Parkinson disease. Pyatigorskaya N, Mongin M, Valabregue R, Yahia-Cherif L, Eweczyk C, Poupon C, Debellemaniere E, Vidailhet M, Arnulf I, Lehericy S. Neurology. 2016 Dec 13;87(24):2540-2545.

### PARKINSON'S

Markers identified to monitor and predict disease progression.

*From the team led by Marie Vidailhet and Stéphane Lehericy*

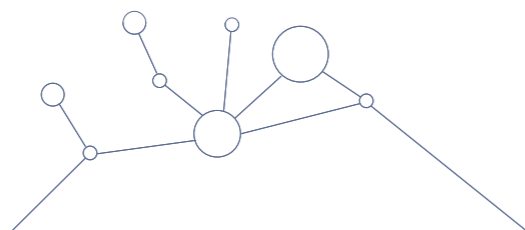
Ehrminger M. et al. The coeruleus/subcoeruleus complex in idiopathic rapid eye movement sleep behaviour disorder, Brain, avril 2016 ; 139 (4):1180-8

### MULTIPLE SCLEROSIS

Cutting-edge technique developed to measure disease progression that would allow tailored treatment for each patient.

*From Benedetta Bodini part of the team led by Bruno Stankoff and Catherine Lubetzki*

Dynamic imaging of individual remyelination processes in multiple sclerosis. Bodini B, Veronese M, García-Lorenzo D, Battaglini M, Poirion E, Chardain A, Freeman L, Louapre C, Tchikviladze M, Papeix C, Dollé F, Zalc B, Lubetzki C, Bottlaender M, Turkheimer F, Stankoff B. Ann Neurol. 2016 Feb; 77(2):253-63. Bodini B. et al, Benzothiazole and stilbene derivatives as promising PET myelin radiotracers for multiple sclerosis, Annals of Neurology, 21 avril 2016.





### TUMORS

Hope for tailored treatment of a certain type of cancer with glioblastomas that target oncogene MDM2.

*From the team led by Marc Sanson*

Verreault M. et al. Preclinical efficacy of the MDM2 inhibitor RG7112 in MDM2 amplified and TP53 wild-type glioblastomas. Clin Cancer Res. Mars 2016, 22(5) : 1185-96

### EPILEPSY

New drug to treat focal seizures.

*From Michel Baulac in the team led by Stéphanie Baulac and Eric Leguern*

Efficacy, safety, and tolerability of lacosamide monotherapy versus controlled-release carbamazepine in patients with newly diagnosed epilepsy: a phase 3, randomised, double-blind, non-inferiority trial. Baulac M, Rosenow F, Toledo M, Terada K, Li T, De Backer M, Werhahn KJ, Brock M. Lancet Neurol. 2017 Jan;16(1):43-54.

### DOWN SYNDROME

A natural compound found in green tea improves patient cognitive skills.

*From the team led by Marie-Claude Potier and Stéphane Haïk*

Safety and efficacy of cognitive training plus epigallocatechin-3-gallate for cognitive improvement in young adults with Down's syndrome (TESDAD): a double-blind, randomised controlled, phase 2 trial. Rafael de la Torre et al. The Lancet Neurology, juillet 2016, 15(8): 801-810.

### RARE DISEASES

A drug with proven efficacy against myoclonic dystonia.

*From Emmanuel Flamand-Roze in the team led by Marie Vidhaillet and Stéphane Lehericy*

A randomized, controlled, double-blind, crossover trial of zonisamide in myoclonus-dystonia. Hainque E et al. Neurology. 2016 May 3;86(18):1729-35

### PRIMARY PROGRESSIVE APHASIA

A pretherapeutic study shows beneficial effects of direct current transcranial stimulation.

*From Marc Teichmann and Antoni Valero-Cabré in the team led by Richard Lévy and Bruno Dubois*

Direct current stimulation over the anterior temporal areas boosts semantic processing in primary progressive aphasia. Teichmann M, Lesoil C, Godard J, Vernet M, Bertrand A, Levy R, Dubois B, Lemoine L, Truong DQ, Bikson M, Kas A, Valero-Cabré A. Ann Neurol. 2016 Sep 19.

## ON THE START-UP SIDE

### EPILEPSY

Smart connected clothing to diagnose epilepsy.

*Bioserenity, managed by Pierre-Yves Frouin, developed the Neuronaute, a medical device already in use in 30 public hospitals (CE-certified)*

### FOR BRAIN TUMORS, ULTRASOUND TO INCREASE TREATMENT DIFFUSION

with the "SonoCloud®" ultrasound device developed by CarThera  
*By CarThera*

Clinical trial of blood-brain barrier disruption by pulsed ultrasound. Alexandre Carpentier and al. Science Translational Medicine, 15 Jun 2016

### PARKINSON'S : Helping patient rehabilitation with a video game, TOAP RUN, with proven efficacy in reducing walking and balance disorders

*By Marie-Laure Welter and Pierre Foulon, Brain e-novation*

### MULTIPLE SCLEROSIS

A mobile app for patient evaluation and monitoring at home to provide better care

*By Ad Scientiam*

# ICM: REVOLUTIONARY, OPEN RESEARCH

RESEARCH TEAMS ARE INDEPENDENT, FULLY LINKED TO ONE ANOTHER THROUGH TRANSVERSAL RESEARCH PROGRAMS THAT ENCOURAGE POOLING OF SKILLS. FUNDAMENTAL, CLINICAL AND TRANSLATIONAL RESEARCH COEXIST TO HELP DISCOVER NEW TREATMENTS AS QUICKLY AS POSSIBLE AND MAKE THEM AVAILABLE FOR PATIENTS.

## 5 FOUNDATIONAL VALUES FOR OUR INSTITUTE, A BREAKTHROUGH ACCELERATOR

### TRANSLATIONAL RESEARCH

A back-and-forth between fundamental and clinical research. It helps patients have faster access to innovations in diagnosis and therapy. This is the foundation of all research carried out at ICM.

### MULTIDISCIPLINARY RESEARCH

Researchers, doctors, biologists, pharmacologists, mathematicians, engineers, physicians, IT specialists... ICM brings together multidisciplinary individuals that work closely together.

### TRANSVERSAL RESEARCH

A breakthrough in one illness can lead to discoveries in others, which is why ICM encourages open research with transversal projects (neuroimmunology, for example).

### INNOVATIVE RESEARCH

With incubated startups that develop treatments with researchers, ICM displays its uniqueness and desire to explore all types of innovation (patents, industry partnerships, living lab...).

### ATTRACTIVE RESEARCH

The Institute is internationally attractive thanks to its scientific reputation and impact in translational research. Resources are available for researchers (platform quality platforms), as well as high-level scientific interactions, independence when it comes to combined direction, and encouraging risk-taking. ICM collaborated with internationally-renowned research centers and attracts talented young researchers from around the world: 30% are from another country.

## AN AMBITIOUS RESEARCH PROGRAM: "BIG BRAIN THEORY"

Ambitious research projects at the frontier of various fields were implemented with the Big Brain Theory program. This call for internal transversal projects aims at encouraging innovative, original, and high-risk initiatives thanks to collaborations between the various teams and platforms within the Institute. 15 very promising initiatives were selected and financially supported to explore new research directions. In order to remain competitive and produce high-level research, ICM encourages risk-taking and breakthrough innovation.

### FUNDAMENTAL RESEARCH

LncPD : Discovering new, unexplored DNA areas involved in Parkinson's disease.

MOCONET : Researching cortical networks in experimental models of Down syndrome.

### CLINICAL RESEARCH

DIEP : Researching the impact of D2HG, a molecule produced by certain tumors, on the modulation of neighboring immune cell modulation.

DYNAMO : Modeling Alzheimer's disease progression to improve diagnosis and treatment.

MS-BIO-PROGRESS : Designing an innovative instrument to evaluate multiple sclerosis progression.

LUCID DREAM : Researching lucid dreams to understand gesture sequence learning and automation.

### TECHNOLOGY AND METHODOLOGY

NG2DB2D - Next-Generation NeuroGenomics DataBases and Big Data : Creating a clinico-genetic database to understand complex pathologies.

### CLINICAL AND FUNDAMENTAL RESEARCH

COG\_BLIND : Decoding information in the visual cortex of patients with congenital blindness.

BIGPARK : Identifying new genes involved in Parkinson's disease to develop new treatment opportunities.

iTargetOPC : Targeting oligodendrocyte precursors, cells responsible for myelin sheath development in the central nervous system, as potential treatment for glioblastoma.

LIBERATE : Understanding the evolution of communication between various cortical areas in normal and pathological aging.

### FUNDAMENTAL RESEARCH, TECHNOLOGICAL AND METHODOLOGICAL DEVELOPMENT

MAXIMS : Verifying the specificity of MRI biomarkers in detecting brain lesions.

ACTIMYEL : Role played by neural activity in (re)-myelination control.

### FUNDAMENTAL RESEARCH, CLINICAL RESEARCH AND TECHNOLOGICAL AND METHODOLOGICAL DEVELOPMENT

ISIS : Understanding the underlying mechanisms of reduced oxygen supply to the brain.



# MAJOR SCIENTIFIC AWARDS WON BY OUR RESEARCHERS

OUR RESEARCHERS CHANNEL THE SPIRIT OF CHARCOT, MAKING HIS VALUES THEIR OWN.



**BENEDETTA BODINI**  
Neurologist at Pitié-Salpêtrière Hospital and Inserm researcher in the “Central nervous system myelination mechanisms” team at ICM

🏆 **MARIE-ANGE BOUVET-LABRUYÈRE AWARD** for the development of a new imaging technique for multiple sclerosis  
> Publication with Bruno Stankoff, team leader at ICM, recognized as one of the 5 best publications of 2016 on multiple sclerosis by Lancet Neurology



**EDOR KABASHI**  
Leader of team “Treatment of Amyotrophic lateral sclerosis: from genetics to zebrafish” at ICM

🏆 **PAULO GONTIJO INTERNATIONAL MEDICINE AWARD** for his research on development of new models and treatment options in Amyotrophic Lateral Sclerosis (ALS).



**BASSEM HASSAN**  
Leader of team “Neural Development” at ICM

🏆 **PAUL G. ALLEN FOUNDATION “DISTINGUISHED INVESTIGATOR” AWARD** for his work on the frontier of neural network and behavioral development



**PHILIPPE FOSSATI**  
Psychiatry Professor at Pitié Salpêtrière Hospital and Pierre et Marie Curie University, “Study of emotions and social interactions” team leader at ICM

🏆 **2016 HALPHEN PRIZE FROM THE PHILIPPE AND MARIA HALPHEN FOUNDATION**, for his work on depression



**CLAIRE WYART**  
Leader of team “Probing dynamic sensory-motor integration in spinal circuits” at ICM

🏆 **FENS-KAVLI SCHOLARS 2016** by the Federation of European Neuroscience Societies and the Kavli Foundation  
🏆 **EMBO YOUNG INVESTIGATOR PROGRAM**  
🏆 **NEW-YORK STEM CELL FOUNDATION (NYSCEF) ROBERTSON AWARD**



**LIONEL NACCACHE**  
University professor, hospital practitioner, Clinical Neurophysiology Department chief at Pitié-Salpêtrière University Medical Center in Paris and team leader at ICM

🏆 **LAMONICA AWARD** in Neurology for his work on consciousness



**LUCE DAUPHINOT**  
CNRS Engineer in the team led by Stéphane Haïk and Marie-Claude Potier at ICM

🏆 **CNRS CRISTAL MEDAL** for her work on single cells



**CHRISTIANE SCHREIWEIS**  
Researcher in Luc Mallet’s team, on “Behavior, emotion and basal ganglia”

🏆 **L’ORÉAL-UNESCO GRANT** as part of the l’Oréal-UNESCO “For Women and Science” program, for her research using innovative methods on repetitive behavior, as observed in OCD and Gilles de la Tourette Syndrome.

## - FOCUS -

### EUROPEAN RESEARCH COUNCIL GRANT: CLOSE TO 10 YEARS OF EXCELLENCE

ERC Grants are prestigious awards hailing from a high-level European research program that aims at supporting talented researchers with ambitious and innovative scientific projects. These grants were implemented in 2007 with the Lisbon Treaty and founding of the ERC, and have since supported over 7,000 projects and over 50,000 researchers for a total budget of nearly 12 billion euros. ERC grants are awarded in very diverse research fields, from mathematics to social science and humanities, life science or physics.

### IN 2016, 3 ICM RESEARCHERS WERE AWARDED A GRANT TO SUPPORT THEIR RESEARCH.



**STANLEY DURRLEMAN**  
ERC « STARTING GRANT »

Expert in mathematical modelling of neuroimaging data, INRIA researcher part of the ARAMIS team at ICM

Project: Modelling the brain to diagnose and treat neurodegenerative illness

Hopes to: Design numerical models of the brain showing the effect of neurodegenerative diseases on brain structure, function and metabolism; Use models to implement early diagnosis and reliable prognosis.



**STÉPHANIE BAULAC**  
ERC « CONSOLIDATOR GRANT »

Expert in epilepsy genetics, co-manager of the “Epilepsy genetics” team at ICM

Project: Understanding the spectrum of severity in familial focal seizures

Hopes to: Verify an initial experimental model for the pathology; Decode the processes involved in epilepsy linked to the mTOR pathway; and Consider new treatment opportunities.



**EDOR KABASHI**  
ERC « CONSOLIDATOR GRANT »

Expert in genetics of amyotrophic lateral sclerosis, leader of team “Treatment of Amyotrophic lateral sclerosis: from genetics to zebrafish”

Project: Research on Amyotrophic lateral sclerosis in Zebrafish to identify new treatment opportunities

Hopes to: Identify new molecules to fight ALS.

# PASSING ON KNOWLEDGE

## LEARNING AND TRAINING AT THE HEART OF THE INSTITUTE'S MISSION

DEVELOPING CUTTING-EDGE RESEARCH IS DEEPLY LINKED TO SHARING KNOWLEDGE AND FOSTERING NEW COLLABORATIONS. TO PASS ON AND SHARE KNOWLEDGE ON A NATIONAL AND INTERNATIONAL LEVEL, IN COLLABORATION WITH PIERRE AND MARIE CURIE UNIVERSITY, WE IMPLEMENTED AMBITIOUS SEMINAR PROGRAMS, SUMMER SCHOOLS, AS WELL AS STUDENT AND CLINICIAN EXCHANGES WITH PRESTIGIOUS INTERNATIONAL INSTITUTIONS. THANKS TO THE IHU PROGRAM AWARDED TO ICM, LEARNING AND TRAINING ACTIVITIES IN PLACE SINCE 2013 HAVE BECOME A PRIORITY.

### PROMOTING SCIENCE

#### STUDENT FELLOWSHIPS PROGRAM

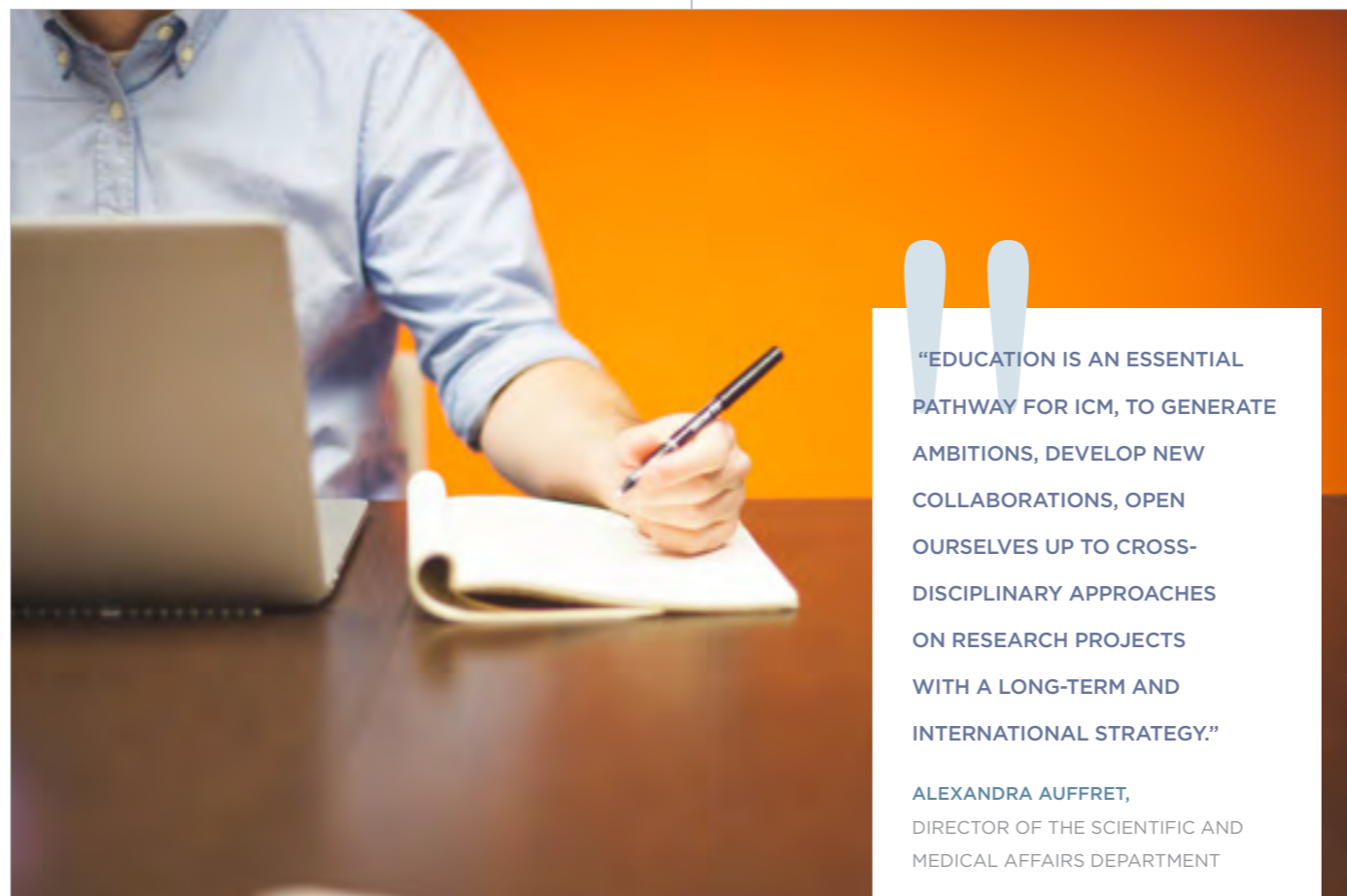
The "Student fellowship" program is a short-term exchange program for Master's or Doctoral students to help share the expertise of international institutions (Massachusetts Institute of Technology, Florey Institute of Neuroscience and Mental Health) and create opportunities for potential collaboration.

#### WORKSHOP CALL FOR PROJECTS

This call for projects is dedicated to ICM researchers and clinicians, to organize international seminars within the institute and promote their skills and expertise among their peers to foster collaboration. 2016 thematics were optogenetics, translational and multi-modal MRI and neurodegenerative illnesses in collaboration with Yale.

#### VISITING PROFESSOR CALL FOR PROJECTS

This call for projects aims at welcoming internationally-renowned senior researchers to ICM to pass along their knowledge. In 2016, we were pleased to welcome Professor David Hafler, President of the Department of Neurology at New Haven Medical School.



"EDUCATION IS AN ESSENTIAL PATHWAY FOR ICM, TO GENERATE AMBITIONS, DEVELOP NEW COLLABORATIONS, OPEN OURSELVES UP TO CROSS-DISCIPLINARY APPROACHES ON RESEARCH PROJECTS WITH A LONG-TERM AND INTERNATIONAL STRATEGY."

ALEXANDRA AUFFRET,  
DIRECTOR OF THE SCIENTIFIC AND MEDICAL AFFAIRS DEPARTMENT

### PROMOTING CLINICAL RESEARCH

#### THE MOVE

The Move is a unique program designed for medical students by Professor Emmanuel Roze, researcher and clinician. The Move is an innovative learning program by simulation that uses miming to teach medical students neurological semiology, meaning the clinical expression of neurological illnesses. The program, developed on a national and international level, is a remarkable example of innovation in education.

#### CLINICIAN EXCHANGE PROGRAM

A clinician exchange program with Yale, within the Neurology department at Pitié Salpêtrière Hospital, allows clinicians to learn how our departments work and how we work.

#### PROGRAM FOR PARAMEDICAL STAFF

A program designed for paramedical staff in partnership with the Public Health and Nursing School to develop innovative paramedical research projects.

### A CROSS-DISCIPLINARY APPROACH

#### SUMMER SCHOOL : BRAIN TO MARKET

"The Brain to Market" summer school is a yearly program that combines translational neuroscience and entrepreneurial training through intensive training to foster new projects, new initiatives and new ways of approaching neurological illnesses. The 2016 thematic was epilepsy, with 50 national and international participants.

#### POST-DOCTORAL PROGRAM

Attracting post-doctoral researchers with a degree in other fields than neuroscience such as mathematics, IT, healthcare economics... to apply their knowledge to a specific topic.

### WHAT'S NEXT?

MAINTAINING AND DEVELOPING CURRENT PROGRAMS.

CREATING AN INTERNATIONAL MASTER'S DEGREE FOCUSED ON NEURODEGENERATIVE ILLNESSES IN RELATIONSHIP WITH PIERRE ET MARIE CURIE – SORBONNE UNIVERSITY.

IMPLEMENTING AN INTRODUCTION TO RESEARCH INTERNSHIP FOR MEDICAL STUDENTS, THE STARE PROGRAM, BASED ON AN INITIATIVE DEVELOPED BY PROFESSOR JEAN-YVES DELATTRE TO HELP 3RD YEAR MEDICAL STUDENTS DISCOVER RESEARCH AND FOSTER NEW CALLINGS TO DEVELOP TRANSLATIONAL RESEARCH.



# AT THE CROSSROADS OF INTERNATIONAL AND NATIONAL RESEARCH

ICM IS PART OF AN INTERNATIONAL NETWORK THAT INCLUDES MAJOR NEUROSCIENCE CENTERS INVOLVED IN SHARED RESEARCH PROJECTS. THE INSTITUTE IS EMERGING AS AN ATTRACTIVE MEDICAL SCIENCE RESEARCH HUB FOR HIGH-LEVEL RESEARCHERS FROM AROUND THE WORLD.

With nearly 300 partnerships developed worldwide, ICM's international reach is on the rise. These collaborations are an opportunity to share our breakthroughs and carry out shared research programs. Exchange programs are also in place to develop training and skill-pooling. ICM aims to develop partnerships with institutions specialized in complementary fields to meet transversal needs.

## INTERNATIONAL COLLABORATIONS



**THE INSTITUTE OF NEUROLOGY** (University College of London, Royaume-Uni) and the **DZNE** (Network of research centers focused on Neurodegenerative illness, Germany) with research partnerships. ICM hopes to co-develop training and education with these institutions.

**YALE NEW HAVEN UNIVERSITY** for a clinician exchange program.

**UNIVERSITY OF CALIFORNIA - SAN FRANCISCO** with the implementation of a Inserm-certified Associated International Laboratory with the team led by Bertrand Fontaine and Stephen Hauser.

**THE MNI (MONTRÉAL NEUROLOGICAL INSTITUTE)** in Canada, with which ICM has organized joint events in the past and welcomed many researchers on a variety of topics.

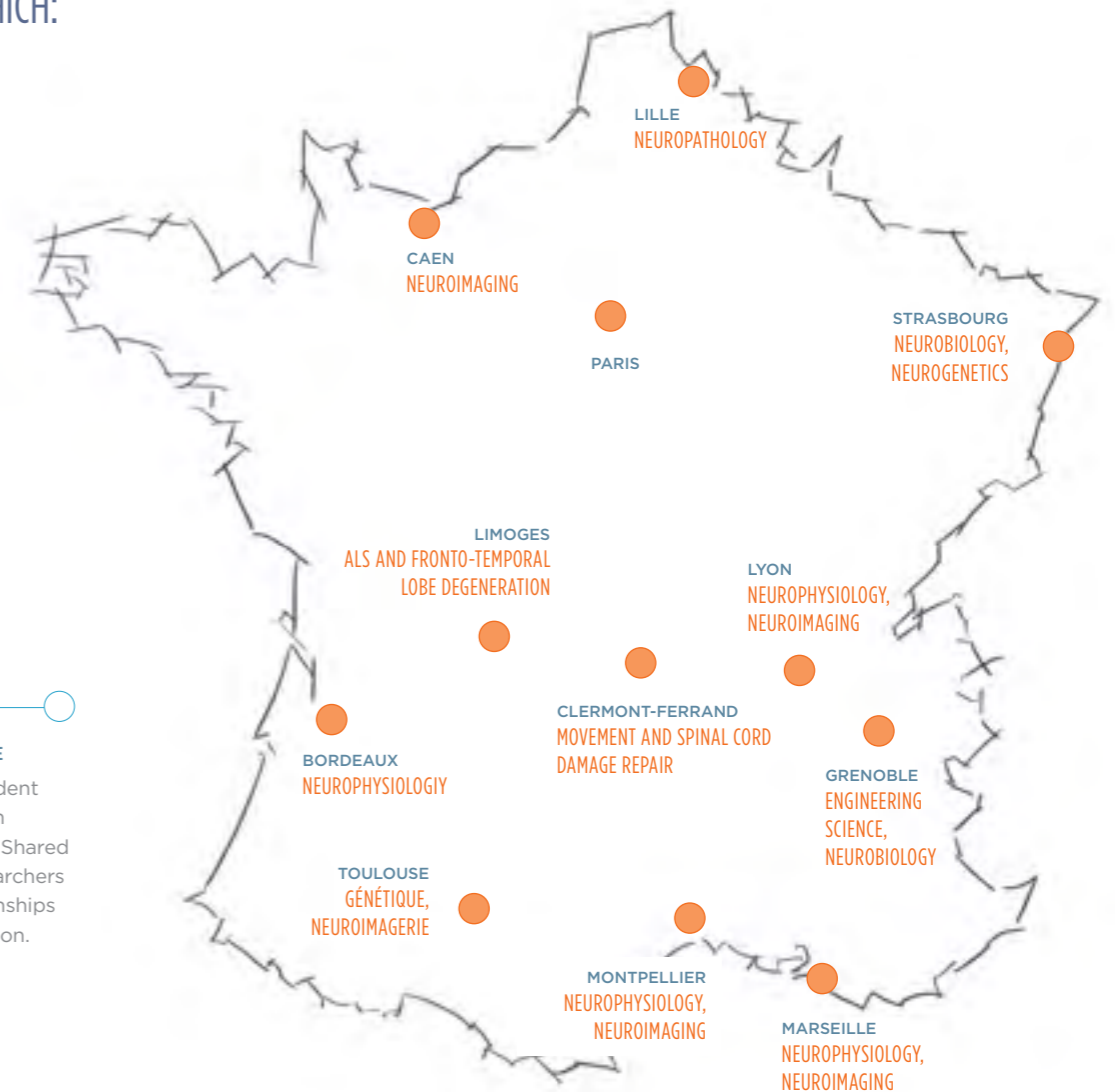
**THE FLOREY INSTITUTE (AUSTRALIA)**, for a student exchange program with short-term internships. Shared seminars with our researchers aim at fostering relationships in research and education.



ICM is part of an international network that includes major neuroscience centers involved in shared research projects. Research carried out at ICM is assessed by an International Scientific Committee composed of experts from around the world. ICM is therefore both an attractive medical and scientific research hub for high-level researchers as well as a generator of novel scientific information on an international level. Our research ambitions require close cooperation with the most prestigious French and international research institutions.

ICM is a cornerstones of the **GREATER PARIS RESEARCH NEUROHUB** (Neuropôle de Recherche Francilien - NERF) and the **PARIS SCHOOL OF NEUROSCIENCE** (École des Neurosciences de Paris - ENP), and partners with other high-level research centers throughout Paris: **PIERRE ET MARIE CURIE UNIVERSITY, ÉCOLE NORMALE SUPÉRIEURE, VISION INSTITUTE, MIRCEN, NEUROSPIN, PASTEUR INSTITUTE...**

## RESEARCH AT ICM IS DEVELOPED IN COOPERATION WITH MAJOR FRENCH NEUROSCIENCE CENTERS, AMONG WHICH:



# THE CLINICAL INVESTIGATION CENTER, CIC TOWARDS TAILORED AND PERSONALIZED PATIENT TREATMENT

THE CLINICAL INVESTIGATION CENTER OR CIC (INSERM, AP-HP), HOUSED IN THE ICM, IS AN EXCEPTIONAL PATHWAY BETWEEN RESEARCH AND CARE, OFFERING INNOVATIVE TREATMENT FOR PATIENTS AFFECTED BY NEUROLOGICAL ILLNESSES.



## 3 QUESTIONS FOR PROFESSOR JEAN-CHRISTOPHE CORVOL, CIC DIRECTOR

### HOW DOES THE CIC WORK? WHAT ARE ITS MISSIONS? WHAT IS THE RELATIONSHIP WITH THE NERVOUS SYSTEM DISEASES HUB AT PITIÉ-SALPÊTRIÈRE HOSPITAL?

The CIC is located in ICM building, at the core of research. It maintains a strong relationship with the doctors working in the Nervous System Diseases hub at Pitié-Salpêtrière hospital. This means we can easily take laboratory discoveries right to the patient's bedside and vice versa. The Center aims at improving our understanding of the human brain and pathologies, as well as granting patients rapid access to breakthroughs in research to improve patient diagnosis and care.

In 2016, the CIC officially merged with the Center for Therapeutic Assessment (Centre d'Évaluation Thérapeutiques - CET), a similar institution located in the Department of Neurology at Pitié-Salpêtrière Hospital. The goal is to create a full clinical research platform, from ICM research on early drug development to assessment and improvement of care, access to major international trials and innovative medical devices with the Living Lab. 172 drug trials are in progress throughout the Nervous System Diseases hub, half of which are at the CIC-CET, in various fields of neurology and psychiatry.

### WHAT ARE SOME HIGHLIGHTS OF 2016 CLINICAL TRIALS THE CIC TOOK PART IN, AND THE MAJOR TRIALS TO COME?

The CIC took part in three major multiple sclerosis clinical trials that demonstrated the efficacy of two new treatments for progressive forms

of the disease. Trials at the CIC also demonstrated the existence of markers for remyelination potential and neuronal loss in patients, allowing prediction of disease progression and selection of the best possible treatment for each patient.

In Parkinson's disease, the CIC is taking part in a European trial on deferiprone, an iron chelator with a supposed effect in decreasing iron deposits in neurons and with a neuroprotective effect. The NS-PARK/FCRIN network, that brings together the 24 centers specialized in Parkinson's disease in France, is also involved in the trial (H2020 European financial support, Lille University Medical Center as promoter). We are also coordinating a trial on dyskinesia treatment, also called involuntary movements, thanks to the same clinical research network and in partnership with CleveXel.

Another great success for 2016 is the study carried out by Emmanuelle Roze, proving the efficacy of zonisamide in treating myoclonic dystonia, a rare illness.

Finally, a study is underway in collaboration with Professor Richard Lévy's team to give a detailed assessment of apathy, lowered activity levels linked to decreased motivation in many neurodegenerative illnesses. This is done using the PRISME "real-life" platform, used for observation and analysis of patient behavior in semi-natural conditions.

Starting in 2017, we will be launching various trials including a collaboration

## 3 PILLARS : ETHICS, SAFETY, QUALITY

The CIC takes ethics and safety very seriously when it comes to studies. Participants in trials are made aware of the benefits and possible risks. Each study receives a favorable opinion from an ethics committee as well as the drug administration (ANSM) before launching. Additionally, the drugs involved in clinical trials all go through a safety assessment process before the trial starts.

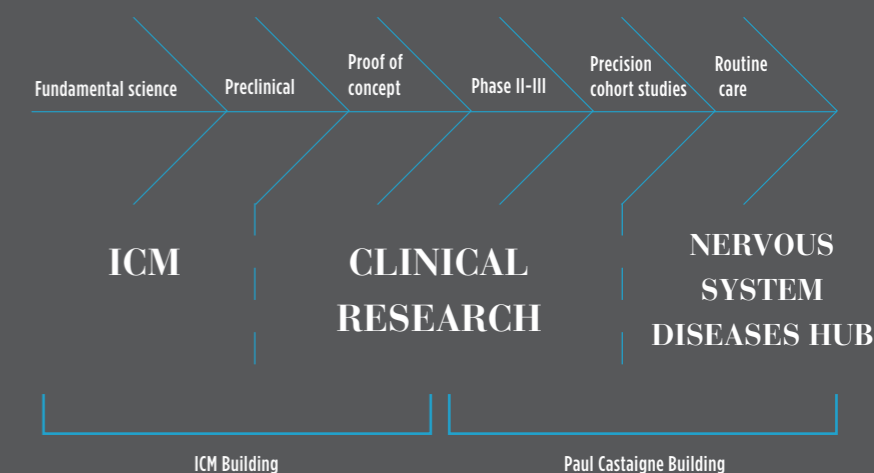
## CIC QUICK FACTS

172 CLINICAL TRIALS IN PROGRESS

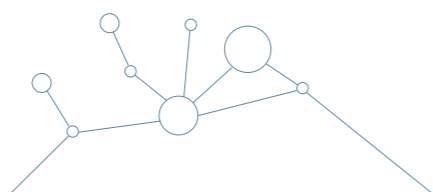
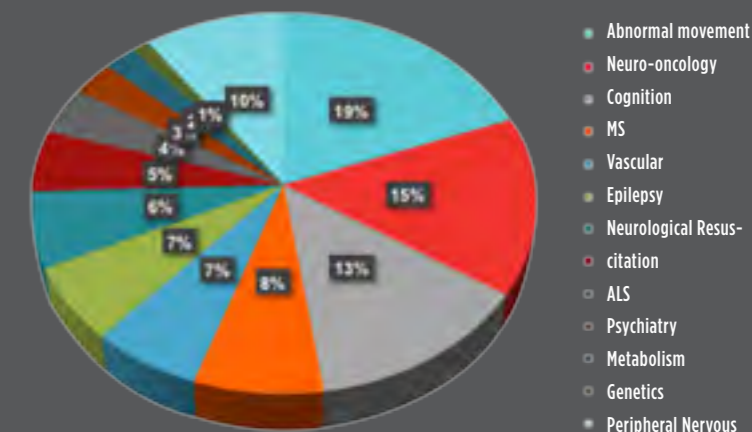
DAILY CONTACT WITH 650 RESEARCHERS AND CLINICIANS

7 000 PARTICIPATING PATIENTS OF THE CLINICAL TRIALS

## STEPS IN CLINICAL RESEARCH



*Innovation <---> Transfer <---> Application*







**CONVERSATION WITH PROFESSOR JEAN-YVES DELATTRE, ICM MEDICAL DIRECTOR AND NSD HUB CHIEF AT THE PITIÉ-SALPÊTRIÈRE HOSPITAL**

## THE NERVOUS SYSTEM DISEASES HUB, NSD TO GIVE PATIENTS ACCESS TO THE LATEST BREAKTHROUGHS IN TREATMENT

WITH OVER 80,000 CONSULTS PER YEAR, THE NERVOUS SYSTEM DISEASES HUB, (OR NSD HUB) IS ICM'S HOSPITAL COUNTERPART. IT POOLS TOGETHER THE DEPARTMENTS OF NEUROLOGY, PSYCHIATRY, FOLLOW-UP CARE AND REHABILITATION, AS WELL AS THE NEUROPHYSIOLOGY AND NEUROPATHOLOGY DEPARTMENTS AT PITIÉ-SALPÊTRIÈRE HOSPITAL. THE NSD HUB'S ACTIVITY IS BASED ON THREE PILLARS: DIAGNOSING, TREATING, AND REHABILITATING.

### THE NSD HUB IS A PARTNER OF CHOICE FOR ICM, HOW DOES THEIR COLLABORATION WORK?

The collaboration between ICM and the NSD Hub is growing, and doing well. The "Clinical Research" entities of ICM and NSD Hub are on their way to becoming a single entity, a neuroscience clinical research powerhouse at Pitié-Salpêtrière Hospital. We are also putting the finishing touch on a clinical research facility managed by Professor Jean-Christophe Corvol. The driving forces behind it come from the hub (AP-HP), INSERM, and ICM (doctors, paramedical staff, statisticians, etc.). It should be fully operational by the end of 2017.

### WHAT STEPS DOES A PATIENT WITH A NERVOUS SYSTEM ILLNESS GO THROUGH AT THE NSD HUB?

The first step is establishing the correct diagnosis using our medical experts and the technical platform we have on-site. Next, we draw up a healthcare plan suited to the patient with the help of a multidisciplinary team. At each and every step, we have to ask ourselves the

following questions: did we use the most modern techniques available, here at ICM, for the patient? Is there a research project planned to improve current knowledge on the patient's illness or treatment that we can ask the patient to participate in?

### WHAT ARE SOME BREAKTHROUGHS FOR 2016?

As I said earlier, one of the major advances for 2016 was the launch of a clinical research unification process between the hub and ICM with Professor Jean-Christophe Corvol. The resulting asset goes much further than the CIC-CET. 172 clinical trials are currently in progress led by NSD Hub and ICM teams - quite a lot. Another progress we've made is going forward in planning the "Neurotrials" and "Neurocatalyst" projects, which will help us have the full clinical research process on-site, from proof of concept of a drug to large-scale assessment in Phase III studies on a national or international level. We've also implemented specific training to develop a research culture among the hub's paramedical staff (nurses, assistant nurses, physical therapists,

psychologists...): we want every single member of our staff to be part of their own research, be it in healthcare or quality of life, and ICM is helping them with training on methodology.

The Living Lab is a great example of collaborative research. Clinicians, researchers, paramedical staff, patients and developers work hand in hand to design, develop and create innovative instruments for improved patient care. Projects for a new "medical beds", 3D cranioplasty as well as a cane emitting light to help Parkinson's patients start up are all examples of real-life applications that help our patients and improve their daily life.

### WHAT ARE SOME MAJOR UPCOMING PROJECTS?

For the first time, the NSD hub is going to dedicate part of its budget to supporting a clinical research project initiated by a young doctor. It is absolutely essential to give young colleagues the drive to invest in clinical research as early as possible in their career. Another project we have right now is developing indicators to help us monitor

## 2016 HIGHLIGHTS

### PROVEN EFFICACY OF A DRUG

TO TREAT MYOCLONIC DYSTONIA, A RARE ILLNESS, WITH RESEARCH CARRIED OUT BY EMMANUELLE ROZE.



precisely everything that is going on in clinical research in our 10 departments - how many innovative trials we have offered our patients, how many patients we are involving per month, etc. - with the hope that as many patients as possible can benefit from new treatments. Designing an innovation-centered department means getting used to that culture, which is why we have started gathering these indicators.

We also hope to implement ICM "Clinical research team" certification for NSD hub departments with a deep involvement in this field. Rigorous assessment by an international jury would be a prerequisite, quite like what is already in place for fundamental (laboratory) research teams at ICM, to improve our clinical research expertise.

Finally, some great news is that we are opening a new building, "Paul Castaigne", in December 2019. The building will be dedicated to Neurology for the entire Pitié-Salpêtrière Hospital. This huge project is a great opportunity for us to rethink our organization and create a tighter link

between medical care and clinical research, both dedicated to our patients. Along with this vast work in progress, Professor Bruno Dubois is driving a project to consider building a facility right next door dedicated to clinical research on neurodegenerative diseases, with close ties to ICM. This would be an opportunity to build a fast-track between the NSD hub and ICM to develop innovative treatment.

### IN YOUR EYES, WHAT DOES TOMORROW'S MEDICAL WORLD LOOK LIKE?

It will be predictive, and fully tailored to patients who are informed and looking to make their own decisions. Medicine has always progressed by identifying different entities that can be impacted by different treatments, in what looks at first like a common framework. I don't see why this should change at all. I also strongly believe that we will listen to what patients have to say, including when it comes to deciding what their future holds in the case of terminal and disabling illness.

### THE INSIGHT PROJECT

COORDINATED BY BRUNO DUBOIS, PROVIDING AN EXCEPTIONAL AMOUNT OF RESEARCH ON VERY EARLY DIAGNOSIS OF ALZHEIMER'S DISEASE.

### DESCRIPTION OF NEW SYMPTOMS

IN PATIENTS WITH BEHAVIORAL DISORDERS AND AFFECTED BY APATHY, THANKS TO WORK DONE BY THE BEHAVIORAL NEUROPSYCHIATRY UNIT (UNITÉ DE NEUROPSYCHIATRIE COMPORTEMENTALE - UNPC) WHERE NEUROLOGISTS, PSYCHIATRISTS AND RESEARCHERS COLLABORATE.



## HOW DOES THE RESEARCH & TECHNOLOGY DEVELOPMENT OFFICE (DAR) TRANSFORM DISCOVERIES MADE BY OUR RESEARCHERS INTO THERAPIES?

### 5 QUESTIONS TO ALEXIS GÉNIN, DIRECTOR OF THE RESEARCH & TECHNOLOGY DEVELOPMENT OFFICE



“OUR GOAL IS TO DETECT PROMISING SCIENTIFIC BREAKTHROUGHS TO DEVELOP THEM INTO THERAPEUTIC SOLUTIONS AS QUICKLY AS POSSIBLE”

ALEXIS GÉNIN, DIRECTOR OF THE RESEARCH & TECHNOLOGY DEVELOPMENT OFFICE.

This mission starts with early detection of research results that could lead to applications, their protection with patents, financial support for proof of concept to get from an idea to a proven idea, and finally, finalizing inventions and new drug or medical technology development. All of this is possible thanks to our “Carnot Institute” certification that supports development of research partnerships and transfer of technology between public research and businesses, as well as the Living Lab and iPEPS-ICM, a business incubator and France’s top innovation accelerator dedicated to brain illnesses. 16 innovative startups working in digital technology, medical technology and drug development are currently incubated.

#### HOW DOES THE DAR DEVELOP DISCOVERIES INTO THERAPIES?

The first phase is based on interaction, detailed discussions with researchers and doctors to find comparable data that may exist elsewhere in order to characterize how new and innovative the finding is. This phase is always undertaken secretly, and this is when we decide to grant an initial package for financial support. As a Carnot Institute, we have access to resources to help us verify an idea’s value or results, and their potential development into products to help patients.

The second phase is protection of intellectual property, when a patent is filed. After this phase, the project can “mature”, with the help of industry partners and investors. At times, we invest in projects ourselves to help push them as far as we can until a partner can take over and sponsor product development.

#### DID THIS PROCESS CHANGE AT ALL IN 2016?

We have been taking a much more proactive approach in order to lead product development ourselves by founding startups. ICM isn’t only bringing expertise and skill to the table to help other startups develop drug, it is now a product developer itself. I would say that was the major change of the year.

#### ICM RECENTLY RECEIVED “CARNOT 3” CERTIFICATION, WHAT CHANGES ARE INVOLVED?

The main Carnot missions remain the same: professionalism in our relationship with industry players, responsiveness, integration within a multi-thematic network of institutes from energy to nanotechnology and health. Along with our colleagues in the Carnot galaxy, we create pathways between the various industrial

fields to foster successful developments, with our eyes turned towards the rest of the world to position the Carnot brand on an international level.

In 2016, Carnot financial support helped bring a dozen projects to fruition, and supported the filing of 7 patents, the Institute’s ongoing commitment to quality, and international development. In February, ICM was part of a major Carnot event: the French American Innovation Days, in Boston, where the Carnot Institute model in healthcare was presented to the American business ecosystem.

#### WHAT ARE SOME OF THE DAR’S MAJOR ACHIEVEMENTS FOR 2016?

First of all, I’d like to mention our work in coordinating FindMed, a network of 10 major Carnot institutes. This shows that ICM can position itself as a point of reference in business services on a

## RESEARCH & TECHNOLOGY DEVELOPMENT OFFICE: WHAT TO KNOW

One of the highest growths among the **Carnot Institute** network

**27** companies incubated at iPEPS-ICM since 2012, **3 are international**

**200** industry partnerships

**OVER 50 PATENTS**

**2** laboratories, recipients of the « **INNOVATION 2030** » : **Bio-electrics lab and Brain eNovation**



Over **100 million** euros raised by our startups – **120** entrepreneurs on-site

**CERTIFICATION** of 2 Biological Resource Center platforms

**OPENING OF THE LIVING-LAB** where patients, researchers, clinicians and developers work together to design new therapeutic solutions

**1 DRUG** developed by MEDDAY to fight multiple sclerosis

**1 TELEMEDICAL** platform created by shared laboratory **Brain eNovation**

Diagnostic solutions for epilepsy developed by **BIO SERENITY** installed in over **30 HOSPITALS**



**MOBILE APPS** to monitor multiple sclerosis developed by **Ad Scientiam**

In a world first, **Carthera**, medical device designer and developer, was granted **5,7 million** euros in financial support by the French administration.

national level. In fact, partnerships with our technological platforms grew over 25% in 2016.

Next is the Living Lab, certified to join the European Living Lab network called ENOLL. The first functioning prototypes to come out of the Lab have already been developed on an industry level, a sole 18 months after the Lab was started. Finally, receiving “French Tech Ticket incubator” certification by the Ministry of Economy illustrated our ability to support international companies. It’s important to note that in 2016, startups incubated with us raised over 60 million euros in funding.

#### HOW DOES THE DAR MEET CURRENT CHALLENGES IN THE DEVELOPMENT OF NEW THERAPEUTIC OPTIONS?

We are hard at work developing new ways to use existing medication, and

are working with excellent chemists specialized in natural molecules to help identify future drugs using traditional medicine.

We also need to employ other approaches: businesses specialized in medical technology development, for example, are very dynamic and can give us a different outlook on how to think about illness. Wearable medical devices, mobile applications, smart objects, and therapeutic gaming could become part of global patient care. Active prevention is also an interesting field to look at, especially nutrition and physical activity, if we can prove their efficacy and integrate them into structured patient programs. We really are trying to understand patient care as a whole rather than take a solely medication-based approach, and are attempting to develop integrated solutions where drugs are one element among many

others used to halt disease progression. Our mid- and long-term mission is to bring therapeutic solutions for patients to market. Starting 2017, we hope to prove clinical efficacy for one project and verify the benefits of 2 to 3 medical technologies for patient use. Thanks to the Future Investments Program (IHU), we will have support from a new project, NeuroCatalyst, that will allow greater investment in clinical research. Additionally, in 2017 our expansion to the Station F startup campus will allow new “digital” healthcare startups to come to life and will help foster innovation interactions.





## THE LIVING LAB

### DESIGNING FUTURE MEDICAL INNOVATIONS TOGETHER, TODAY

#### 5 QUESTIONS FOR ALEXIS STEINER, LIVING LAB MANAGER

##### WHAT IS THE LIVING LAB, EXACTLY?

It is a collaborative platform where patients and hospital staff are right at the heart of innovation design.

It is a free space, away from hospital life, where different approaches and opinions from researchers, engineers, doctors, hospital staff, patients, students, startups, and more can interact to come up with the most innovative ideas possible.

##### ITS MISSION

It aims to create innovative medical devices to improve patient care in neurology and psychiatry. Our goal is to launch our innovations and bring them to market quickly thanks to help from the Research and Technology Development Office, either with operating licenses negotiated with industry players, collaborations with businesses, or even by creating dedicated startups.

##### HOW DOES IT WORK?

To put forward a solution, we need to identify a need, first of all, and describe it with the help of patients and hospital staff. Next, we try to find a creative solution to this need by imagining what the ideal solution would look like. Finally, we bring the idea to life as quickly as we can by testing a prototype from a technological, clinical, and financial point of view.

##### SOME NEW PROJECTS IN 2016

Encouraging functional rehabilitation after patients are discharged from the hospital, diagnosing a risk of reduced autonomy to improve elderly patient support, treating

feeding disorders (children experiencing trouble dealing with food) with therapeutic cards, improving cranioplasty in the operating room, robotics to support cognitive rehabilitation of stroke or head injury patients, allowing prediction of behavioral crises in patients with autism: these are some of the projects developed at the uCIL Living Lab.

##### 2 SUCCESS STORIES FOR 2016

With the support of a patient from the France Parkinson Association, we developed a cane that emits visible light to get rid of the freezing effect, when patients are suddenly unable to move, and to help Parkinson's patients take a first step. Thanks to support from an industry partner and France Parkinson, we hope to make this device available to every patient soon.

A topic that we spent some time on is improving everyday life for patients with long-term hospital stays and how to give them some privacy. We collaborated with a design school, hospital staff and patients and came up with a visually-pleasing mobile wall with an integrated night stand and technical supply unit (light, oxygen...) that isolates patients. A prototype was produced with external suppliers and approved by all the participants in the project. A hospital furniture supplier is on board to produce and sell the product.

### UPCOMING PROJECTS FOR 2017

To increase patient implication in cognitive rehabilitation, we created a robot in collaboration with AI MERGENCE, a startup. **THE ROBOT HELPS THE OCCUPATIONAL THERAPIST DURING THERAPY SESSIONS** at the hospital, and the patient can then bring it home where it provides assistance for rehabilitation exercises. The project is financed by a Carnot call for projects, and AI MERGENCE will enter the incubator in 2017.

A test provided free of charge to detect **CEREBELLAR DISORDERS (CCFS)**. Blueprints to make the box will be available online for free, allowing anyone to make their own and take the test at home.

**OPENING OF A FABLAB ET ICM, a prototyping workshop right at the heart of the building in collaboration** with the CENIR platform and BEBG team.

## 2016 HIGHLIGHTS

10 CREATIVITY WORKSHOPS

100 individuals from diverse backgrounds, doctors, patients, paramedical staff, designers, sociologists, developers, engineers

300 IDEAS

10 PROJECTS

in close collaboration with hospital staff and patients, including 4 finalized in 2017

ENOLL CERTIFICATION (European Network of Living Labs)

The world's only neurology living lab

INTERNATIONAL REPUTATION

### FINDMED CREATING PATHWAYS BETWEEN ACADEMIA AND THE DRUG INDUSTRY

FINDMED is a consortium coordinated by ICM, with Damien Salauze as Operations Director. It is composed of 10 Carnot Institutes and aims at implementing partnerships with small to mid-size French drug manufacturers.

FINDMED is a French governmental initiative to support competitiveness of drug manufacturers by granting them access to academic research and the associated technological means.

The technological platforms of the various Carnot Institutes in the consortium blend cutting-edge equipment with expertise, allowing industrial partners to bring their projects to life and innovate with equipment tailored to their needs.

ICM's nomination as project coordinator anchors the Institute as a leader in business services.



### FINDMED KEY FIGURES

- 10 CARNOT INSTITUTES, INCLUDING 6 LEADERS IN THE HUMAN AND ANIMAL HEALTH FIELDS
- 175 CONTRACTS WITH INDUSTRY PLAYERS (EXCEPT LARGE GROUPS), INCLUDING
- 32 VERY SMALL BUSINESSES (1.2 M€ REVENUE)
- 66 SMALL AND MID-SIZED BUSINESSES (5.2 M€ REVENUE)
- 30 INTERMEDIATE BUSINESSES (2.8 M€ REVENUE)
- 56 CUTTING-EDGE TECHNOLOGICAL PLATFORMS

# AN INCUBATOR TO SUPPORT STARTUPS



ICM'S IPEPS INCUBATOR FOLLOW YOUNG INNOVATIVE COMPANIES THROUGHOUT THEIR DEVELOPMENT TO TRANSFORM IDEAS INTO THERAPIES. THEY BENEFIT FROM AN IDEAL ENVIRONMENT, AT THE HEART OF A CUTTING-EDGE RESEARCH INSTITUTE, ITSELF RIGHT IN THE MIDDLE OF A HOSPITAL"

JULIEN ELRIC, START-UP MANAGER AT THE RESEARCH & TECHNOLOGY DEVELOPMENT OFFICE.

## FINDING THE PERFECT PROJECT

The incubator's goal is to develop discoveries, ideas and innovations from ICM laboratories or from the outside. A project's potential is evaluated in collaboration with ICM researchers and clinicians that take part in the decision to create an ICM-incubated company. The incubator also has a forward-looking approach, taking part in international conventions, scientific conferences and competitiveness centers to identify projects that could be a good fit with ICM.

## RAISING FUNDS

The incubator helps companies raise funds as drug and medical device develop is very costly. ICM startups have succeeded in raising over 100 million euros since 2012 both in private and public funds. To support companies in their development, the incubator relies on various partners including the Public Bank for Investment (Banque publique d'investissement), the primary financial partner for startups, and a vast network of investors.

## ACCELERATING INNOVATION

Supporting startups is an everyday affair, to help them transform their idea into a profitable business that will succeed in bringing an innovation to market. Some activities are: reviewing business plans, helping create a pitch, developing a company presentation for potential investors, introducing them to investors, streamlining costs, and more.



## FROM BIOTECHNOLOGY TO E-HEALTH

The 16 startups incubated at ICM cover all facets of neuroscience, from medical technology, to biotechnology and e-health.

## A TURNING POINT

In 2016, a truly proactive approach was implemented with partnership development, a search for foreign companies to build an international vision, and even stronger support through share ownership for some companies.

## ENCOURAGING INTERACTION

Cross-fertilization is one of the incubator's core ideas: encouraging interaction and collaboration between companies through staff and equipment pooling, through conversations between researchers and clinicians... This collaborative environment is what leads our projects to success.



# LES START-UP DE L'ICM



**ACTIVITY:** Innovative medical devices designed to treat brain illnesses.

**2016 HIGHLIGHT:** financial support of 5.7 million euros in the "Research and Development Projects for Competitiveness" ("Projets de R&D Structurants Pour la Compétitivité" - PSPC) project of the Future Investments Program (Programme d'Investissements d'Avenir - PIA), led by the General Commissioner for Investment (Commissariat Général à l'Investissement - CGI) and operated by Bpifrance for its DOME project.



**ACTIVITY:** Non-invasive methods based on spinal cord stimulation (trans-spinal direct current) for treatment of patients with motor disorders.



**ACTIVITY:** medical devices for neurology/neurosurgery, specifically for patients with intracranial hypertension

**2016 HIGHLIGHT:** Official launch of the company. In vivo proof of concept, Scientipôle interest-free 'honor' loan and PIA (BPI) financing



**ACTIVITY:** Neuroprotective molecules used against neurodegenerative illnesses such as Parkinson's disease.

**2016 HIGHLIGHT:** Founded in February 2016 and incubated at ICM in September. Obtained an exclusive license to use an ICM molecule that may have a major effect in treating Parkinson's. 2016 Scientipôle Initiative Winner and recipient of the Emergence French Tech Grant.



**ACTIVITY:** Innovative digital instruments in healthcare, especially therapy video games.

**2016 HIGHLIGHT:** Publication of results in Journal Of Alzheimer's Disease verifying efficacy and patient tolerance in a pilot usability and acceptability study of therapeutic video game X-TORP designed for patients with Alzheimer's disease and associated illnesses.

Financing of a new Europe-wide study in partnership with Rabdoud University in the Netherlands for therapeutic video game TOAP Run designed for patients with Parkinson's disease, within the H2020 program. Launch of the ReMinAry project to implement rehabilitation through Motor Imagery, based on the cognitive process whereby a patient mental simulated an action without actually performing it. The online platform curapy.com, that gathers therapeutic video games with proven efficacy in clinical trials, is finishing up its "test phase" year with over 3,000 healthcare professionals signed up.



**ACTIVITY:** The Neuronaute, smart clothing for at-home epilepsy monitoring

**2016 HIGHLIGHT:** 4 m€ revenue in 2016. Over 32 hospitals currently use their digital solutions.



**ACTIVITÉ:** Screening instruments for neuroprotective molecules in various neurodegenerative illnesses



**ACTIVITÉ:** Measuring instruments to detect blood-brain barrier crossing (that prevents molecules from entering the brain) by molecules



**ACTIVITY:** Applications for improved patient care at home or in a hospital setting.

**2016 HIGHLIGHT:** 1 million euros raised and renewed partnership with Roche. Presentation of clinical trial results and proof of concept for their future medical device to the ECTRIMS. Several research contracts with the pharmaceutical industry.



**ACTIVITÉ:** Diagnostic de la maladie d'Alzheimer.



**ACTIVITÉ:** Outils d'analyse biostatistique.





## SOPHISTICATED TECHNOLOGICAL PLATFORMS FOR HIGH-LEVEL RESEARCH

HIGH-PERFORMANCE TECHNOLOGICAL PLATFORMS ARE NECESSARY TO ACHIEVE MEANINGFUL SCIENTIFIC BREAKTHROUGHS. ICM IS BOTH REVOLUTIONARY IN ITS DESIGN AND INNOVATIVE IN ITS ORGANIZATION, AS WELL AS UNIQUE IN ITS CUTTING-EDGE TECHNOLOGICAL EQUIPMENT. ICM RESEARCHERS WORK AT VARIOUS SCALES: FROM MOLECULES (DNA, PROTEINS,...) TO CELLS, TO INDIVIDUALS AS A WHOLE. AT EACH SCALE, INNOVATIVE TECHNOLOGY IS MADE AVAILABLE TO RESEARCHERS AND CLINICIANS. ICM PLATFORM NETWORK ENABLES TRANSLATIONAL RESEARCH, WITH AN IMPORTANT RELATIONSHIP FORGED BETWEEN RESEARCHERS AND CLINICIANS.

### 5 QUESTIONS FOR ETIENNE HIRSCH, DIRECTOR OF PLATFORMS

#### HOW DO WE ENSURE COMPETITIVE RESEARCH RESULTS?

Progress in biology and medicine needs strong technology and advice from the best experts in their field. In fact, most major discoveries are thanks to technical and methodological progress.

#### WHAT IS THE MISSION OF THE PLATFORMS?

The human brain is our body's most complex organ. Understanding how it functions and the associated pathologies means acquiring data at every level (molecular, cellular, neural network...) and at each moment. For ICM founders, it was important to give research teams the instrumental and organizational capabilities to meet their goals. From the start, ICM was structured around high-level technological and human resource pooling to necessary to research development. Beyond making innovative instruments and equipment available - high-performance microscopes, MRI, PET-MRI, high-speed sequencer... - the mission of our platforms is sharing technical skills and offering services and expertise. The platforms are open to the entire scientific community: ICM research teams, outside academic teams, incubated companies and outside companies.

These platforms are an opportunity for researchers to widen the scope of their research and exploration by giving them access to unique resources.

#### WHAT'S NEW FOR 2016?

In 2016, we launched a call for tenders to encourage platform competitiveness and incite them to develop methodological and technological research.

3 projects were financed with this call for tenders:

- The DISCO method to make brain tissue transparent and thus "peruse" through the brain and see neurons in 3D
  - Automation of gene analysis to implement experimental modelling
  - New functional testing to study activity of human neuron cultures, derived from induced pluripotent stem cells
- This R&D activity is essential to diversify the technological offer of our platforms and meet the needs of research teams. It is also an opportunity to provide a return on ICM's investment in our platforms and ensure its long-term viability.

#### OUR 2016 SUCCESS STORY?

Thanks to CENIR cutting-edge brain imaging, researchers in the team led by Stéphane Lehericy and Marie Vidailhet identified a marker in a pre-symptomatic variant of Parkinson's disease, in which patients present isolated behavioral disorders during REM sleep. This marker could be used as a diagnostic test for future patients. Thanks to the various cellular exploration techniques at CELIS, Olga Corti in Alexis Brice's team highlighted the cellular mechanisms

involved in certain familial forms or Parkinson's disease caused by a Parkin protein genetic mutation. They showed that the protein seems to act as a regulator of calcium channels between the endoplasmic reticulum and mitochondria, the cell's energy generator thought to play a pivotal role in the disease's various forms. Shedding light on this process that is responsible for the death of neurons involved in Parkinson's disease gives us new insight into possible therapeutic opportunities.

#### WHAT'S NEXT?

We hope to maintain and reinforce platform competitiveness with a second call for tenders, "research and development in 2017". We will also be assessing activities carried out by platforms that received investments from our public partners.



# ICM PLATFORMS

ICM PLATFORMS FOLLOW A SILO ORGANIZATION BASED ON THEIR SCALE: MOLECULAR EXPLORATION, CELLULAR EXPLORATION, IMAGING, PRECLINICAL FUNCTIONAL EXPLORATION, FUNCTION EXPLORATION, BIO-INFORMATICS AND BANKS.

## MOLECULAR EXPLORATION

- Genome analysis and development of viral vectors
- **iGenSeq** - genotyping-sequencing platform
- Genome analysis, detection of possible genetic mutations and identification of possible relationships between mutation and pathological signs.
- **iVector** - vectorology platform
- Production of viral vectors used for gene therapy used by ICM researchers in the hopes of "repairing" damaged DNA in patients.

## CELLULAR AND MOLECULAR IMAGING

- 360° cellular observations, classic and photon microscopy
- Photon optogenetic electron microscopy, fluorescence microscopy, 3D microscopy, light sheet microscopy, etc.

## PRECLINICAL FUNCTIONAL EXPLORATION

- Study of living organisms in experimental models
- **PHENO-ICMice** - Rodent Model Platform
- **PHENO-ZFish** - Zebrafish Model Platform

## FUNCTIONAL EXPLORATION

- Study of living organisms using non-invasive and respectful methods, particularly adapted to both healthy volunteers and affected patients.
- **CENIR - Human MRI** - Research neuroimaging platform High-quality imaging instruments for brain and spine research.
- **CENIR- MEG/EEG** - Magnetoencephalography and Electroencephalography platform - Non-invasive methods for visualization of cerebral activity with millisecond precision.
- **CENIR- STIM** - Stereotaxic platform
- Program development and analysis using stereotaxic imaging data (uses include deep brain stimulation, drug-resistant epilepsy and radiosurgery)..
- **CENIR-PANAM** - Physiology and movement analysis platform
- Clinical and therapeutic research using non-invasive brain stimulation, motor control studies and multidisciplinary association of various techniques.
- **CENIR -Small Animal MRI** MRI Platform for small animals
- Experimental pathological model platform for assessment of new biomarkers, the study of pathology mechanisms, and drug assessment.

## CELLULAR EXPLORATION

- Implementation of easy-to-handle cell cultures to reproduce and study nervous system pathology mechanisms.
- **CELIS** - Cell culture platform
- Cell models and cutting-edge technology used to study brain and spinal cord pathology, as well as screening of potential medication.
- **CELIS-E-PHYS** - Electrophysiology platform
- Record electrical activity within cells in various experimental conditions (isolated cells, tissue samples).
- **CELIS-IPS** - Platform for the production of human induced pluripotent stem cells
- Development of human induced pluripotent stem cells (iPS).
- **Histomics** - Histology platform
- Study of tissue samples.

## BIOLOGICAL RESOURCE CENTER

- Samples collected during blood tests, biopsies, or other surgical actions are an extremely precious source of information in research. The ICM is home to 3 biobanks dedicated to managing these biological resources (biological samples and associated data): collecting, recording, processing, storing, and making them available to researchers.  
The DNA and Cell Bank
- Biological resource center for the French Network for Multiple Sclerosis Genetic Studies (**CRB-REFGENSEP**)
- The Tumor Bank : **OncoNeuroTek**

## PRISME – HUMAN BEHAVIOR EXPLORATION PLATFORM

- **PRISME - Virtual Reality** : makes virtual reality instruments adapted to cognitive and behavioral neuroscience available for use by researchers.
- The platform also develops new equipment and therapeutic protocols for neuropsychiatric illnesses.
- **PRISME - Real Life** : dedicated to the study of cognitive functions, motor performance, and social interactions in ecological environments. The platform team assists research teams in the development of adapted protocols. One of the platform's greatest strengths lies in its ability to test a large number of subjects to increase representativeness.

## ICONICS BIOINFORMATICS

- Neuroscience research has seen a spectacular increase in the sheer amount of data collected in labs. The role of the iCONICS Bioinformatics silo is to collect data from various sources and ensure it is properly stored, organized, and managed with appropriate instruments to analyze it and interpret it using specialized methods and detailed statistics.
- Database and Datawarehouse
- Groups data within databases, all developed with the same structure to format and manage, on a daily basis, information from affected or healthy patients.
- Bioinformatics/Biostatistics
- Genetic and -omic (transcriptomic, genomic, epigenomic) data processing. Design and implementation of advanced methods to multimodal data integration.



# DILIGENCE AND TRANSPARENCY AT THE HEART OF OUR ACTIONS

MAINTAINING A HIGH LEVEL OF EXCELLENCE IS KEY FOR ICM, WHICH IS WHY THE INSTITUTE IMPLEMENTED INTERNAL AND EXTERNAL AUDITING PROCEDURES TO ENSURE THOROUGH AND EFFICIENT MANAGEMENT: AS A MEMBER OF THE TRUSTED DONATIONS COMMITTEE AND INVOLVEMENT OF AN INDEPENDENT AUDITOR.



Financial situation in 2016 p.76



# OPEN BOOKS

THE 2016 BALANCE STATEMENT SHOWS ICM AND ADREC OPERATIONS POST-MERGER FOR THE FIRST TIME. CONSEQUENTLY, THE ICM'S 2016 CONSOLIDATED BALANCE STATEMENT INTEGRATES ASSETS AND LIABILITIES FOR BOTH ENTITIES AND TAKES INTO ACCOUNT THE IMPACT OF THE BUILDING'S CONSTRUCTION, HISTORICALLY SUPPORTED BY ADREC (WITHIN A PUBLIC DOMAIN PROVISION) IN TERMS OF FIXED ASSETS AND LOANS. CASH FLOW IS ALSO ON THE RISE THANKS TO ADREC LIQUID ASSETS. THE ICM'S SCOPE OF CONSOLIDATION IN ITS 2016 BALANCE STATEMENT REMAINS HEALTHY.

## FUNDRAISING

15.2 M€ WERE RAISED IN 2016, AN 9% INCREASE COMPARED TO 2015.

Major patronage agreements signed with foundations or companies in 2016:

- Groupe Pasteur Mutualité to support ICM's research mission
- The Edmond J. Safra Foundation for research project funding
- Fonds Brou de Laurière, for research project funding

THE CIRCLE OF FRIENDS OF ICM BRINGS TOGETHER DONORS WHO HAVE SUPPORTED ICM FROM ITS INCEPTION, WITH DONATIONS OF 10,000€ OR MORE.

The Circle was created as a means of giving special thanks to important donors, individuals, companies, or foundations, who very actively participated in the Fundraising Campaign launched by ICM in 2008.

- At the end of 2016, the Circle had nearly **600 members**.
- Exclusive activities are organized to thank them for their support and to help donors meet and discuss with researchers, and are also a means of giving them more **in-depth information** regarding **research outlooks** and how donations are used.
- Maurice Lévy and David de Rothschild, Founding Members of ICM, currently serve as Circle co-presidents.
- In 2016, ICM organized a charity dinner at the Conciergerie in Paris on June 8, 2016, for the Circle of Friends of ICM.

OVER THE YEAR, ICM CONTINUED ITS DIRECT MARKETING STRATEGY, INITIATED IN 2010, TO INCREASE ITS DONOR BASE.

Fundraising campaigns raised 6.4 M€ over the course of the fiscal year and donor base increased to 144,000 by end of year.

Finally, ICM is especially grateful to families who collected donations in memoriam for the Institute.

## IN-KIND DONATIONS AND SPONSORSHIPS

MANY COMPANIES HAVE OFFERED THEIR SUPPORT BY CONTRIBUTING SKILLS FROM THEIR FIELD, OR BY DONATING PRODUCTS FREE OF CHARGE. IN THIS SECTION ARE ALSO FEATURED ARTISTS AND COLLECTORS WHO HAVE DONATED WORKS OF ART TO BE SOLD, BENEFITING ICM.

ICM has received in-kind support within the scope of communication and fundraising activities in the form of:

- Media placement from Air France, Reedexpo/FIAC, Euronews;
- Complimentary services and products (Air France, Publicis, Orrick Rambaud Martel, Quaterback, IDEC, Moët & Chandon, Hôtel Barrière Le Fouquet's Paris, Crédit Agricole Centre Ouest).
- Luxury products, collectibles, art and other objects for the auction held during the Institute's charity auction (Enrico Navarra Editions, Akbar Padamsee, Kamel Mennour Gallery, Gérard Garouste, Gilles Le Baud, Camille Henrot, François Henrot, Fabrice Hyber, Francis Joyon, Cyril Kongo, Bertrand Lavier, Claude Lévêque, Montres FP Journe Paris SAS, Richard Mille, François Morellet, Bettina Rheims, David de Rothschild, Domaines Barons de Rothschild, Guy Savoye, Vanessa von Zitzewitz, Jean Todt, Romain Grosjean, Cité du Cinéma, Hôtel Intercontinental Paris, FIA).

## ICM IN FRANCE

ICM CONTINUED ITS REGIONAL EXPANSION IN 2016. THREE REGIONAL BRANCHES (LIMOUSIN, BASSE-NORMANDIE AND AUVERGNE) WERE ORGANIZED AROUND THE FOLLOWING GOALS:

- Reinforce visibility, reputation, and attractiveness of ICM amongst donors, the general public, and economic and political figures;
- Contribute to the development of ICM's financial resources to accelerate scientific discoveries with its own research teams and regional, national and international partnerships;
- Encourage ties between ICM and regional neuroscience research partners and promote collaborations.

# BALANCE SHEET

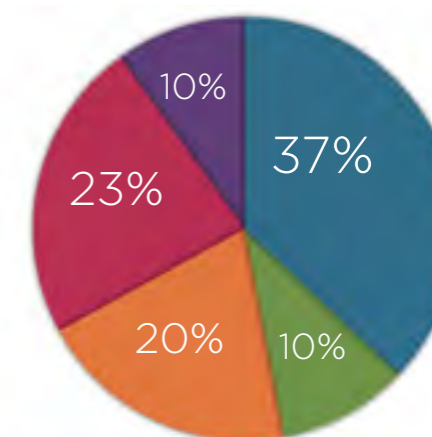
## 2016 RESOURCES

2016 resources reached 39.9 M€, including fiscal year products of 32.5 M€ and a carryover of allocated and unused resources from previous fiscal years of 7.4 M€. Fiscal year products are essentially made up of fundraising revenue (15.1 M€ or 46.5%), general public donations (11.9 M€ or 36.6%), companies and private foundations (3.2 M€ or 10%).

Additionally, they include:

- Revenue from technological platforms (3.3 M€), and research partnerships with industry partners (3.2 M€);
- Public subsidies (5.5 M€);
- Private subsidies (2.1 M€).

GENERAL PUBLIC FUNDRAISING  
PRIVATE FOUNDATION AND CORPORATE FUNDRAISING  
ACTIVITY REVENUE  
PUBLIC AND PRIVATE SUBSIDIES  
OTHER REVENUE



## 2016 APPLICATIONS

IN 2016, THE GRAND TOTAL OF APPLICATIONS REACHED 38.8 M€: 30.9 M€ USED OVER THE COURSE OF THE YEAR AND 7.9 M€ ALLOCATED FOR FUTURE USE. THE SHARE OF APPLICATIONS DEDICATED TO SOCIAL MISSIONS REACHED 24.9 M€, 81% OF TOTAL FISCAL YEAR APPLICATIONS. ICM SOCIAL MISSIONS INCLUDE:

- RESEARCH PROJECTS (55 %)
- TECHNOLOGICAL PLATFORMS (27 %)
- SCIENTIFIC EVENTS AND INTERNATIONAL PARTNERSHIP DEVELOPMENT (5 %)
- INNOVATIVE COMPANY INCUBATION (13 %)



Research project financing is primarily dedicated to nervous system diseases and spinal cord trauma. Technological platforms (neuroimaging, vectorology, genotyping sequencing, cell culture and histology) support these projects. Fundraising and communication costs (12%) represent expenses in canvassing of the general public (donations and bequests) as well as companies and private foundations (patronage and sponsorship) and communication. Operational costs (7%) represent support staff costs (finance, human resources, legal, IT and logistics). Applications on allocated resources (7.9 M€) primarily represent company and foundation donations received over the course of the year, to be utilized later for specific multi-year research programs.

## ALLOCATION OF RESOURCES FROM THE GENERAL PUBLIC

RESOURCES RAISED FROM THE GENERAL PUBLIC AND USED IN 2016 TOTALED 11.9 M€.

IN SHORT, 71€ OF EVERY 100€ RAISED FROM THE GENERAL PUBLIC WERE USED TO FUND SOCIAL MISSIONS AND INVESTMENTS. 25€ WERE USED TO COVER FUNDRAISING AND COMMUNICATION COSTS, AND 4€



## SIMPLIFIED BALANCE SHEET

| Assets (k€)                         | 31 12 2015    | 31 12 2016     |
|-------------------------------------|---------------|----------------|
| Net immobilized assets              | 9 963         | 54 276         |
| Net available and realizable assets | 35 108        | 50 399         |
| <b>Total</b>                        | <b>45 071</b> | <b>104 675</b> |

| Liabilities (k€)   | 31 12 2015    | 31 12 2016     |
|--------------------|---------------|----------------|
| Organization funds | 19 101        | 44 498         |
| Fiscal year result | 766           | 1 191          |
| Dedicated funds    | 7 464         | 7 919          |
| Debts              | 17 740        | 51 067         |
| <b>Total</b>       | <b>45 071</b> | <b>104 675</b> |

## COMMENTS

TOTAL ICM INVESTMENTS SINCE THE INSTITUTE'S LAUNCH REPRESENT NEARLY 24.5 M€, DEDICATED PRIMARILY TO TECHNOLOGICAL PLATFORMS SUPPORTING RESEARCH. FISCAL YEAR INVESTMENTS AMOUNTED TO 2 M€.

### PRINCIPAUX INVESTISSEMENTS :

- Key equipment acquired in 2016 is a helium recycling system as well as a sequencer, for a total of 490 K€;
- Research team workspace reconfiguration and scientific equipment acquisition for 392 K€;
- Scientific IT storage capacity acquisition and calculation cluster for 737 K€.

Fixed assets amount to 54.3 M€. On December 31 2016, cash flow amounted to 28.5 M€. ICM organization funds represent 45.7 M€. This includes equity of 19.3 M€ as well as investment subsidies of 26.4 M€. Nonexpendable endowments total 1.2 M€. By fiscal year end, dedicated funds (to be allocated to various programs) amounted to 7.9 M€.

### MONETARY RESERVE POLICY

ICM was supported by an 11.7 M€ grant when it was started in 2006. The board has a very cautious policy in terms of monetary reserve preservation. ICM reserves are invested in marketable securities (long-term investment contracts with major banks, capital guaranteed and 100% in euros).

### IN-KIND VOLUNTARY CONTRIBUTIONS

- Volunteering: ICM was supported by volunteering over the course of the fiscal year, especially for communication campaigns in Paris and the three regional branches. Estimated volume is 1.4 yearly full-time equivalent, i.e. 37 K€ based on hourly minimum wage.

MAINTAINING A HIGH LEVEL OF EXCELLENCE IS KEY FOR ICM, WHICH IS WHY THE INSTITUTE IMPLEMENTED INTERNAL AND EXTERNAL AUDITING PROCEDURES TO ENSURE THOROUGH AND EFFICIENT MANAGEMENT: AS A MEMBER OF THE TRUSTED DONATIONS COMMITTEE AND INVOLVEMENT OF AN INDEPENDENT AUDITOR.



### CODE OF TRUSTED DONATIONS COMMITTEE

On November 3, 2010, ICM received certification from the Comité de la Charte pour le Don en Confiance (Code of Trusted Donations Committee), renewed on October 6, 2016.

For over 20 years, the Committee has been a regulator of professional fundraising from the general public.

Its action is centered on 3 leading guidelines: certified organizations must respect ethics regulations, must abide by collective discipline with respect to donors, and must accept continuous monitoring of commitments.



ICM FOUNDATION - 2016 PROFESSORIT AND LOSS STATEMENT

EXERCICE CLOS LE 31 DÉCEMBRE 2016

| APPLICATIONS  | 2016 APPLICATIONS | 2016 ALLOCATION OF RESOURCES RAISED FROM THE GENERAL PUBLIC BY APPLICATION | RESOURCES   | 2016 RESOURCES COLLECTED | 2016 RESOURCES COLLECTED AND USED |
|---|-------------------|--|---|--------------------------|-----------------------------------|
|   |                   |  | Carryover of resources collected from general public not allocated/used at start of fiscal year |                          | 537 606                           |
| <b>1. Social Missions</b>   | 24 856 025        | 8 459 725  | <b>1. Resources collected from general public</b>   | 11 911 067               | 11 911 067                        |
| Actions directly carried out  |                   |  | Unallocated monetary donations  | 10 209 784               | 10 209 784                        |
| Research Programs   | 13 717 879        | 2 279 528  | Allocated monetary donations  | 321 800                  | 321 800                           |
| Technological Research Platforms  | 6 805 363         | 2 818 012  | Unallocated bequests and other gifts  | 780 983                  | 780 983                           |
| Research Application and Incubator  | 3 144 114         | 2 374 195  | Allocated bequests and other gifts  | 0                        | 0                                 |
| Other social missions   | 1 188 670         | 987 990  | Other revenue from general public generosity  | 598 500                  | 598 500                           |
| <b>2. Fundraising costs</b>   | 3 736 848         | 2 949 528  | <b>2. Other private funds</b>   | 8 352 390                |                                   |
| Cost of appeals to the generosity of the general public                                   | 3 366 891         | 2 642 029  | Patronage   | 3 127 655                |                                   |
| Costs related to private fund canvassing  | 259 861           | 215 989  | Partnerships  | 3 149 193                |                                   |
| Communication costs   | 110 096           | 91 509   | Private subsidies   | 2 075 543                |                                   |
| <b>3. Institute operational costs</b>   | 2 258 740         | 501 814  | <b>3. Subsidies and other public financial support</b>  | 5 509 568                |                                   |
|   |                   |  | <b>4. Other products</b>  | 6 681 608                |                                   |
|   |                   |  | Financial products  | 442 084                  |                                   |
|   |                   |  | Services rendered   | 3 268 019                |                                   |
|   |                   |  | Other products  | 2 971 505                |                                   |
| <b>I. TOTAL APPLICATIONS</b>  | 30 851 612        | 11 911 067   | <b>I. TOTAL RESOURCES</b>   | 32 454 633               |                                   |
| <b>II. PROVISIONS</b>   | 16 835            |  | <b>II. CARRYOVER OF PROVISIONS</b>  |                          |                                   |
| <b>III. PLEDGES ON ALLOCATED RESOURCES</b>  | 7 859 810         |  | <b>III. CARRYOVER OF ALLOCATED RESOURCES UNUSED IN PREVIOUS FISCAL YEARS</b>                    | 7 464 986                |                                   |
| <b>IV. FISCAL YEAR SURPLUS</b>  | 1 191 362         |  | <b>IV. VARIATION OF ALLOCATED FUNDS COLLECTED FROM GENERAL PUBLIC</b>                           |                          | -1 543                            |
| <b>V. GRAND TOTAL</b>   | 39 919 619        |  | <b>V. INSUFFICIENT FISCAL YEAR RESOURCES</b>  |                          |                                   |
| Share of fixed assets acquired during the fiscal year financed by collected funds         |                   |  | <b>VI. GRAND TOTAL</b>  | 39 919 619               | 12 447 130                        |
| Neutralization of provisions for depreciation of fixed assets financed by collected funds |                   |  |   |                          |                                   |
| <b>TOTAL APPLICATIONS FINANCED BY FUNDS COLLECTED FROM GENERAL PUBLIC</b>                 |                   | 11 911 067   | <b>TOTAL APPLICATIONS FINANCED BY FUNDS COLLECTED FROM GENERAL PUBLIC</b>                       |                          | 11 911 067                        |
|   |                   |  | <b>BALANCE OF FUNDS COLLECTED FROM GENERAL PUBLIC NOT ALLOCATED/USED END OF FISCAL YEAR</b>     |                          | 536 063                           |
| <b>EVALUATION OF VOLUNTARY IN-KIND DONATIONS</b>  |                   |  | <b>EVALUATION OF VOLUNTARY IN-KIND DONATIONS</b>  |                          |                                   |
| Social missions   | 36 960            |  | Volunteering  | 36 960                   |                                   |
| Fundraising costs   |                   |  | In-kind services  |                          |                                   |
| Operational costs   |                   |  | In-kind donations   |                          |                                   |
| Total   |                   |  | Total   |                          |                                   |

# COMMUNICATION AND PHILANTHROPY

YOUR GENEROUS SUPPORT AND INVOLVEMENT GAVE RISE TO AN UNPRECEDENTED SCIENTIFIC ADVENTURE. TOGETHER, YOU HAVE DECIDED TO ACT ALONGSIDE US TO IMPROVE CURRENT AND FUTURE WELL-BEING FOR MILLIONS OF WOMEN AND MEN WORLDWIDE.



Le cercle des Amis de l'ICM *p.84*

Communication *p.86*

Thank You *p.88*



# PHILANTHROPY TO SUPPORT RESEARCH ON NERVOUS SYSTEM DISEASES

**T**HE CIRCLE OF FRIENDS OF ICM BRINGS TOGETHER THE INSTITUTE'S MAJOR BENEFACTORS (INDIVIDUALS, BUSINESSES, FOUNDATIONS AND ORGANIZATIONS). SCIENTIFIC PARTNERSHIPS, FINANCIAL SPONSORING, EQUIPMENT DONATIONS OR SKILL PATRONAGE: SUPPORT FROM PRIVATE PARTNERS AND THE GENERAL PUBLIC'S GENEROSITY ARE KEY IN ALLOWING ICM TO INCREASE ITS RESEARCH PROGRAMS, RECRUIT THE BEST SCIENTISTS, ATTRACT YOUNG TALENT AND PROVIDE THEM WITH CUTTING-EDGE TECHNOLOGICAL EQUIPMENT. THROUGHOUT THE YEAR, PRIVATE LABORATORY VISITS ARE ORGANIZED FOR CIRCLE MEMBERS AS WELL AS SCIENTIFIC AND CULTURAL CONFERENCES AND MEETINGS WITH RESEARCHERS.

FUNDS RAISED FROM BEQUESTS AND LIFE INSURANCE ROSE DRAMATICALLY IN 2016, REACHING A TOTAL OF 0.8 M€.

## CERCLE DES AMIS DE L'ICM



LE CERCLE DES AMIS DE L'ICM  
The Committee aims at rallying support to help ICM bring its ambition to life. Members are:

### MEMBERS

- Lily SAFRA, Le Cercle des Amis de l'ICM Honorary President
- Lindsay OWEN-JONES, Le Cercle des Amis de l'ICM Honorary President
- Pr. Gérard SAILLANT, ICM President
- Jean TODT, ICM Vice-President
- Maurice LÉVY, Co-President of the Cercle des Amis de l'ICM
- David de ROTHCHILD, Co-President of the Cercle des Amis de l'ICM
- Cédric de BAILLIENCOURT,
- Jean BURELLE,
- Sylvain HEFES,
- François HENROT,
- Jean-Philippe HOTTINGUER,
- Christian SCHMIDT de la BRELIE,
- François THOME,
- Isabelle WEILL,
- Serge WEINBERG, ICM Treasurer
- Alain WICKER



IN 2016, **TWO MAJOR EVENTS** BROUGHT TOGETHER MAJOR BENEFACTORS IN SUPPORTING ICM'S FUTURE CHALLENGES:



**1** IN JUNE, THE INSTITUTE ORGANIZED A GALA DINNER AT THE CONCIERGERIE, IN PARIS, WITH MAJOR BENEFACTORS  
240 guests attended a dinner hosted by Stéphane Bern and took part in a recital by Natalie Dessay as well as a choreography by Marie-Claude Pietragalla and Julien Derouault, accompanied at the piano by Philippe Cassard. After dinner, an art and exceptional experiences auction was held, hosted by auctioneer Frédéric Chambre (PIASA). Thanks to the generous support of the attendees, 1.2 million € were raised over the course of the evening for ICM.



**2** AN ONGOING PARTNERSHIP WITH THE FIAC CONTEMPORARY ART FAIR WITH THE "ART AND SCIENCE" BREAKFAST  
Professor Marie Vidailhet, neurologist, Jennifer Flay, FIAC Director, researcher and team leader at ICM along with artists Camille Henrot, Jean-Sébastien Leblond-Duniach, countertenor Sébastien Fournier and choreographer Florence Guérin shared their vision of movement disorder with the Institute's Founding Members and event host Claire Chazal. Over 300,000€ were raised over the course of the morning to support ICM research.



# YOUR SUPPORT IS ESSENTIAL

SEVERAL EVENTS TOOK PLACE DURING THIS PAST YEAR ALREADY FILLED WITH EXCITING SCIENTIFIC PROGRESS.



Among these was the tenth “Future Research” program graduation ceremony; “The Brain to Market” Summer School combining neuroscience and entrepreneurship on the topic of epilepsy, and the Dublin presentation of “The Move” program, that uses miming to teach neurological semiology to medical school students.



Various communication efforts were carried out during the National Neurodegenerative Illnesses Days, both towards Institute donors and the general public. These efforts were an opportunity to cement ICM’s role as a major player in nervous system diseases research and position it as a key contact for media inquiries.



F.P Journe renewed its commitment to donate 5% of proceeds on each sale of the Centigraphe Souverain Watch to ICM.



The IDEC Maxi Trimaran, ICM partner, aiming for the Jules Verne Trophy

IDEC has chosen to display ICM logo on its Maxi Trimaran

## THEY SUPPORTED ICM

FEE RARISSIME LE LIONS CLUB DES ESSARTS-LE-ROI 20 KM DE PARIS  
 LIONS CLUB BLOIS DOYEN LIONS CLUB BLOIS RENAISSANCE  
 LIONS CLUB CHAMBORD DELIA LIONS CLUB CLASSIC DAYS  
 UN CHRONO POUR UN DON GÉRARD CROTTI DE VERRIÈRES LE BUISSON  
 MUSIC PASSION COGNO-BOURDIEU PIERRE MOREL LORS DU TOUR AUTO  
 PARKINSON ECOLE SAINT JEAN DE PASSY Un circuit pour le cerveau  
 JACQUES-NICOLAS DE WECK POUR FÉDÉRATION FRANÇAISE POUR LE DON DE SANG BÉNÉVOLE DE ST MAUR  
 LIONS CLUB DE MONTLERRY SOGNO DI ET LE ROTARY CLUB DE SAINT MAUR  
 Lions Club Lyon Doyen CAVALLINO Internationaux de Strasbourg Porsche Club Motorsport

## REGIONAL DELEGATIONS

ICM researchers collaborate with several regional teams. Shared research projects are focused on three illnesses: Frontotemporal lobar degeneration (FTLD) in Caen (Basse-Normandie), Amyotrophic Lateral Sclerosis in Limoges (Limousin), and spinal cord damage in Clermont-Ferrand (Auvergne).

## ICM ON THE OUTSIDE

« MENTAL DÉSORDRE »  
 À LA CITÉ DES SCIENCES ET DE L'INDUSTRIE  
 CHARITY DAY BGC  
 20KM DE PARIS  
 « 48H POUR FAIRE VIVRE DES IDÉES »  
 LE MAXI TRIMARAN IDEC À LA CONQUÊTE  
 DU TROPHÉE JULES VERNE  
 TROPHÉE LES ECHOS  
 COURSE DES HÉROS  
 S3ODÉON  
 « MUSIQUE & CERVEAU »  
 VIVA TECHNOLOGY  
 SEMAINE DU CERVEAU  
 COLÈRES PLANQUÉES  
 TOUR DU LAC DE VASSIVIÈRE

“ICM’s vision has always meant a lot to me. One day, we will lean the brain’s secrets thanks to the hard work of women and men who are dedicated to gaining a deeper understanding of neuroscience and to furthering medicine. I am proud to have supported ICM from the start with the yearly planning of the 20 KM de Paris, with a booth in the race village, an annual donation as well as complimentary race bibs for researchers. ICM’s mission is innovative and ambitious: it deserves all the support possible not only for research, but also to improve patient care and everyday life. Congratulations to the whole team for this unparalleled human and scientific adventure.”

**DIDIER ECK**  
 President of the 20 KM de Paris Association





# THANK YOU

## MAJOR PATRONS

Maria Rosa Bemberg  
 CARCEPT PREV - IPRIAC - KLESIA  
 FIA FOUNDATION FOR THE AUTOMOBILE  
 AND SOCIETY  
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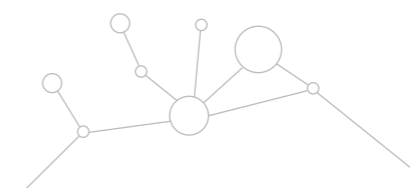
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