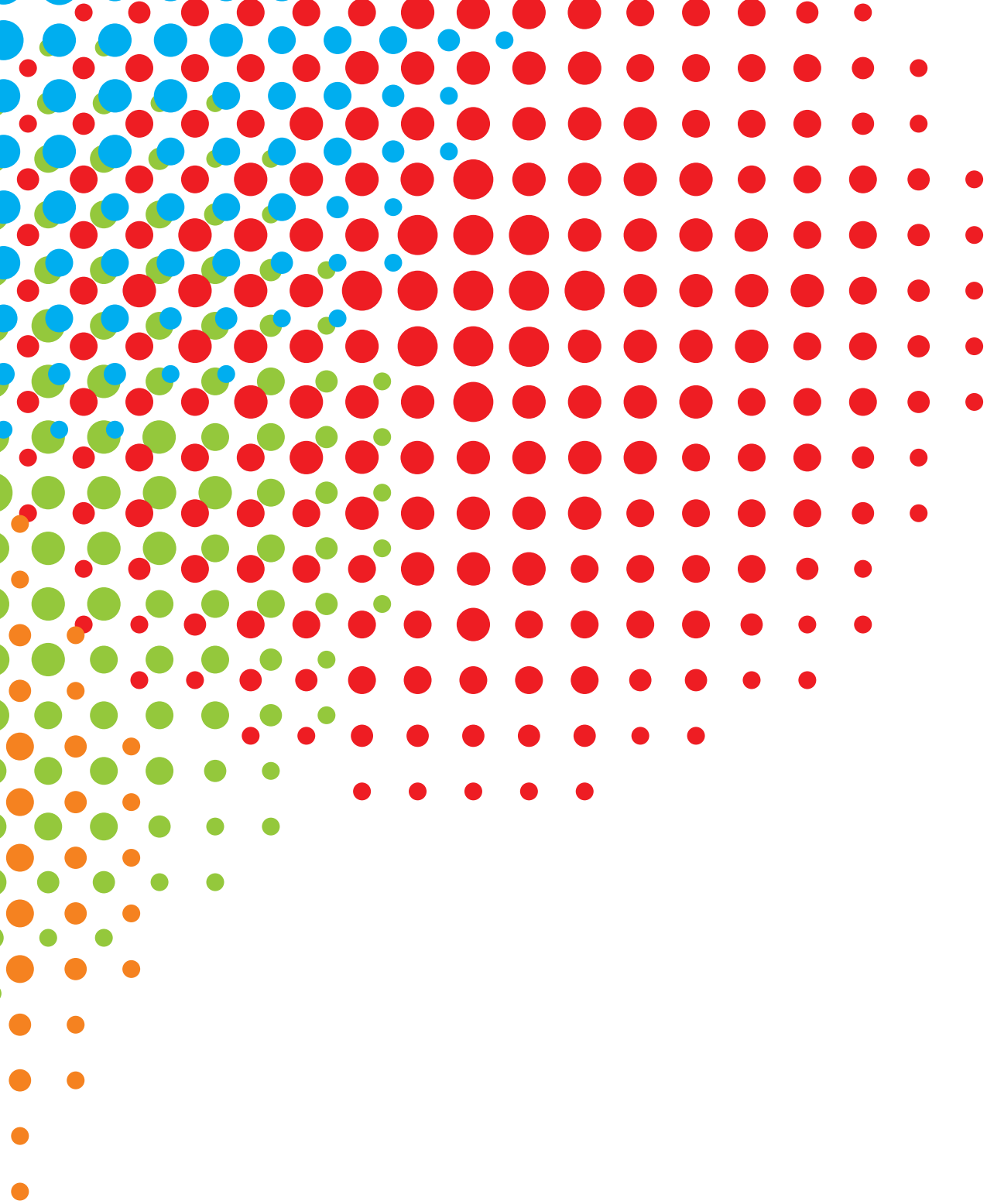


LabEx BRAIN

BORDEAUX neurocampus

Activity Report 2011/2019

INDEX

General presentation

- Main objectives
- Our strategy
- Budget / Financial plan

LabEx "BRAIN" (Laboratory of Excellence "Bordeaux Region Aquitaine Initiative for Neuroscience"), is the cluster of excellence specialized in neuroscience in Bordeaux, headed by Daniel Choquet. The project was selected on the first wave of the "Investissement d'Avenir" national program by an international jury and run until 2020.

Main objectives

Main objectives of the national program

The aim of the "Investissement d'Avenir" program was to build an integrated high-level policy in research, training, dissemination and technology transfer, with the final objective of developing the economical impact of research results. In particular, the general objectives of the LabEx program was i) to favor the emergence of laboratories of excellence, in all the territories and in all the disciplines; ii) to encourage the best French laboratories to strengthen their scientific potential by recruiting researchers and investing in innovative equipment; iii) to promote the emergence of ambitious and internationally visible scientific projects carried by laboratories or groups of laboratories.

Main objectives of BRAIN

LabEx BRAIN obtained significant means to compete with its foreign counterpart's centers and increase the international visibility of neuroscience in Bordeaux, France. With this aim, BRAIN put together a multidisciplinary consortium of scientists, featuring world renowned leaders, in order to meet the most important challenges facing neuroscience research. Hence, the project received 20M€ with the general ambition to position our research community as a key player in the creation of new knowledge and the discovery of new treatments for neurodegenerative and psychiatric diseases at the European and global level. BRAIN also participated in the development of local employment with the emergence of start-ups, and is now becoming the reference for European training in neuroscience.

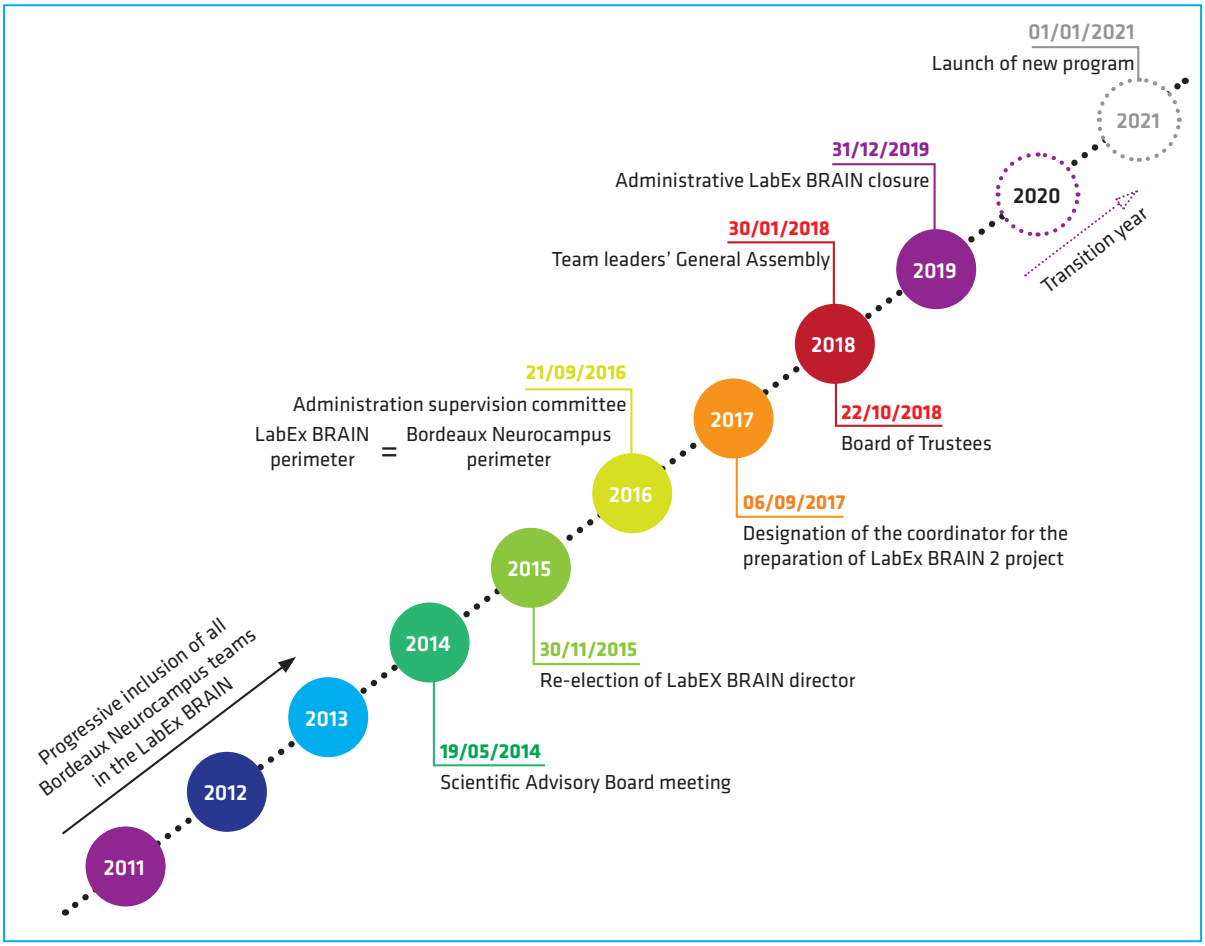
OUR STRATEGY

Perimeter

BRAIN was built on the diverse and complementary expertise of its teams and partners, in fields ranging from high resolution imaging and cell biology of the neuron to animal and human behavior through the physiology of neural networks and mechanisms of neuro-degenerative and behavioral disorders.

The gradual work of including all Bordeaux Neurocampus teams within the LabEx BRAIN community of excellence paid off in 2016 with the extension of the LabEx perimeter to all teams. This, along with the completion of the construction of Centre Broca Nouvelle Aquitaine building, resulted in a more united and integrated Bordeaux Neurocampus community.

Institutional evolution of LabEx BRAIN



Objectives and general strategy

Scientific objectives

BRAIN allowed to initiate new ideas and transversal projects, by bringing together a multidisciplinary consortium of world renowned scientists, in order to face the biggest neuroscience research challenges and to tend towards transversality between the molecular, systemic, behavioral and clinical levels.

Our efforts have been organized and concentrated around 5 major transversal projects corresponding to major challenges in modern neuroscience. The five scientific projects of brain resulted from a combination of bottom-up and top-down approaches. They all transversally involved teams from different partner research centers and all reflect our motto: "*from molecules to behavior for understanding brain function and its pathologies*".

The strengths of these scientific projects lied in their focused and well identified aims, multidisciplinary approaches, critical mass of top level researchers and major potential impacts:

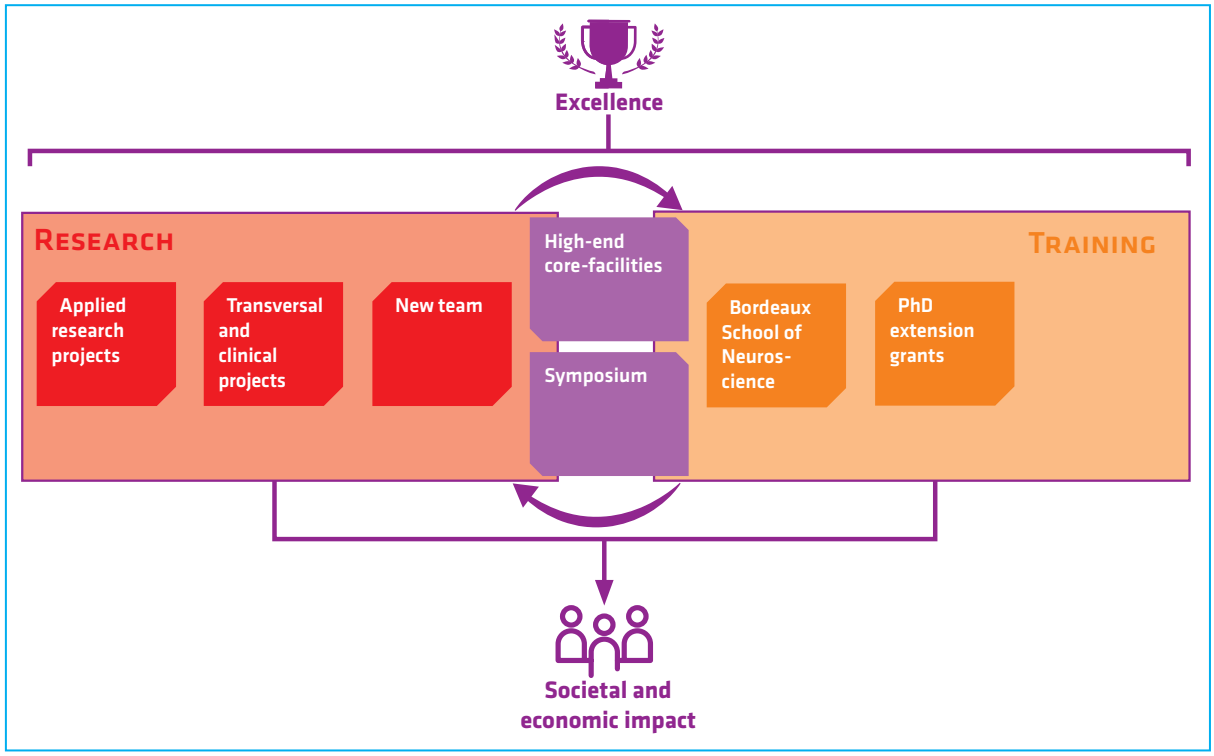
- ▸Axis 1: Mechanisms and pathophysiological consequences of the dynamic organization of synapses
- ▸Axis 2: Integrative physiology of synapses and neuronal networks
- ▸Axis 3: Molecular basis of the transition to addiction
- ▸Axis 4: Transversal pathophysiology and innovative therapeutics for aging, memory and cognition
- ▸Axis 5: Transversal pathophysiology and innovative therapeutics for sleep and attention disorders

In order to connect basic research to societal issues, the transfer strategy developed within the LabEx BRAIN encouraged the creation of new start-up based on BRAIN laboratories results.

General strategy

With the final aim to have a concrete societal and economic impact, we developed programs in research and trainings in a continuous interaction. Support to facilities was a key component of our strategy, in order to offering access to high end technologies and services, as well as reaching excellence. The support to selected projects, regularly evaluated, permitted to maintain an up to date level in such an international competitive context. As European pioneers, we created the Bordeaux school of neuroscience (see below), a precious tool for attractivity and excellence.

Our strategy



Tool implementation

Research

Transversal projects

From 2011 to 2019, BRAIN launched **5 calls for projects** to deepen and expand internal collaborations. Indeed, all the projects involved partners from at least 2 different laboratories. The evaluation criteria was based on the project significance, complementarity of involved teams, multidisciplinary aspect of the approach and innovation. **A total of 52 scientific projects has been supported**, with a 30% selection rate.

Clinical research projects

3 calls were launched in 2015, 2017 and 2018 to support clinical research projects. It consisted of financing clinical trials (physiological, pathophysiological, diagnostic or interventional therapeutic, industrial trials) in healthy or unhealthy subjects. **A total of 11 clinical research projects** has been supported through this selective process.

New team

In 2014, LabEx launched an international call for applications to set up a new team within the SANPSY unit. The selected candidate received a competitive start-up package including running costs, equipments and salaries to set-up her team.

Core facilities

11 core facilities, ranged from in vitro analyses and molecular and cellular tools, to animal and human phenotyping, were supported by the LabEx. The aim of this program was to offer high-end technical equipment and services to all Bordeaux Neurocampus teams at a reduced price, annually evaluated through an internal audit based on utilisation rate and excellence of the service offer. The IBISA labeling of 3 facilities testifies to the quality of this program.

Training

Bordeaux School of Neuroscience

The LabEx BRAIN allowed **the acquisition of all initial equipment for the creation of the Bordeaux School of Neuroscience** (see also description in Focus). Unique in Europe and based on the model of Cold Spring Harbor Laboratory, the Bordeaux School of Neuroscience offers the international/European Community a platform of high technological level, giving the opportunity to organize training for research in neuroscience based on experimental practice.

The Bordeaux School of Neuroscience has been selected by FENS/IBRO to be the major partner site of the Cajal Advanced Neuroscience Training Program.

PhD Extension Grant

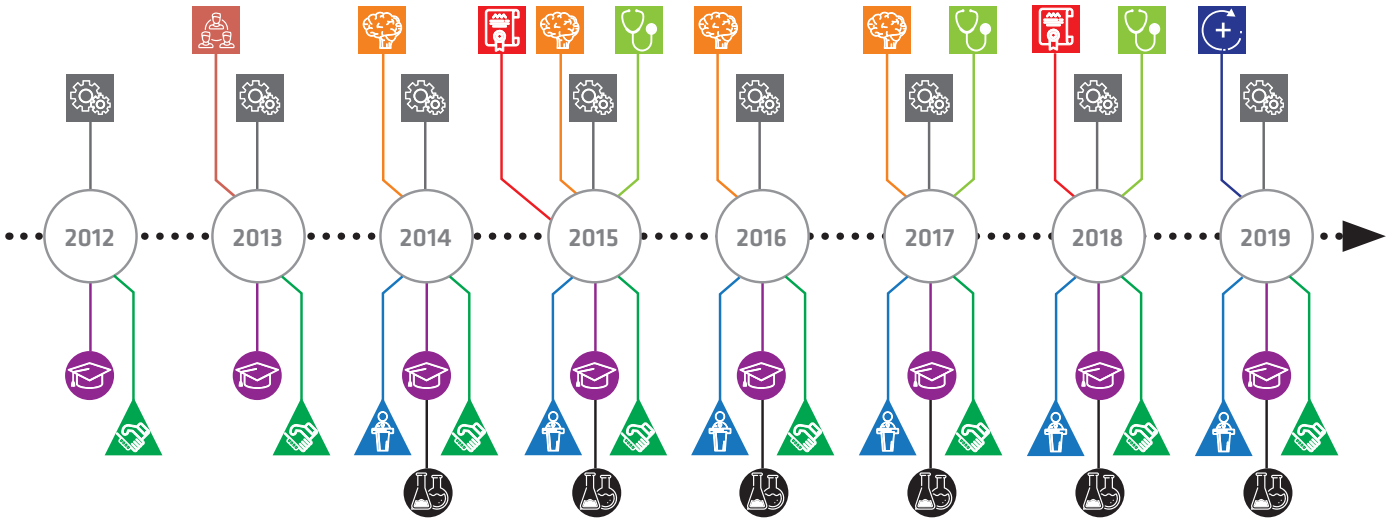
A program dedicated to PhD students was set-up an launched **on a yearly basis** to offer a **fellowship immediately after a 3 year Ph.D**, covering a period to finish their projects before leaving for a post-doc. A total of **52 students were supported from 2011-2019**.

Dissemination

Applied research projects / Technological Transfer

BRAIN launched **2 calls for technological transfer**, in 2015 and 2018, to support applied research projects with high potential economic impact. **The 4 supported projects** included the discovery, development or optimization of innovative therapeutic or diagnostic products, as well as the promotion of research resources dedicated to the discovery of new therapies or diagnostic tools (in silico, cellular or animal screening methods).

LabEx BRAIN programs 2012-2019



Research programs

- Facilities
- International call for new team
- Call for transversal projects
- Call for transfer projects
- Call for clinical projects
- Call for IdEx projects extension

Training programs

- PhD extension grant
- Bordeaux School of Neuroscience support

Dissemination programs

- Sabbatical & symposium support
- International Bordeaux Neurocampus conference

Knowledge transfer
On a yearly basis, the LabEx BRAIN has been supported the organisation of scientific symposium that took place in Bordeaux. A total of 70 events were supported from 2011 to 2019. Moreover, our community is very active beyond Bordeaux and is involved in the organisation of international meetings around the world.

Researchers are also implicated in popularization, such as conferences, debates, workshops for a general audience, in the context of "brain week" ("la semaine du cerveau") or the "science festival" ("la fête de la science").

Operating processes

Governance

The form of governance of BRAIN reflects the overall objective of the partners involved, i.e. to collaborate constructively with efficient and transparent processes, and in keeping with a longer term strategy.

The steering committee
It represented the research laboratories of BRAIN. It met every two months to discuss growth strategy and to decide on general guidelines.

The executive committee
It was composed of three deputy directors in charge of technology transfer, training and clinical relationships alongside the Neurocampus project coordinator. It handled BRAIN management on a daily basis through the project manager.

The external scientific committee
It was composed of highly qualified international scientists. Its role was to discuss the Cluster's global policy for the forthcoming years and appraise the annual scientific program.

After four years of operation, as stipulated in the LabEx charter, the direction of LabEx has been renewed. Daniel Choquet was unanimously re-elected as Director of the Steering Committee for 4 more years. Moreover, the steering committee has been enlarged and one seat has been added for Nutrineuro.

Principles of the calls for proposals

The LabEx BRAIN launched calls for proposals for scientific projects (transversal, transfer and clinical projects), PhD extension grant, symposium, etc... The general principles were aimed at favouring a rapid, efficient and transparent process.

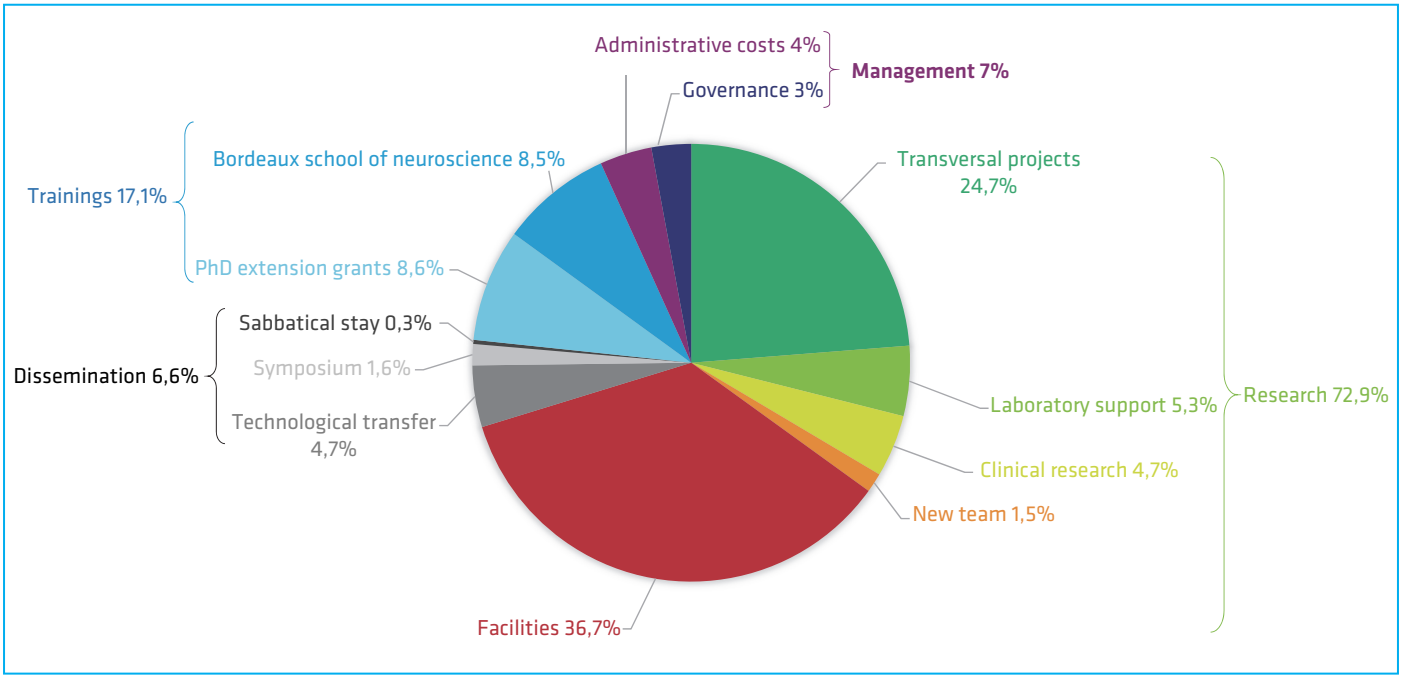
Launching of the call for proposals
The criteria were discussed by the steering committee. The call text was then largely diffused through the LabEx and Bordeaux Neurocampus websites as well as the newsletter.

Evaluation and selection process
In order to favor risky and early stage projects, we proceeded to an internal evaluation of the proposals. Each grant was independently evaluated by the steering committee members and then discussed for final selection in plenary session, taking every step to reduce the impact of potential conflicts of interest. The projects were evaluated on significance, multidisciplinary approach and innovation. The projects submitted to the call for clinical proposals were first sent to external referees before committee evaluation.

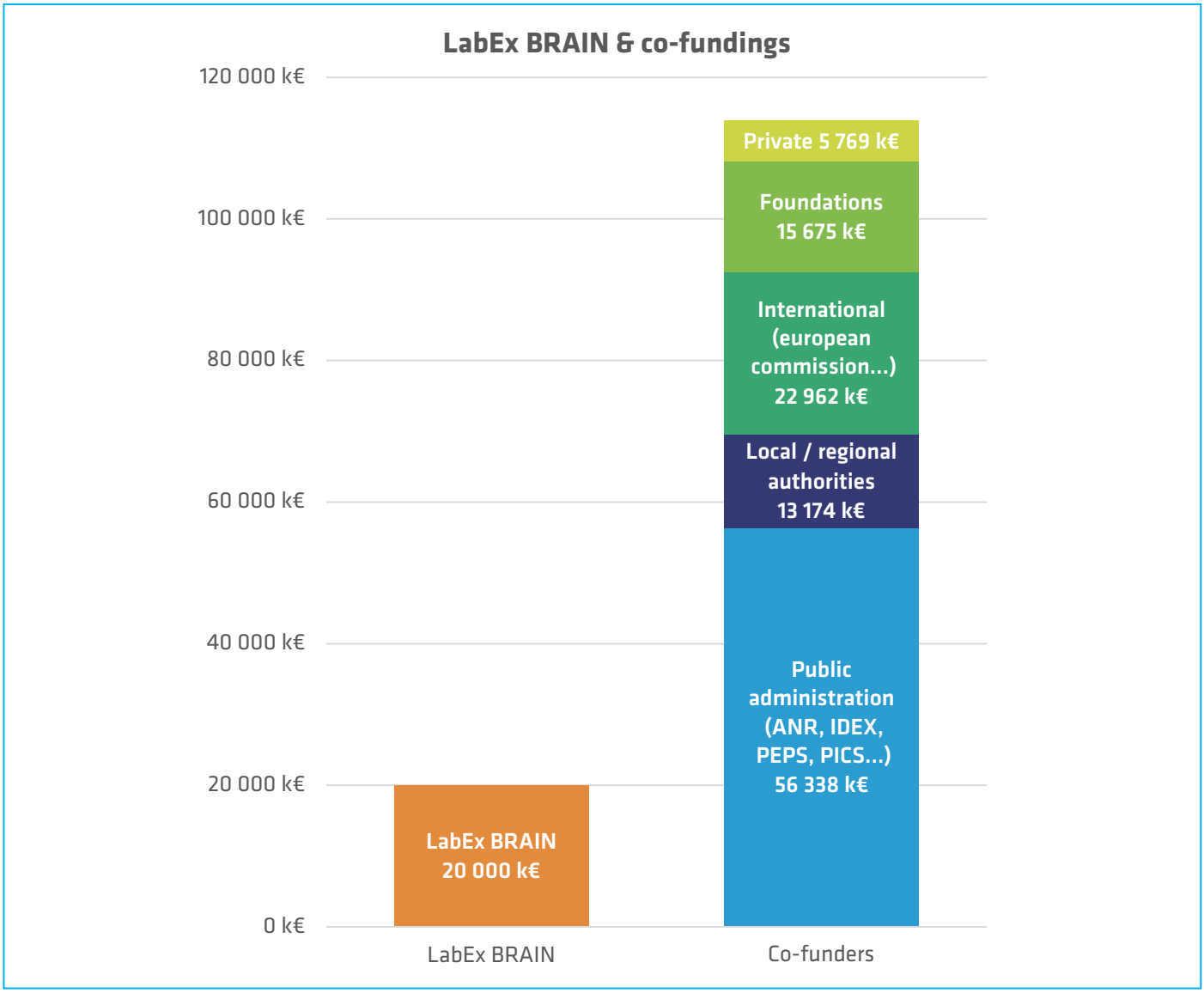
Monitoring systems
We assessed every other year the impact of the selected project on additional grants obtained, published publications and in progress. For core facilities, we evaluated the service given to the community, the degree of opening, the number of users and the overall operation of the facility analysing the description of the service offer and price list, personnel list, total budget outcomes and total incomes. We also asked for a report on the symposium activity, reporting the number of participant and speakers, from Bordeaux, vs french vs international laboratories.

BUDGET/ FINANCIAL PLAN

Budget



Cofunds



Main results

- Highlights and focus on flagship projects
- Research
- Trainings
- Attractiveness

HIGHLIGHTS AND FOCUS ON FLAGSHIP PROJECTS

700 research personal
50 teams
20 % growth

135 prestigious awards
including **7** ERC grants
5 medals (CNRS, INSERM, INRA)
40 research excellence prices

2100 articles published
250 articles per year

67 research projects funded
52 PhD students supported

750 invitations to international meetings as speakers
79 scientific events supported

30 patents
16 licenses
8 start-up created

120 M€ co-funds

Bordeaux School of Neuroscience

Creation of a laboratory exclusively dedicated to training in neuroscience

School Director: Christophe Mulle

Throughout the year, the Bordeaux School of Neuroscience, under the direction of Christophe Mulle, offers the national and international community a neuroscience laboratory equipped as a research laboratory, and entirely dedicated to research training in Neuroscience, based on experimental practice. The Bordeaux School of Neuroscience provides not only the infrastructure, but also the logistical expertise for the organisation of training, as well as access to high-tech technological platforms, such as the functional genomics platform or the Bordeaux Imaging Center.

The Bordeaux School of Neuroscience has been a flagship project of the LabEx BRAIN, which has supported this project since 2014 with a financial support up to €1600k. This financial support was used to equip the training laboratory and to recruit staff, in particular its Manager. The University of Bordeaux is providing support by offering a laboratory space in the premises on approximately 500 m^2.

The school has been chosen by the European Federation of Neuroscience (FENS) and the International Brain Organisation (IBRO) to be the leading centre for neuroscience research training in Europe. A partnership has been signed for the organization of the prestigious "Cajal Advanced Schools in Neuroscience", four 3-week schools organized every year at the Bordeaux School of Neuroscience (www.fens.org/Training/CAJAL-programme/). The Cajal program has just obtained a support of 250k€/year for 5 years from the Gatsby Foundation.

As part of EUR, ENB organises one-week technology workshops open to Masters and PhD students in neuroscience. In addition, a two-week training course entitled "Introduction to experimental neuroscience" based on experimental practice will be offered to students and young researchers from other disciplines (chemistry, psychology, phsyics, computer science,...) interested in neuroscience.

Cannapreg

Preclinical development of AEF0117, the first of a new pharmacological class: the C3-12,NMPDs (Non Metabolized Pregnenolone Derivatives)

Pier-Vincenzo Piazza (NCM)

The objective of this project was to complete the regulatory preclinical development of a NCE AEF0117 that is the first clinical candidate of a new pharmacological class the C3-17,NMPDs (Non Metabolized Pregnenolone Derivatives), which are able to specifically inhibit only part of the signaling pathways activated by the CB1 receptors. AEF0117 is being developed as a therapy of cannabis use disorders (CUD) for which there are no available pharmacological therapeutic tools.
All the experiments planned in the grant have been completed and show that AEF0117 has very good absorption, distribution, metabolism and toxicity (ADMET) characteristics.

After oral administration AEF0117 is well absorbed (>72%), it is stable (half-life > 20h in dogs); it does not interact with the major metabolic enzymes and is excreted intact at 90% through the gastrointestinal tract. Finally, it has not toxic effect up to 3000 times the active dose.

The final step of this project was the submission of an Investigative New Drug (IND) application to the FDA. The IND has been obtained in November 2016. Phase one clinical studies have now been successfully completed and trial in cannabis abusers started in October 2018. This project obtained in 2016 a NIDA grant that has been obtained in collaboration with Prof. Margaret Haney (Columbia University, US). This is a three years grant of 3.3M$ in direct costs that has covered the costs of the phase I trial and will cover part of the costs of the first study in cannabis abusers that will be performed in Prof. Haney laboratory.

Extrabrain

Shedding light on the extracellular space of the brain: from health to diseases

Laurent Groc (IINS), Erwan Bézard (IMN), Valentin Nägerl (IINS), Stéphane Oliet (NCM), Partner outside Labex Brain: Laurent Cognet (LP2N)

Brain research has made tremendous progress over the last few decades in nearly all areas of investigation with the exception of one: the extracellular space (ECS). It is however a key compartment defined as the web-like space around and between brain cells, filled with a myriad of molecules that reside in or transit through it to enable proper brain function and homeostasis. How molecules diffuse and spread in the ECS is a very important but challenging problem that must be solved ultimately in in vivo brains. This lack of knowledge is mainly due to the absence of dedicated investigation strategies for such a complex and finely structured biological entity. The innovative project launched with the support of the Labex Brain (Groc, Bezard) and IDEX gave us the opportunity to ground our capacity to image the ECS (Godin et al., Nature Nanotechnologies, 2017; Tonnesen et al., Cell, 2018). We posit that molecular diffusion in the ECS is locally regulated by the properties of the ECS, which is essential for brain function in health and diseases.

From the Labex Brain, we have now gather additional experts to build a strong taskforce composed of L. Groc (cell neuroscience, psychiatry), E. Bezard (neurodegenerative diseases), U.V. Nägerl (neurophotonics), and S. Oliet (neurophysiology, neuro-astrocyte communication), in collaboration with L. Cognet (nano-imaging, LP2N). We will further develop and apply these unconventional investigation approaches, based on original nano-imaging strategies (super-resolution microscopy and carbon nanotube tracking), to decrypt the role of the ECS at unprecedented methodological (in vivo brain) and biological (different models) levels.

We teamed up to develop and apply unconventional investigation approaches, based on original nano-imaging strategies (super-resolution microscopy, spherical nanoparticle tracking), to the in vivo brain. The outcome of these developments will provide the Bordeaux Neuroscience community a unique array of tools to investigate the ECS in health and diseases. Furthermore, as the role of the ECS is critical in many other body organs and tumors, our effort will provide the Bordeaux Bio-Medicine community an unprecedented way to study the pathophysiology of body organs, cross-fertilizing the fields of physics, pathophysiology and biotherapy (IDEX priorities).

RESEARCH

Highlights on some of our main scientific achievements

We have achieved a series of breakthrough discoveries and development of innovative tools in the last decade that resulted in high impact publications in diverse fields, in addition to those cited in the rest of the report.

Imaging techniques

Development of high-end, high throughput imaging techniques, based on single molecule super-resolution microscopy and methods to segment and quantify localization-based super-resolution microscopy data (Levet et al., **Nature Methods**, 2015;Beghin et al., **Nature Methods**, 2017, Inavalli et al. Nature Methods, 2019).

Development of a method to track single-nanotube in the living brain and reveal the nanoscale organization of the extracellular space (Godin et al., **Nature Nanotechnology**, 2017).

Development of super-resolution shadow imaging (SUSHI) which uses 3D-STED microscopy to reveal exquisite details of nanoscale brain organization (Tønnesen et al., **Cell**, 2018).

Development of a method combining super-resolution microscopy and cell stretching to decipher the molecular adaptation of neuronal structures to mechanical forces (Massou et al., **Nature Cell Biology**, in press).

Synapse nanoscale dynamic organization

Superresolution microscopy was used in a series of papers to elucidate the nanoscale organization of excitatory synapses (Nair et al. **J Neuroscience** 2013, Chazeau et al. **EMBO J**, 2014 ; Haas et al. **Elife 2018**; Kellermayer et al., **Neuron**, 2018;) and growth cone dynamics (Garcia et al., **PNAS** 2015; Dos Santos Carvalho et al., **Elife** 2020).

New molecular mechanisms of synaptic plasticity and memory

Discovery of new mechanisms of synaptic plasticity through regulation of AMPA transcription and adhesion proteins phosphorylation (Letellier et al., **Nature Neuroscience**, 2014; **Elife** 2020; 2018)

Direct demonstration that the recruitment of new receptors to synapses by surface diffusion is a critical mechanism for the expression of LTP and hippocampal learning (Penn et al., **Nature**, 2017).

Insights into the operating mode of NMDARs, showing that synaptic and extrasynaptic NMDA receptors are functional distinct and gated by different endogenous co-agonists (Papouin et al., **Cell**, 2012).

Elucidating the mechanisms of memory formation (Sellami et al. **PNAS** 2017; Bessières et al., **Nature Protocol**, 2017; Hebert-Chatelain et al., **Nature**, 2016).

Role of astroglial cells in synaptic plasticity

Identification of astroglial CB1 receptors as determinants of synaptic D-Serine availability to enable recognition memory and astroglial functions (Han et al. **Cell**, 2012, Robin et al. **Neuron**, 2018).

Discovery that activation of astroglial CB1 in mitochondria hamper brain metabolism, alter neuronal functions, regulate memory and impair social interaction (Jimenez-Blasco et al. **Nature**, *in press*).

Mechanism by which postsynaptic P2XRs can directly modulate excitatory synaptic transmission and further expand the role of glial-derived ATP at brain synapses (Pougnet et al., **Neuron**, 2014).

Mechanism of control of food intake and its dysfunction

The unraveling of the role of the Endocannabinoid System Controls Food Intake (Soria-Gomez, **Nature Neuroscience**, 2014; Mazier et al., Molecular Metabolism, 2019).

Identification of abnormalities contributing to depressive symptoms in obesity (Delgado et al., **Psychoneuroendocrinology**, 2018; Lafourcade et al., **Nature Neuroscience**, 2011; Ducrocq et al., **Cell Metabolism**, 2020).

New insight into the mechanisms of neurodegenerative diseases

Discovery of protective cellular mechanism in Multiple System Atrophy and Parkinson Disease (Bassil et al., **PNAS**, 2016; Arotcarena et al., **JCI Insight**, 2019).

Molecular Mechanisms of Parkinson and Alzheimer's diseases (Arotcarena et al. **Brain**, 2020; Barthet et al. **Nat Com**, 2019 ; Bourdenx et al., **Sci. Adv.**, 2020).

Mechanisms and treatment of maladaptive behaviors

Development of the first treatment to cannabis addiction (Vallée et al., **Science**, 2014).

Identification of the mechanisms underlying psychotic-like conditions (Busquets-Garcia et al., **Neuron** 2018; **Molecular Psychiatry**, 2017).

Identification of pathophysiological mechanisms of Post-Traumatic Stress Depression and fear responses (Kaouane et al., **Science**, 2012; Courtin et al., **Nature**, 2014; Dejean et al., **Nature**, 2016; Soria-Gomez et al., **Neuron**, 2015).

Discovery that crayfish exhibit a form of anxiety similar to that described in vertebrates, suggesting the conservation of several underlying mechanisms during evolution (Fossat et al., **Science**, 2014).

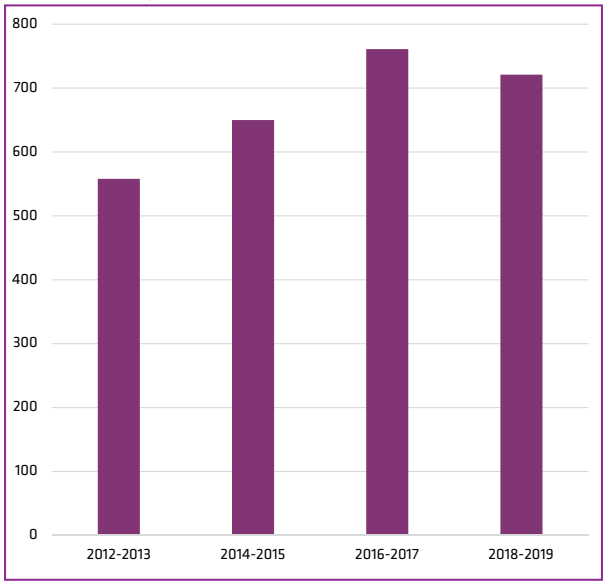
Unraveling the neural pathway of decision making (Alcaraz et al., **eLife**, 2018; Mallet et al., **Neuron**, 2016; Marinovic et al., **eLife**, 2017).

Publications

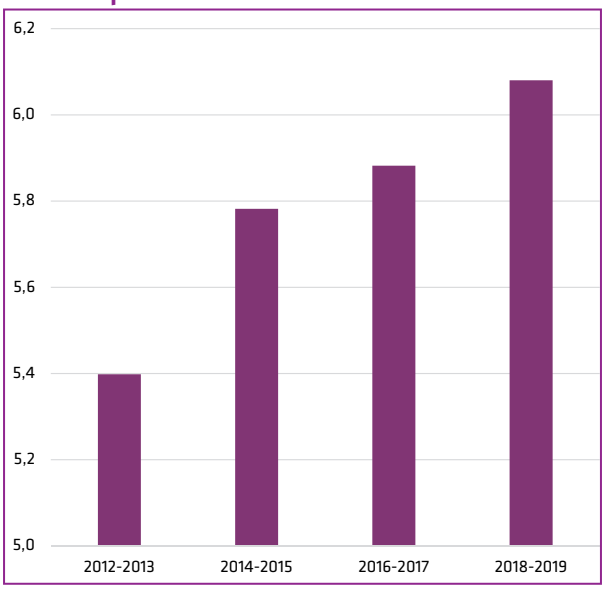
The community published a total of 2100 articles with an average of 300 per year, and each team published around 6 articles per year. An article is cited on average 18 times, and 24% of our publications are cited more than 20 times. The average impact factor of our publications is 5.72, and has been growing since 2015. On all our articles, 3.6% are among the top 1% of the most cited publications, and 31.1% are among the top 10% of the most cited publications.

The Bordeaux Neurocampus community reaches an international level of publication, either in the mean number of publications, as in the mean impact factor. However, it is important to notice that laboratories have different publication's strategies. Indeed, while some laboratories publish a high number of scientific articles in medium or lower impact factor journals, other has a lower number of publication but in top level journals, making this institute very competitive compared to the best international centres (Max Plank Institute in Francfort, etc...).

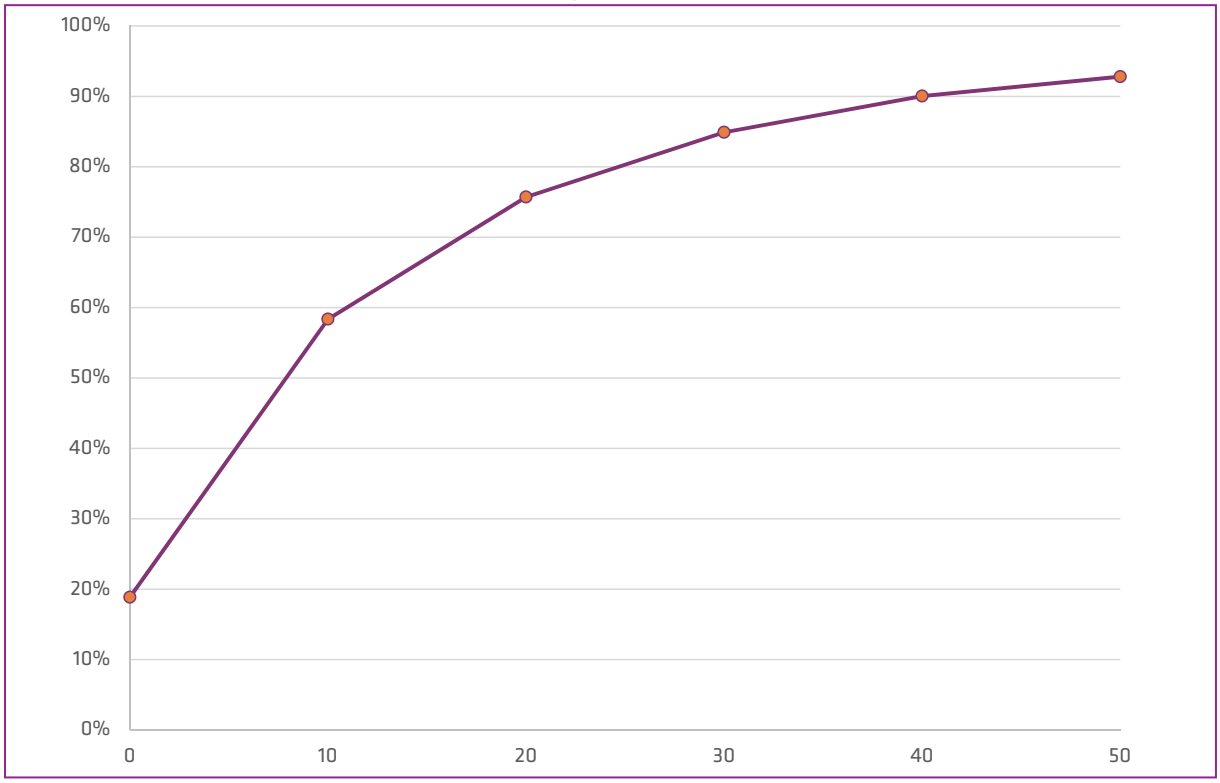
Number of publications



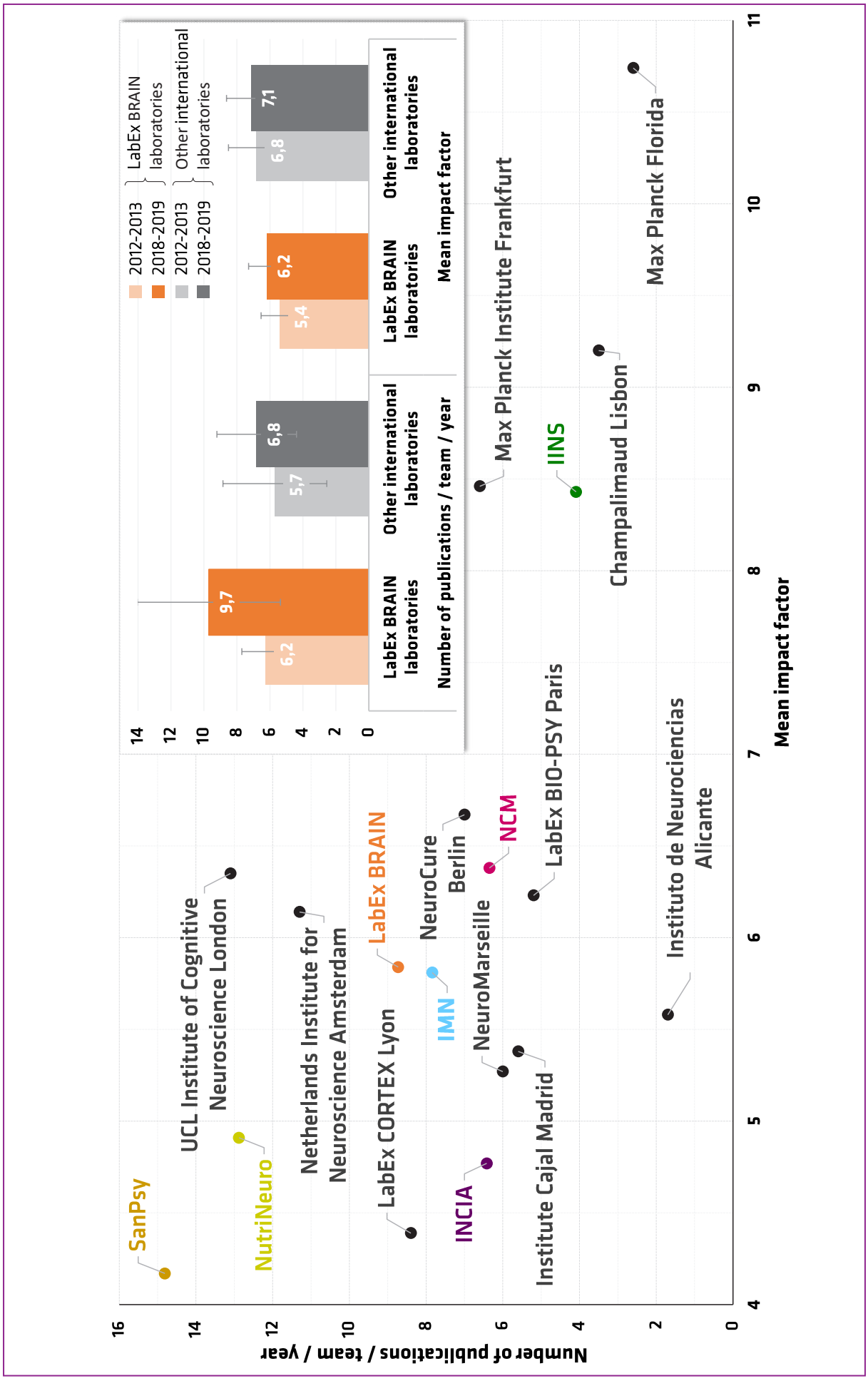
Mean impact factor



Cumulative distribution of number of citations / publication



Number of publications per team per year / Mean impact factor (2012 to 2019)



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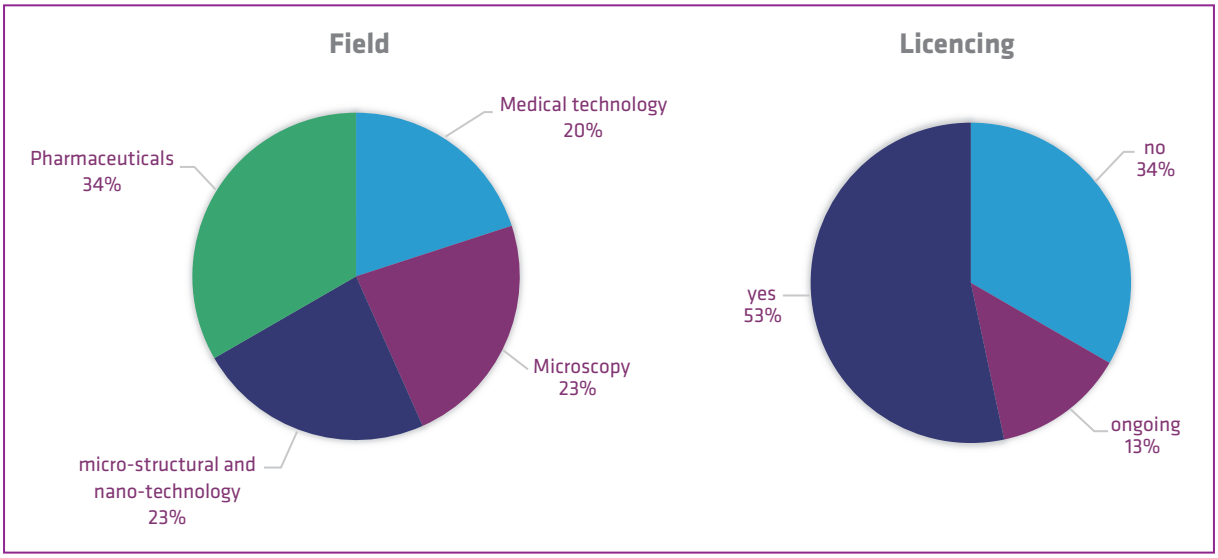
Technological transfer

30 patents and 16 licenses were registered during the 2012-2018 period and 8 start-up companies (Figure 10) were created or hosted in our institutes.
The technological transfer concerns all the levels of our scientific activity, from the nanoscopic to the clinical levels, through innovative pedagogical propositions. The number of collaborations between BRAIN teams and the private sector strongly increased in the period 2011-2020. 8 startup companies emerged from BRAIN teams.

Patents



Start-up created

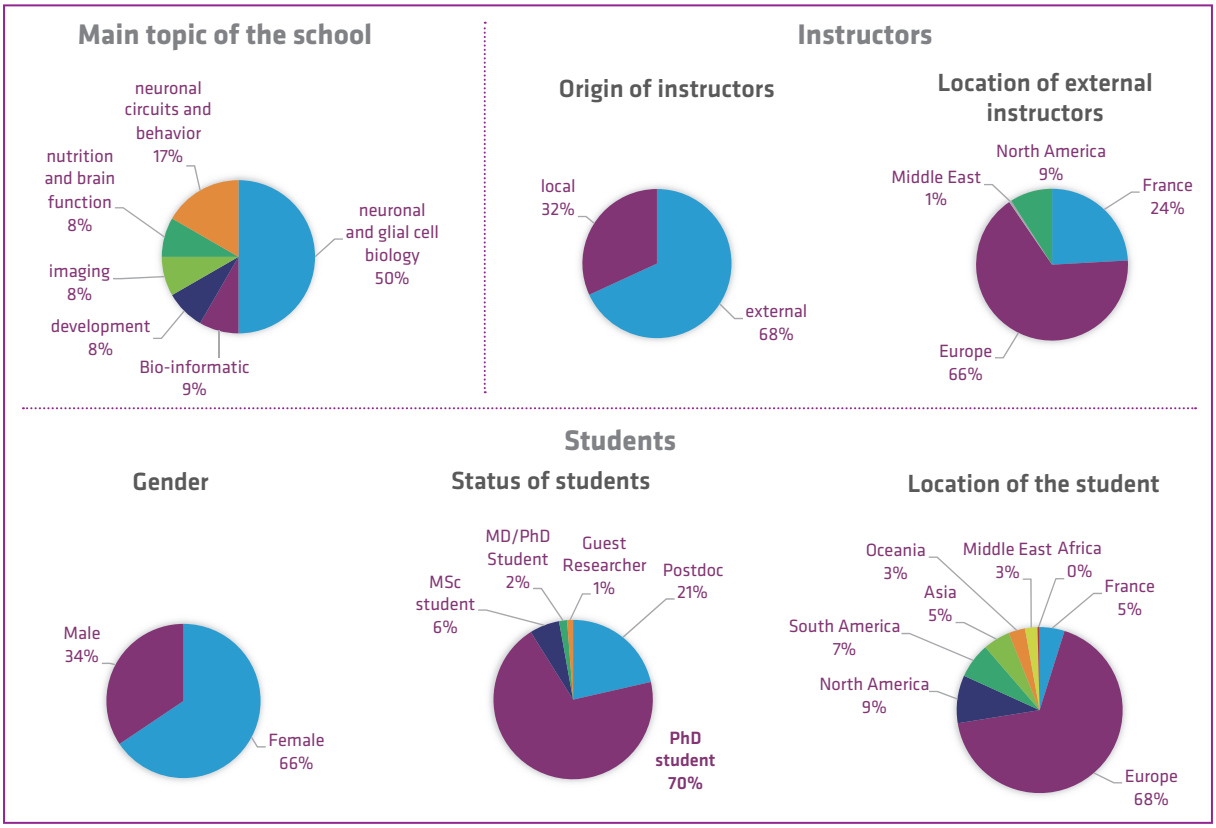
Start-up	Spin-off BN lab	Topic
Aelis Farma	NCM	New chemical entity; dinical trial in phase 2 for cannabis addiction
Sosco	IINS	Light-Sheet Fluorescence Microcopy; high-throughput s.creening
Practeex	IINS	Pedagogical innovation
Alveole	IINS	Innovation in microscopy - consumables for microscopy
Corlieve Therapeutics	IINS	Innovative therapy for resistant epilepsy
Motac	IMN	CRO for preclinical demonstration of Therapeutic efficacy in relevant animal model of neurological disorders
Treefrog	IMN	Technology removing roadblock for stem cell production; stem cell therapy for Huntington and Parkinson disease
Acamed	SanPsy	Development of virtual medical agents for first-line triage of psychiatrie patients

TRAININGS

Bordeaux School of Neuroscience

13 CAJAL school were organized at the Bordeaux School of Neuroscience from 2015 to 2018.

Bordeaux School of Neuroscience

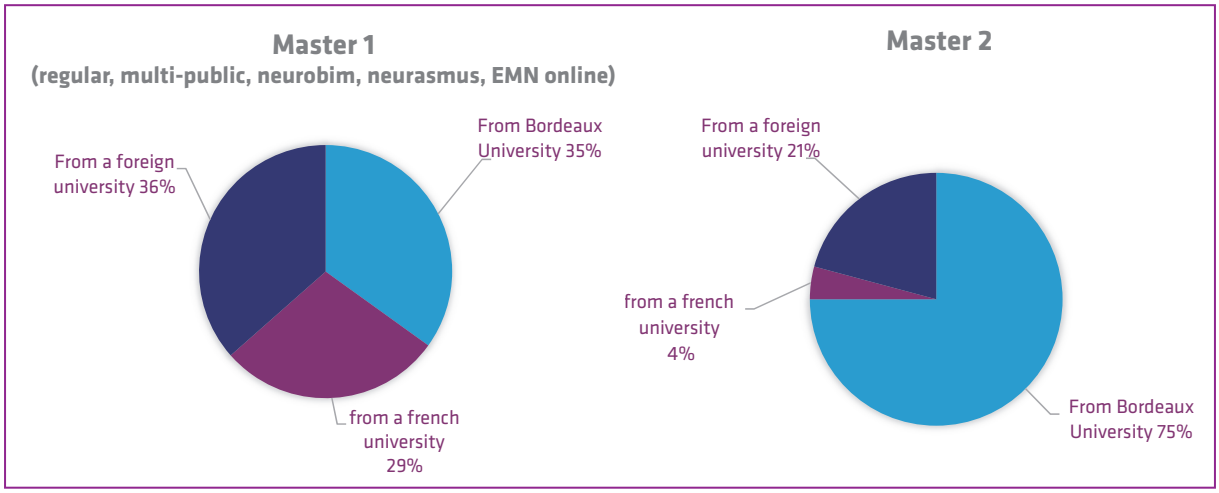


Bordeaux Neurocampus Graduate Program

The Bordeaux Neurocampus Graduate Program is part of the Bordeaux University Graduate Research School and supported by the state-funded program "Investment for the future". It is an innovative, cross-disciplinary and integrated - Master to Doctorate - international program in Neuroscience.

931 candidates postulated to the M1 (M1 régulier: 238, M1 multipublic: 227, M1 neurobim: 148, M1 neurasmus: 265, M1 EMN online: 53). The selection rate is 6.7%. The first PhD program was launched in 2018. 100 national and international candidates postulated, 5 were selected.

Bordeaux Neurocampus Graduate Program

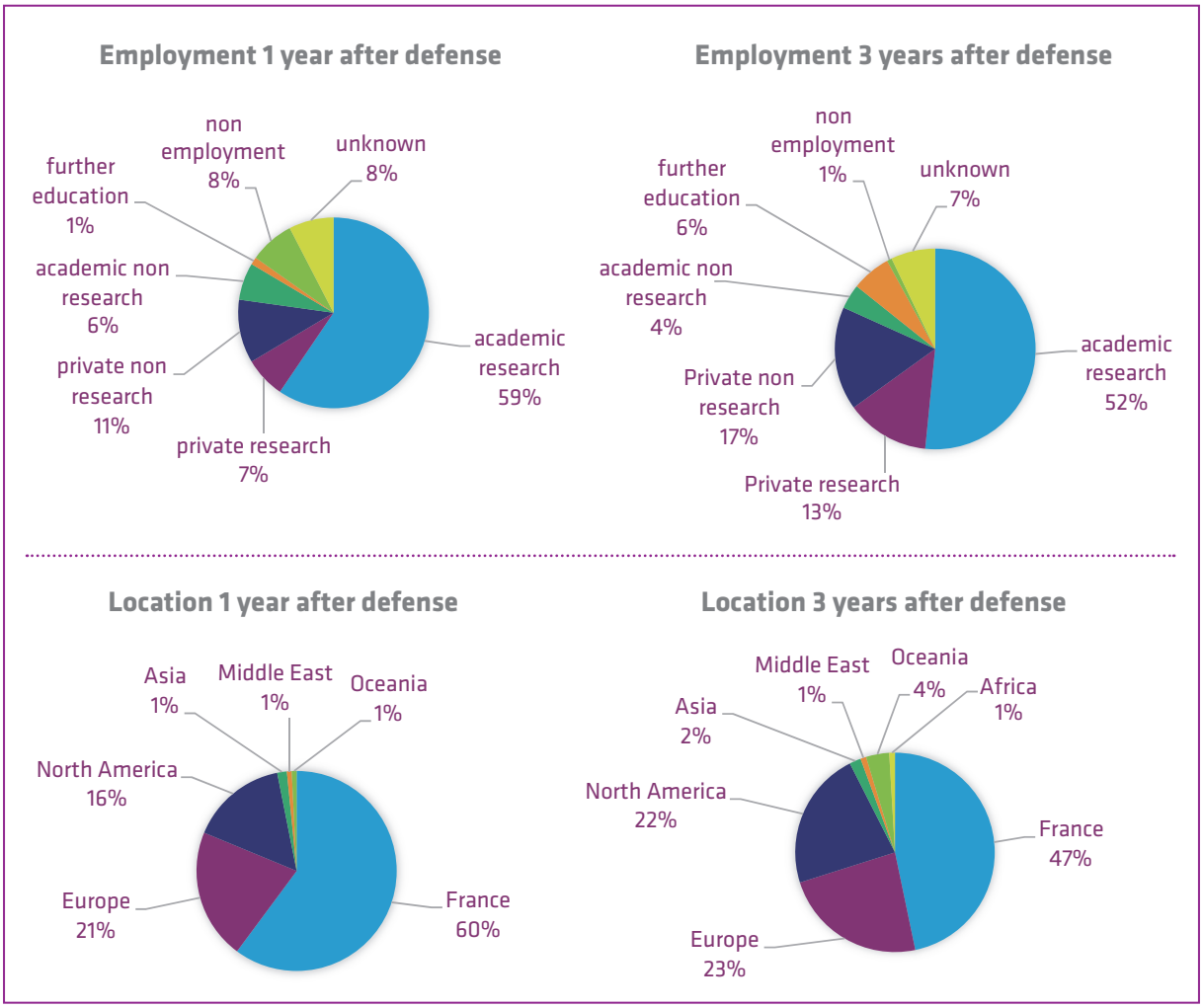


Future of PhD students

A total of 149 PhD students graduate from 2012 to 2018. Most of our PhD students follow their carrier in academic research.

Note that 2 students created their own start-up company. Currently, only 2% of our PhD students are unemployed.

Future of PhD Students



ATTRACTIVENESS

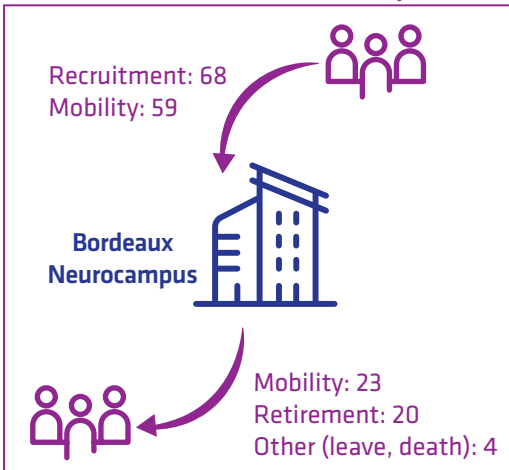
Human resources

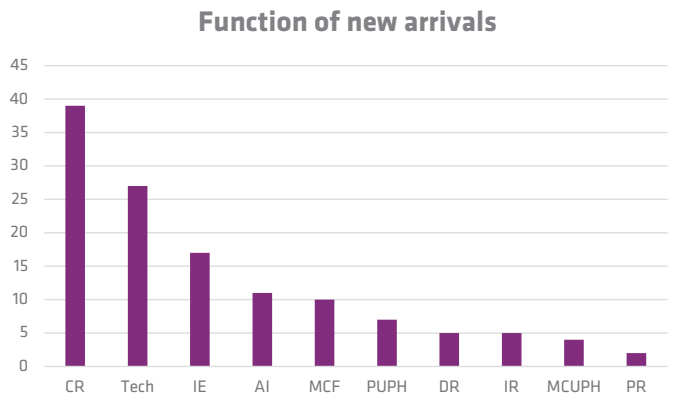
Our community is gathered in the Bordeaux Neurocampus department of Bordeaux University. The 690 research personal are spread out in 6 research units and 50 teams. The main employer is the University of Bordeaux, followed by the CNRS and INSERM.

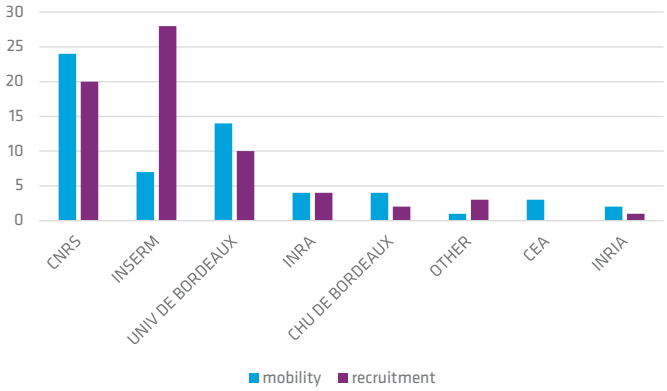
Research personal

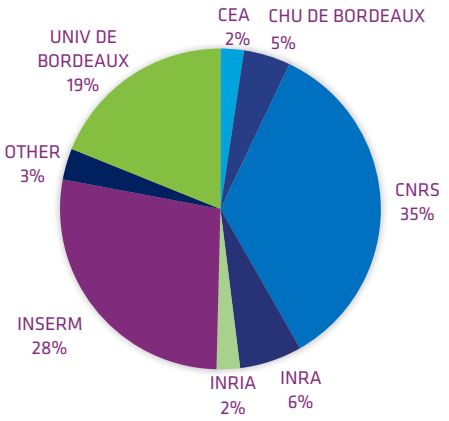
From 2011 to 2018, we had a 20% growth: indeed, 127 arrivals in permanent positions, with 54% of recruitments; 46% internal appointment. Mainly as researchers (CR 31%, tech 21%, IE 13%).

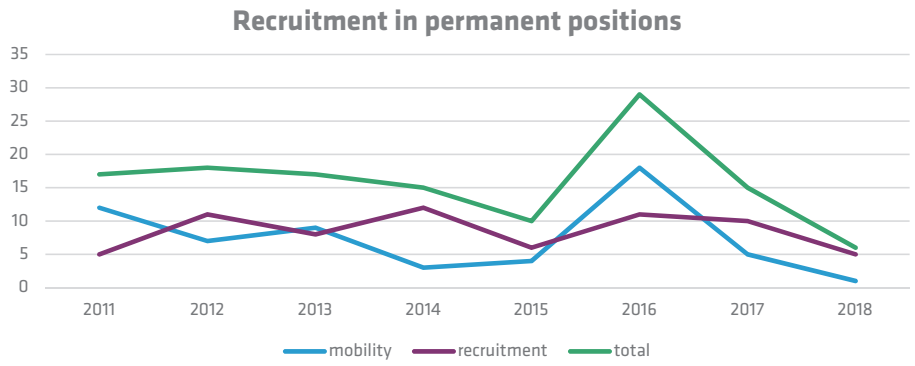
Recruitments and mobilities on permanent positions





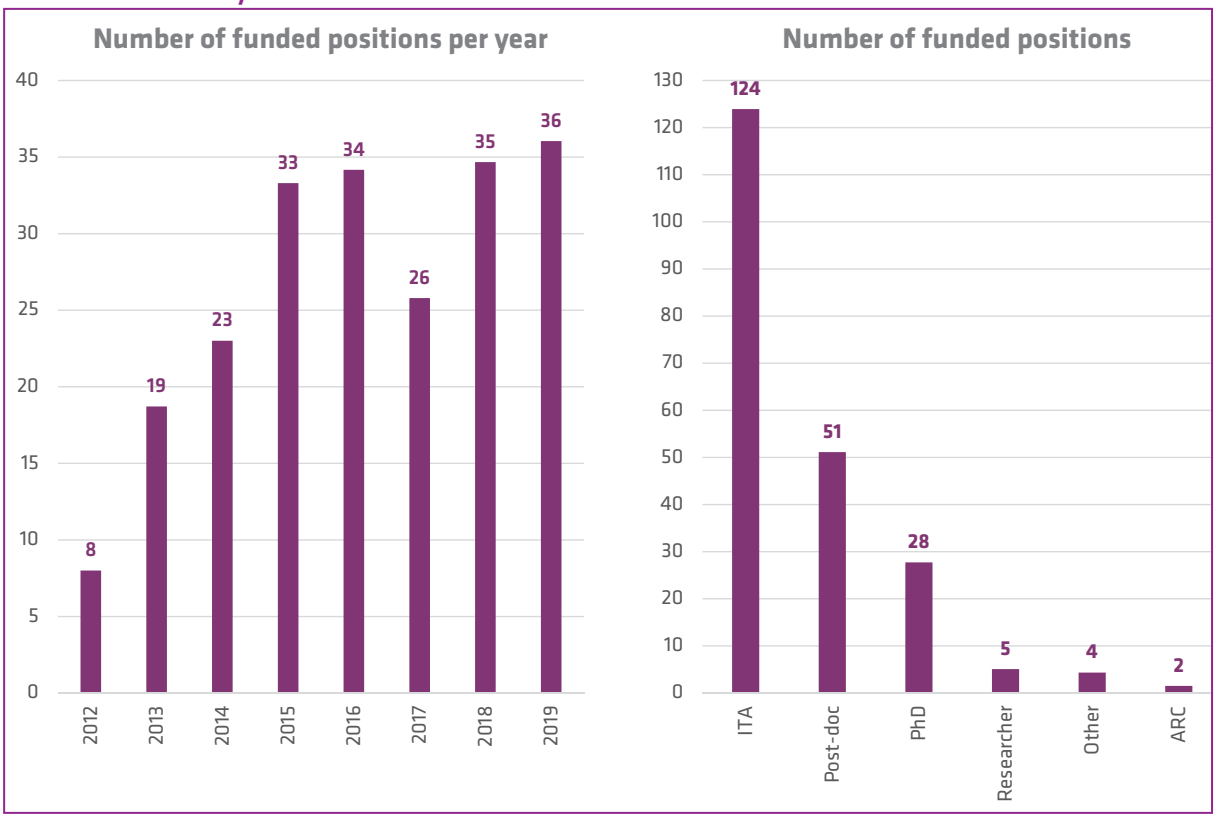






Concerning the LabEx BRAIN itself, between 2012 and 2019, 214 contracts of 1 year have been funded: 124 ITA, 51 post-doc, 28 PhD, 5 researchers, 2 clinical research assistants and 4 others, with a mean of 27 contracts per year.

Positions funded by the LabEx BRAIN

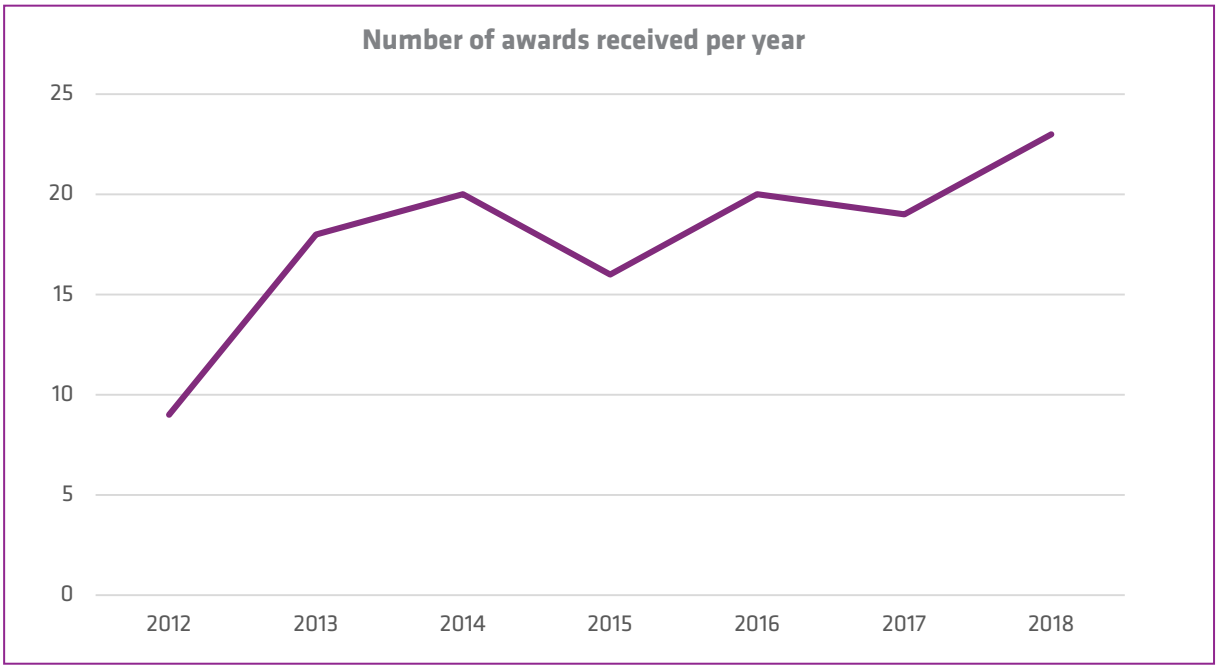


Renown

The national and international renown of researchers can be evaluated by the number of awards received. Indeed, from 2012 to 2018, 135 prestigious awards were received by our researchers, including 7 ERC grants, 5 prestigious CNRS, INSERM or INRA medals, 40 PEDR or PES.

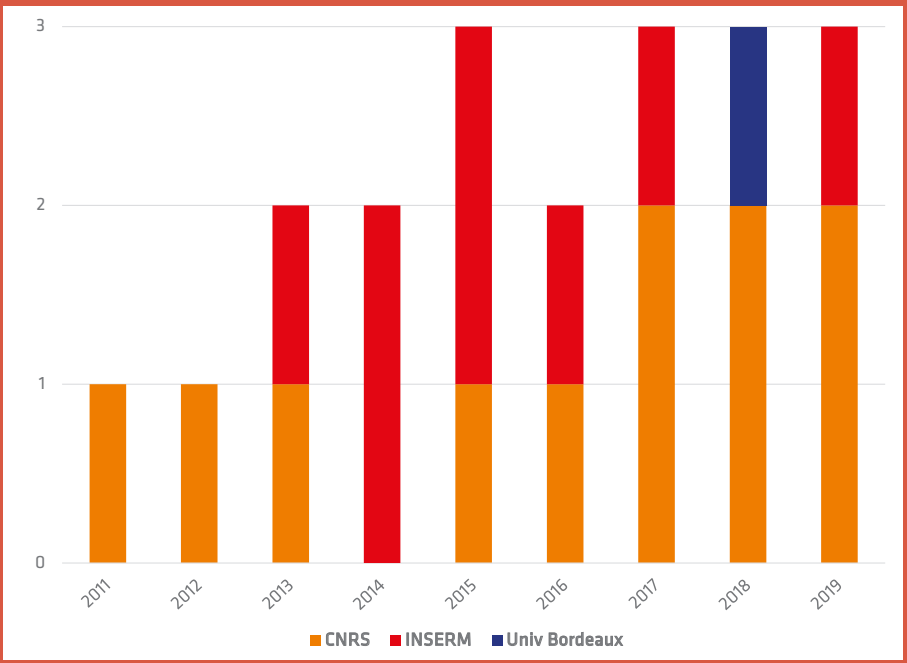
Moreover, we keep a record of 756 inivited talk in international meetings, including 35 Gordon conferences and 8 Jacques Monod conferences. 110 of our researchers sit on expert panel for national (ANR, HCERES, FRM...) and international (ERC) grant evaluation committees or recruiting committee, 25 of whom serve as chair or vice-chair.

Honors



Neurocampus Project

Creation of permanent positions



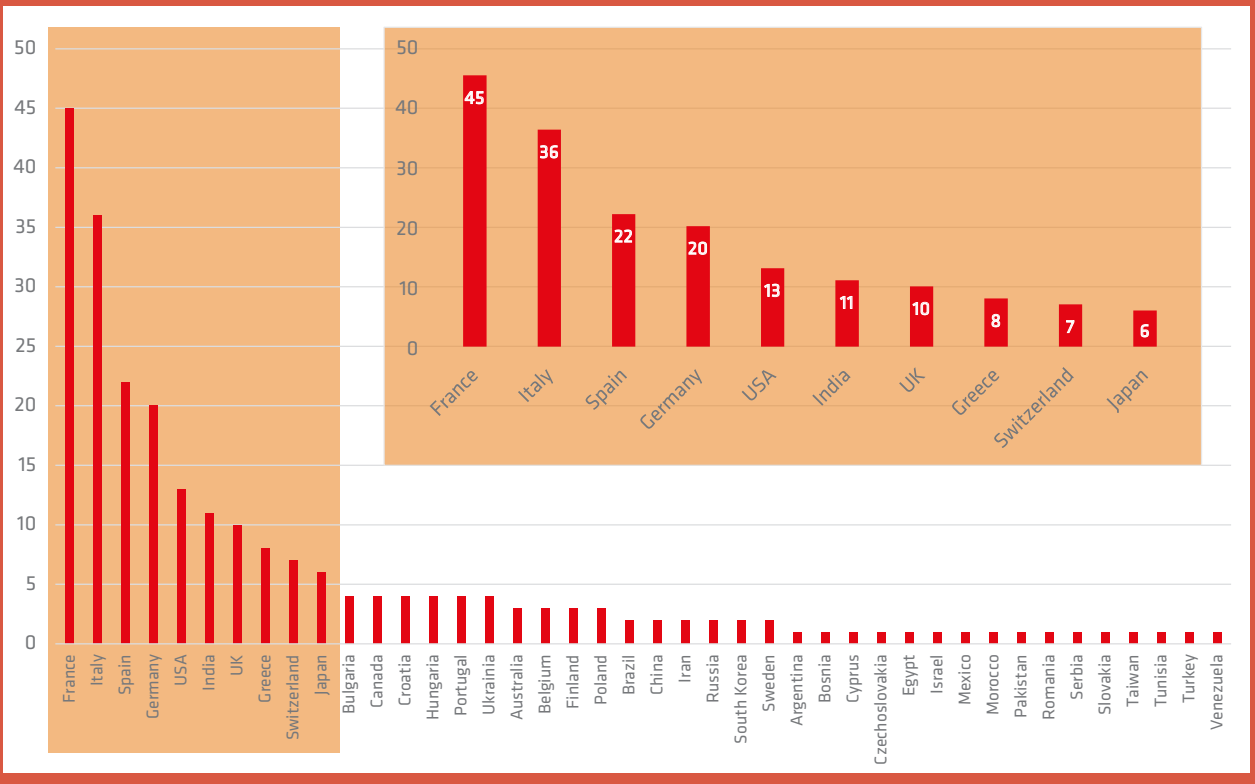
RÉGION Nouvelle-Aquitaine

20 permanent positions have been created between 2011 and 2019 thanks to the Aquitaine Regional Council Neurocampus program. During the three waves of team leader recruitments in 2016, 2017 and 2018, we received 242 applications coming from 42 different nationalities, with a majority of candidates coming from France, Italy, Spain, Germany and USA.

Recruitements of team leaders

Researcher	Year of arrival	University of origin	Nationality
Anna Beyeler	2016	MIT, USA	Swiss
Frédéric Gambino	2016	Geneva University, Switzerland	French
Lisa Roux	2016	NYU Medical School, USA	French
Arne Battefeld	2017	Netherland Institute for Neuroscience, NE	German
Sandra Soukup	2017	VIB/KU Leuven, BE	German
Jonathan Elegheert	2018	Oxford, UK	Belgian
Fabien Wagner	2019	EPFL, SU	French
Naoya Takahashi	2019	Berlin, GE	Japanese

Nationalities of team leaders candidates

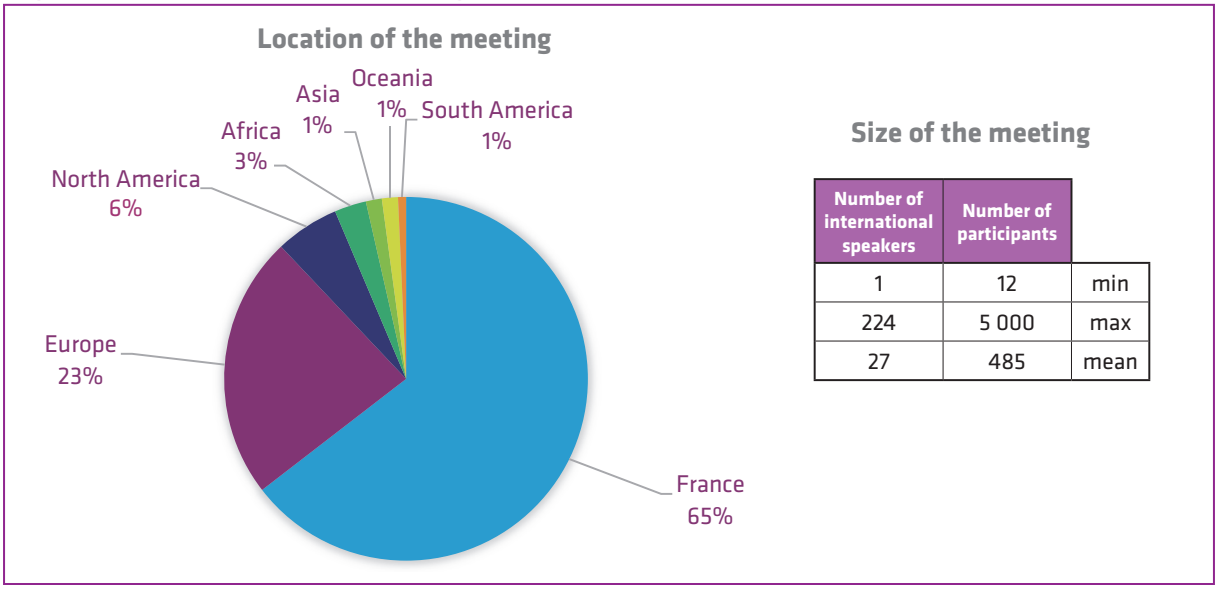


Scientific animation and events

On a yearly basis, BRAIN has been supported the organisation scientific symposium that take place in Bordeaux. A total of 79 events were supported from 2011 to 2018. Moreover, our community is very active beyond Bordeaux and in involved in the organisation of international meetings around the world, as show in the figure below.

Researchers are also implicated in popularization, such as conferences, debates, workshops for a general audience, in the context of "brain week" ("la semaine du cerveau") or the "science festival" ("la fête de la science").

Organization of international meeting



Size of the meeting

Number of international speakers	Number of participants	
1	12	min
224	5 000	max
27	485	mean

International collaborations

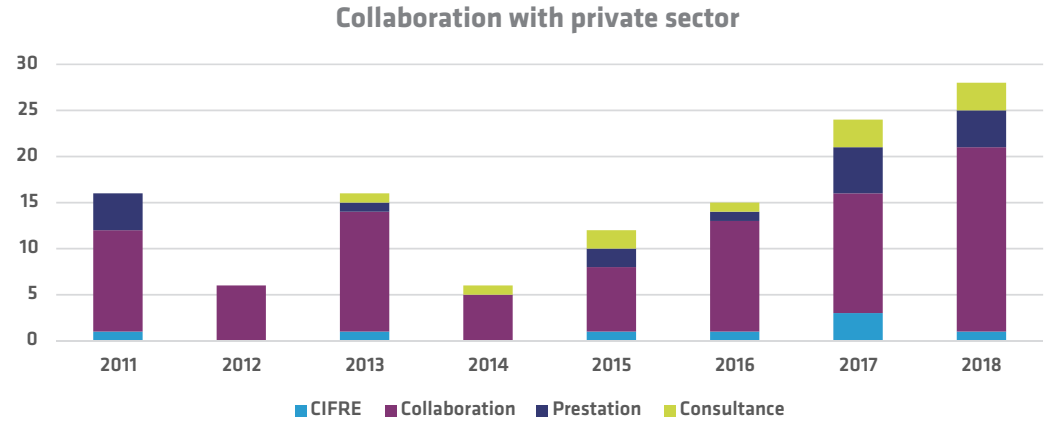
A total of almost 300 international collaborations has been record from 2012-2018, 78% of them led to publication. Our international partners, ranked in ascending order, are mainly from Canada (Québec, Montreal, Toronto), USA (Boston, Chicago, Los Angeles) Germany (Bonn, Hamburg, Heidelberg, Munich), UK (Oxford, London, Cambridge),

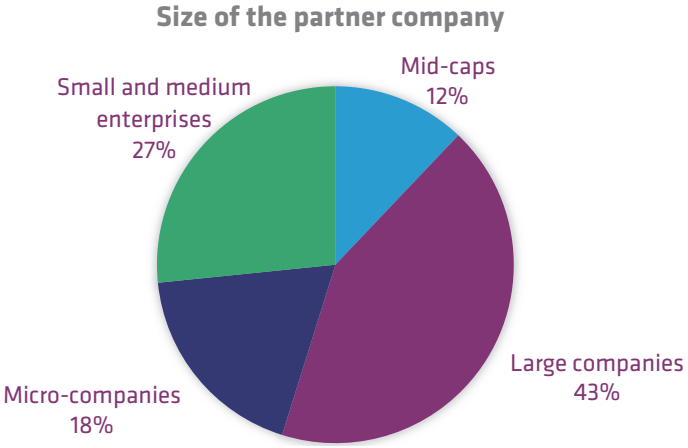
Spain, Switzerland, Italy, The Netherlands or Australia. The overwhelming majority of research collaborations do not take place within an institutional framework, however, although some collaborations are within Eranet, ANR, LIA, COST, H2020 Collaborative Network, HFSP, Marie Curie Action FP7 or PICS.

Relationships with the economic sphere

125 collaborations with industry were carried out.

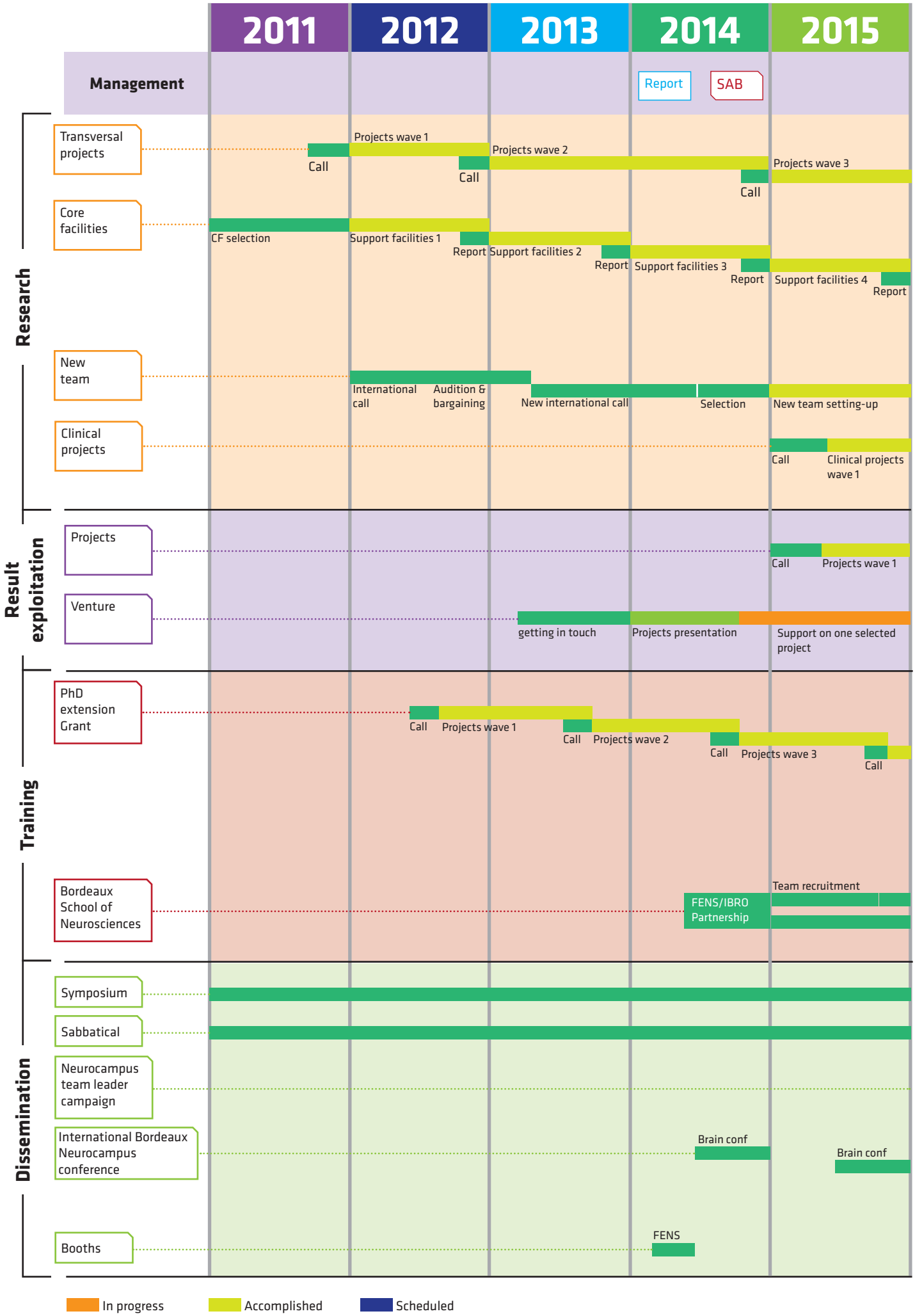
Collaboration with the private sector





Funded projects and actions

- Gantt chart
- Transversal research projects
- Transfer research projects
- Clinical research projects
- Facilities
- Hosting of foreing scientists
- Phd extension grant
- Bordeaux School of Neuroscience
- Neuroscience Graduate Program
- Organization of scientific symposia
- Communication to the general public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Projects wave 2
Call
Projects wave 3
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CF selection
Support facilities 1
Report
Support facilities 2
Report
Support facilities 3
Report
Support facilities 4
Report
New team
International call
Audition & bargaining
New international call
Selection
New team setting-up
Clinical projects
Call
Clinical projects wave 1
Result exploitation
Projects
Call
Projects wave 1
Venture
getting in touch
Projects presentation
Support on one selected project
Training
PhD extension Grant
Call
Projects wave 1
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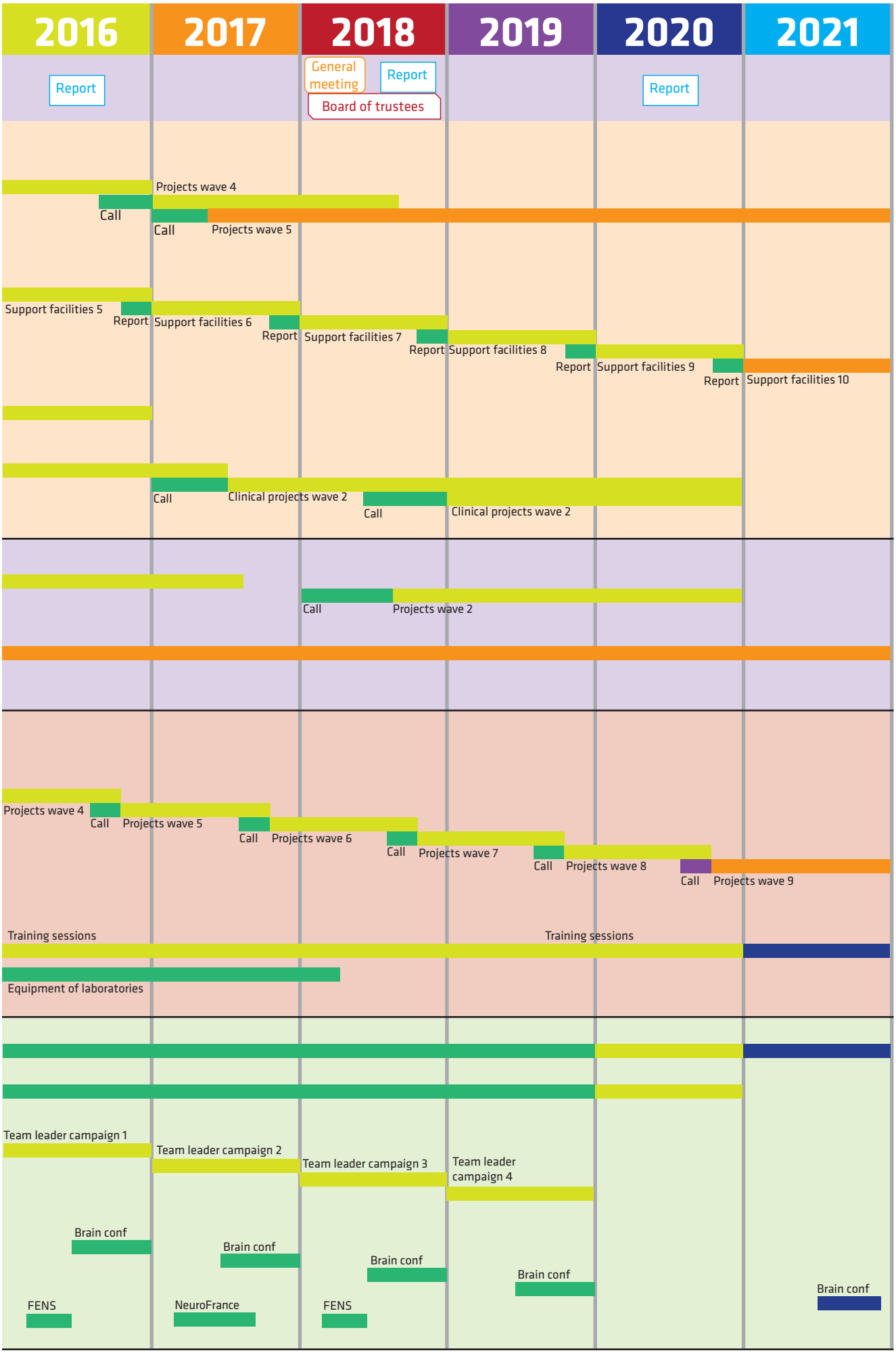
Projects wave 2
Call
Projects wave 3
Call
Bordeaux School of Neurosciences
FENS/IBRO Partnership
Team recruitment
Dissemination
Symposium
Sabbatical
Neurocampus team leader campaign
International Bordeaux Neurocampus conference
Brain conf
Brain conf
Booths
FENS
In progress
Accomplished
Scheduled


2016
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General meeting
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Board of trustees
Report
Projects wave 4
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Projects wave 5
Support facilities 5
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Support facilities 7
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Team leader campaign 1
Team leader campaign 2
Team leader campaign 3
Team leader campaign 4
Brain conf
Brain conf
Brain conf
Brain conf
Brain conf
FENS
NeuroFrance
FENS

TRANSVERSAL RESEARCH PROJECTS
CALL FOR PROPOSALS

The LabEx BRAIN launched calls for proposals in order to deepen and enlarge intra-Bordeaux Neurocampus collaborations. All the scientific topics aiming at improving our knowledge in neuroscience were eligible to this open call for proposals. Nevertheless, the LabEx BRAIN scientific areas of excellence remained priorities.

LAUREATES

2017

AMPA-MO-CO : Role of AMPA receptor mobility in hippocampal spatial coding and learning
Investigators : Humeau (IINS), Bontempi (IMN)
LabEx grant : 120 000 €

MesoPOM' : Role of the pro-opio-melanocortin (POMC) -mesolimbic neurocircuit in the development of diet-induced obesity
Investigators : Cota (NCM), Fioramonti (NutriNeuro)
LabEx grant : 120 000 €

M-REX : Multi-scale analysis of remodeling of brain extracellular space after traumatic brain injury: focus on astroglial mechanisms
Investigators : Nägerl (IINS), Badaut (INCIA), Marsicano (NCM)
LabEx grant : 120 000 €

MuGly : Mechanisms underlying glycine compartmentalization in the extracellular space: identification and functional role
Investigators : Groc (IINS), Oliet (NCM), Castanon (NutriNeuro)
LabEx grant : 120 000 €

NANOSYNSLICE : Nanoscale imaging of synaptic molecules in brain slices
Investigators : Sibarita (IINS), Sans (NCM)
LabEx grant : 120 000 €

NewbornRndEndo : Regulation of membrane trafficking by Rnd2 in newborn neurons of the adult hippocampus
Investigators : Pacary (NCM), Perrais (IINS)
LabEx grant : 120 000 €

PDPAIN : Understanding the pathophysiology of pain in Parkinson's disease
Investigators : Benazzouz (IMN), Fossat (IINS)
LabEx grant : 120 000 €

PIPAIS : Interplay between scribble and the phosphoinositide metabolism controls the AIS structure and the axonal excitability
Investigators : Montcouquiol/Sans (NCM), Brachet (IINS)
LabEx grant : 120 000 €

SLOWSYN : Enhancing slow wawe sleep to mitigate synucleinopathy and neurodegeneration in parkinson's disease and multiple system atrophy models
Investigators : Bézard (IMN), Nadjar (NutriNeuro), Philip (SanPsy)
LabEx grant : 120 000 €

SYNOPTOGENESIS : Optogenetic tuning of the synaptic excitation/inhibition balance through neuroligin phosphorylation
Investigators : Thoumine (IINS), Georges (IMN)
LabEx grant : 120 000 €

2016

AstroMachine : Identifying the Astrocytic Ca2+- signalling machinery governing synaptic plasticity
Investigators : Oliet (NCM), Nägerl (IINS), Massa (NCM)
LabEx grant : 120 000 €

Astrosome : Is the exosome secretion a new astrocyte-neuron communication pathway?
Investigators : Favereaux (IINS), Panatier (NCM)
LabEx grant : 120 000 €

DoLipran : Exploring the vulnerability of the dopaminergic synaptic membrane to lipid manipulations: from molecular origin to behavioral consequences
Investigators : Trifilieff (NutriNeuro), Herzog (IINS)
LabEx grant : 120 000 €

DopaNet-GOAL : Dopaminergic control of neuronal networks dynamics during goal-directed behaviors
Investigators : Mallet (IMN), Gambino (IINS)
LabEx grant : 105 000 €

FEARLESSPAIN : Neuronal circuits of fear conditioned analgesia
Investigators : Fossat (IINS), Herry (NCM)
LabEx grant : 120 000 €

HippoMeal : Cellular mechanisms underlying hippocampal regulation of feeding behavior
Investigators : Carta (IINS), Ferreira (NutriNeuro), Busquets-Garcia (NCM)
LabEx grant : 117 000 €

MotivRun : Are cannabinoid receptors on glutamatergic neurons involved in the imbalance between the motivational drives for feeding and running in restrictive anorexia?
Investigators : Chaouloff (NCM), Georges (IMN)
LabEx grant : 120 000 €

P2XforALS : Unraveling the implication of P2X4 purinoceptors in amyotrophic lateral sclerosis (ALS) pathogenesis
Investigators : Boué-Grabot (IMN), Bertrand (INCIA)
LabEx grant : 112 000 €

PCP Compass : PCP signaling control of young neurons growth: from nanoscale analysis to directed motility
Investigators : Montcouquiol/Sans (NCM), Studer (IINS)
LabEx grant : 120 000 €

2014

Astradict : Is stress-induced vulnerability to drug of abuse an astrocyte-dependent process?
Investigators : Panatier (NCM), Piazza (NCM), Georges (IINS)
LabEx grant : 120 000 €

CannaCalc : Modulation of synaptic calcium signaling by mitochondrial type 1 cannabinoid receptor
Investigators : Pouvreau (IINS), Massa (NCM)
LabEx grant : 120 000 €

CortMem : Neuron-type specific cellular mechanisms underlying the organization of recent and remote memories in the normal and diseased brain
Investigators : Frick (NCM), Bontempi (IMN)
LabEx grant : 113 400 €

DOPABED : Functional characterization of a dopaminergic projection to the bed nucleus of the stria terminalis during aversive learning
Investigators : Georges (IINS), Herry (NCM)
LabEx grant : 120 000 €

ExtraBrain : Exploring the brain extracellular space dynamics in physiology and pathology
Investigators : Groc (IINS), Bézard (IMN), Cognet (LAPHIA), Blanchard-Desce (LAPHIA)
LabEx grant : 100 000 €

MEMO-MS : Pathophysiology and imaging biomarker of memory impairment in early multiple sclerosis – from animal model to patients
Investigators : Tourdias (NCM), Hiba (TRAIL)
LabEx grant : 119 190 €

NanoPain : Nanoparticles as a carrier of bioactive peptide against pain sensitization
Investigators : Landry (IINS), Heroguez (AMADEUS)
LabEx grant : 60 000 €

NeuroAge : Comparison of the plastic properties of adult-born and developmentally-born granule dentate neurons
Investigators : Abrous (NCM), Mulle (IINS)
LabEx grant : 100 000 €

NEUROCONTEXT : Neuronal circuits of contextual fear
Investigators : Humeau (IINS), Herry (NCM)
LabEx grant : 118 000 €

OntoMemo : Contribution of the dentate gyrus to the ontogeny of learning and memory skills
Investigators : Koehl (NCM), Georges (IINS)
LabEx grant : 100 000 €

SuperClass : New methods of aquisition ad classification for high content screening of membrane receptor organization and dynamics using super-resolution microscopy
Investigators : Sibarita (IINS), Domenger (CPU)
LabEx grant : 120 000 €

2013

Deciphering the mechanisms of central pain sensitization in vivo using innovative heat-shock local deletion of the L-type calcium channel Cav1.2 gene in the mouse lumbar bulge
Investigators : Baudet (IINS), Fossat (IINS), Quesson (CNRS UMS 3428), Petry (INSERM U1049), Dumont (Image Guided Therapy)
LabEx grant : 86 600 €

Determining the mode of binding of PSD-95 tandem PDZ domains
Investigators : Sainlos (IINS), Mackereth (IECB)
LabEx grant : 94 000 €

Does the orexin system corntibute to individual differences in sleep deprivation-induced changes in neurobehavioral function
Investigators : Philip (Sanpsy), Layé (NutriNeuro)
LabEx grant : 45 000 €

Membrane dynamics of astrocytic glutamate transporter and its functional impact on synaptic functions
Investigators : Groc (IINS), Oliet (NCM)
LabEx grant : 63 332 €

Relative contribution of the hypothalamic proliferative and neuroinflammatory responses to the obese phenotype
Investigators : Cota (NCM), Abrous (NCM), Layé (NutriNeuro)
LabEx grant : 49 000 €

Role of neuronal and astroglial CB1 receptors in morpho-functional plasticity of the tripartite synapse
Investigators : Marsicano (NCM), Nägerl (IINS)
LabEx grant : 63 332 €

Role of planar polarity proteins on the cytoskeleton dynamics of dendritic spines
Investigators : Montcouquiol/Sans (NCM), Thoumine (IINS)
LabEx grant : 63 332 €

Study of miRNA expression pattern as diagnostic and prognostic biomarker in Amyotrophic Lateral Sclerosis
Investigators : Favereaux (IINS), Le Masson (NCM), Wielanek-Bachelet (Centre référence SLA)
LabEx grant : 88 000 €

The impact of structural changes in axons on information transfert in CA3 neurons: a combined computational and nanoscale imaging study
Investigators : Cattaert (INCIA), Nägerl (IINS)
LabEx grant : 20 000 €

Thermo-sensitive nanoparticules as a carrier of bioactive peptide against pain sensitization
Determining the mode of binding of PSD-95 tandem PDZ domains
Investigators : Landry (IINS), Heroguez (CNRS UMR 5629), Petry (INSERM U1049)
LabEx grant : 86 600 €

Translational study of the cerebral substrates involved in pathological fear recovery
Investigators : Herry (NCM), Bonnet (UMS CNRS 3428)
LabEx grant : 70 000 €

2012

Biobanque
Investigators : Bézard (IMN), Meissner (IMN)
LabEx grant : 50 000 €

Characterization of molecular pathways involved in vulnerability to drug addiction
Investigators : Revest (NCM)
LabEx grant : 40 000 €

Characterization of neuronal circuits involved in addiction
Investigators : Herry (NCM)
LabEx grant : 40 000 €

CytoPlan : Impact of planar polarity on shaping neurons and synapses
Investigators : Montcouquiol/Sans (NCM), Thoumine (IINS)
LabEx grant : 36 000 €

Dippal : Diagnostic précoce et pléothérapie de la maladie d'Alzheimer
Investigators : Orgogozo (SanPsy), Philip (SanPsy)
LabEx grant : 45 000 €

Functional contribution of newly born neurons to the formation of remote memories during normal aging
Investigators : Abrous (NCM), Bontempi (IMN)
LabEx grant : 70 014 €

Morpho-functional plasticity of the tripartite synapse
Investigators : Marsicano (NCM), Nägerl (IINS), Oliet (NCM)
LabEx grant : 58 000 €

Programming support for dynamic clamp hybrid systems applications
Investigators : Simmers (INCIA), Lemasson (NCM), Cattaert (INCIA)
LabEx grant : 68 000 €

Psychobehavioral characterization of addiction
Investigators : Cota (NCM), Deroche-Gamonet (SanPsy)
LabEx grant : 20 000 €

SCOAL : Sleep, cognition and Alzheimer
Investigators : Philip (SanPsy)
LabEx grant : 45 000 €

Unraveling the anatomical wiring diagram to understand the physiology and pathophysiology of the hippocampus and neocortex
Investigators : Mulle (IINS), Frick (NCM)
LabEx grant : 116 000 €

Transfert projects
Call for proposals

The aim of the "investissement d'avenir" program is to build an integrated high-level policy in research, training, dissemination and technology transfer, with the final objective of developing the commercial possibilities of research results. During the first 3 years of activities, the LabEx BRAIN has been supporting basic research within the scientific open call for proposal. The call for transfer and applied research funded applied biological and biomedical research projects with a strong potential economic impact. The projects could concern discovery, development or optimization of innovative therapeutic or diagnostic products; as well as valorisation of research tools dedicated to the discovery of new therapeutic or diagnostics (e.g. screening methods, in silico, cellular or animal models).

Laureates

2018

BrainOrganoscope : Development of a screening imaging platform for brain organoids
Principal investigator : Jean-Baptiste Sibarita (IINS)
Partners : K. Alessandri, M. Feyeux (TREEFROG)
LabEx grant : 21 100 €

FUSO : Development and validation of automatic sleep spindle analyser
Principal investigator : Jacques Taillard (SanPsy)
Partners : Physip, Paris
LabEx grant : 106 000 €

2015

CannaPreg : Preclinical development of AEF0117, the first of a new pharmacological class: the C3-12,NMPDs
Principal investigator : Pier-Vincenzo Piazza (NCM)
LabEx grant : 300 000 €

SinglePull : Single molecule pull-down platform to dissect protein-protein interactions in neurobiology
Principal investigator : Vincent Studer (IINS)
LabEx grant : 300 000 €

Clinical research projects
Call for proposals

To meet the challenges of Neuroscience research, the LabEx BRAIN brings together teams that have decided to work in collaboration on multidisciplinary themes. This call for proposals aimed to support innovative transversal or translational research. It was specifically dedicated to clinical research projects involving one or more Bordeaux teams: based on the results obtained by a Bordeaux team (fundamental, preclinical or clinical research), the LabEx BRAIN proposed to finance human trials on healthy or sick subjects, whether physiological, physiopathological, diagnostic or therapeutic, excluding industrial trials.

Laureates

2018

Karepi : Ectopic kainate receptors in temporal lobe epilepsy : a new therapeutic target
Principal investigator : Christophe Mulle (IINS)
Partners : G. Penchet, C. Marchal, V. Michel (CHU Bordeaux)
LabEx grant : 220 000 €

Somvoice : Voice biomarkers to predict excessive daytime sleepiness
LabEx grant : 113 700 €

Soccer-brain : Brain changes after repetitive head impacts in soccer and the effects of a protective device: biomechanical, cognitive, electrophysiological and multimodal neuroimaging studies
Principal investigator : Patrick Dehail (EA4136)
Partners : J. R. Cazalets (INCIA), H. Cassoudesalle, P. Poisson, B. Glize, N. Duclos (EA4136)
LabEx grant : 70 000 €

2017

Adachol : In vivo involvement of the cholinergic and dopaminergic systems in the pathophysiology of apathy
Principal investigator : Joachim Mazer (INCIA)
Partners : G. Catheline, P. Fernandez, W. Mayo, I. Sibon (INCIA)
LabEx grant : 99 779 €

Neuroperf : Effectiveness of neurofeedback on cognitive performance and daytime alertness in controlled sleep restricted healthy suvbject
Principal investigator : Jean-Arthur Micoulaud-Franchi (SanPsy)
Partners : Fabien Lotte (INRIA)
LabEx grant : 99 779 €

2015

Infrared : Near infrared spectroscopy for assessing freezing of gait in Parkinson's disease
Principal investigator : Wassilios Meissner (IMN)
Partners : B. Mazoyer (GIN), N. Tzourio-Mazoyer (GIN), G. Perchey (GIN)
LabEx grant : 50 000 €

MirSLA : Study of miRNA expression pattern in patient's sample as diagnostic and prognostic biomarker in amyotrophic lateral sclerosis
Principal investigator : Alexandre Favereaux (IINS)
Partners : G. Le Masson (NCM), A.-C.Wielanek-Bachelet (Centre référence SLA)
LabEx grant : 40 000 €

Moodsec : Use of an innovative and easy-to-use tool based on the perception of visual food stimuli for assessing hedonic and motivational states in major depression. Relationships with peripheral endocannabinoids
Principal investigator : Bruno Aouizerate (NCM)
Partners : P.Philip, Sanpsy
LabEx grant : 50 000 €

2015

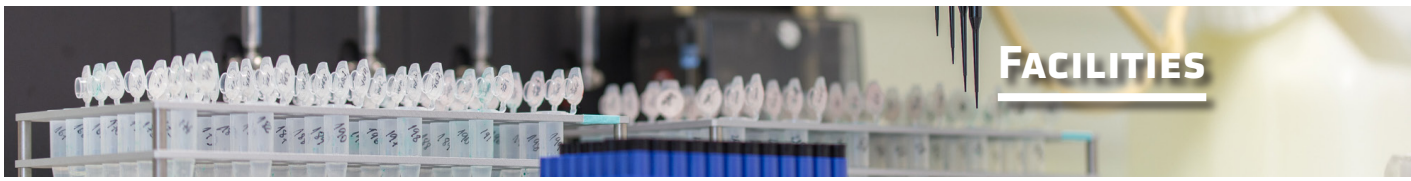
Obeteen : Neurocognitive impact of adolescent obesity
Principal investigator : Guillaume Ferreira (NCM)
Partners : P. Barrat (CHU), G. Catheline et S. Chanraux (INCIA)
LabEx grant : 64 000 €

Somnet : The sleepless brain: neuroimaging support for a differential diagnosis of insomnia
Principal investigator : Ellemarije Altena (SANPSY)
Partners : M. Joliot (GIN), E. Sanz Argita (GIN) P.Philip (SANPSY)
LabEx grant : 100 000 €

Traumafear : Identification of the cerebral networks mediating pathological fear behavior in PostTraumatic Stress Disorder patients and in rodents: a translational study
Principal investigator : Vincent Dousset (IBIO/NCM)
Partners : C. Herry (NCM), M. Bonnet, (IBIO/NCM)
LabEx grant : 50 000 €

New team

Dr. Ellemarije Altena, SanPsy: Cognitive and emotional neuroimaging of sleep
The research topic «Cognitive and Emotional Neuroimaging of Sleep», integrated into the SanPsy unit and led by Dr. Ellemarije Altena, is studying in particular the effects of sleep deprivation on cognitive functions and emotional reactions using driving simulation tasks, cognitive tests and neuroimaging techniques such as EEG and fMRI.
LabEx BRAIN grant : 297 896 €



In vitro analysis, molecular and cellular tools

Biochemistry

The «Biochemistry & Biophysics Platform of the Bordeaux Neurocampus» provides a set of specialized and complementary equipment's (as well as the related expertise) in the fields of biochemistry and protein biophysics to the all community. The facility also offers a range of services related to these techniques, ranging from protein production and purification, protein detection and quantification, to the study of protein interactions. We support basic clinical research and we are also open to private partners for industrial projects. We train and provide technical support and scientific expertise to users on the various devices of the platform. This ensemble of equipment and expertise allows us to address a wide range of protein-related biochemical and biophysical investigations.

Financial support of LabEx BRAIN

2020 : 64 534 €
2019 : 64 534 €
2018 : 109 533 €
2017 : 64 533 €
2016 : 77 750 €
2015 : 70 000 €
2014 : 105 000 €
2013 : 105 000 €
2012 : 105 840 €

Transcriptomic

Different Services are offered: nucleic acid and protein extraction, nucleic acid quantification, total RNA quality control, cDNA synthesis with quality control (protocols adapted to RNA quantities), design and validation of PCR primers (More than 5000 pairs of primers for different species), quantitative PCR with the chemistries SybrGreen or Taqman probes, digital PCR with the chemistries Evagreen or Taqman probes (Absolute quantity), selection of the appropriate controls for the qPCR and dPCR, PCR on unique cell (from patch clamp, cell sorting, laser microdissection...).
Different protocols (from RNA to the PCR reaction) are designed for small (microdissected brain structures) or large materials.

Platform labeled “research platform of the University of Bordeaux”
Neurocentre-magendie.fr/pcr

Financial support of LabEx BRAIN

2020 : 45 719 €
2019 : 45 719 €
2018 : 45 719 €
2017 : 45 719 €
2016 : 55 083 €
2015 : 57 283 €
2014 : 57 283 €
2013 : 57 283 €
2012 : 57 283 €

Cellular Biology Facility

The strong need for the production of primary cultured cells, recombinant proteins and plasmids call for the reinforcement of some of those activities as a central resource of expertise. Many research groups have expertise in cell biology and have joined efforts to mutualize resources and optimize efficiency. In addition, many groups specialized in imaging, electrophysiology or behavior can benefit from access to an open resource in cell biology.
The core service «Cell biology resource» coordinates production of primary neuronal cultures, molecular biology tools and protein production. In addition, this core facility can respond to specific requests, pending agreement, to perform primary neuronal cultures, construct cDNAs of interest and protein production. It also acts as a bridge with the biochemistry core facility.

Financial support of LabEx BRAIN

2020 : 87 963 €
2019 : 87 963 €
2018 : 87 963 €
2017 : 87 963 €
2016 : 113 500 €
2015 : 120 500 €
2014 : 120 500 €
2013 : 120 500 €
2012 : 53 130 €

Vectorology

The IMN Vector Core is a full-service facility with extensive experience in the production of adeno-associated vectors (AAV). The resources and services of the core facility are open to all members of Bordeaux Neurocampus.
The main objective of the core is to provide investigators access to viral-based vectors for in vitro and in vivo gene transfer studies. The core facility offers consulting on AAV construct design and AAV capsid selection, molecular cloning of AAV plasmids and high quality custom AAV vector production for serotypes 1, 2, 5, 6, 8, 9 and rh10.

Financial support of LabEx BRAIN

2020 : 24 900 €
2019 : 24 900 €
2018 : 24 900 €
2017 : 24 900 €
2016 : 30 000 €

Laser Microdissection

Laser microdissection makes it possible to isolate and collect cells within tissues or cell cultures according to their phenotypic or functional characteristics by means of microscopic visual inspection. This technique is necessary to study specific, targeted, microscopically visible cell populations within heterogeneous tissue. The platform is equipped with an automated laser microdissector from PALM version 4 (Zeiss) coupled with fluorescence. The system works with a pulsed UV laser that allows the cells of interest to be cut with high precision by photoablation of the adjacent tissue. This system does not require any contact between the sample and the collecting tube, thus limiting the risk of contamination for molecular analysis. Several regions of interest can be microdissected into an automated operation, and gathered into a cap that will be used for biomolecular extraction.

Financial support of LabEx BRAIN

2020 : 31 620 €
2019 : 31 620 €
2018 : 31 620 €
2017 : 31 620 €
2016 : 40 800 €
2015 : 44 000 €
2014 : 44 000 €
2013 : 44 016 €
2012 : 44 016 €

Bordeaux Imaging Center

The Bordeaux Imaging Center offers resources in photonic and electronic imaging, mainly in Biology, Health and Biomaterials.
This includes the provision of equipment and expertise for sample preparation, image acquisition and image processing and analysis.
The BIC offers access to the most advanced bioimaging techniques for fixed and live cell imaging such as video-microscopy, confocal microscopy, multiphoton microscopy, transmission and scanning electron microscopy and provides a unique set of high-end equipment for super-resolution microscopy (STED, SMLM, and FLIM for the measurement of molecular interactions).
BIC has strong expertise in ultra-structural studies through its expertise in cryo-methods of biological samples and their analysis in electron microscopy by 2D, 3D and Chemical Analysis.

Financial support of LabEx BRAIN

2020 : 112 050 €
2019 : 112 050 €
2018 : 112 050 €
2017 : 112 050 €
2016 : 135 000 €
2015 : 117 000 €
2014 : 147 000 €
2013 : 148 597 €
2012 : 148 900 €

Animal phenotyping & Human phenotyping

Breeding & experimentation platforms

In Vivo Pole

In Vivo Pole (PIV) is an animal facility for rodents located on the 4th floor of the Broca Centre.
It is composed of three zones: SPF (Specific Pathogen Free) EOPS facility subdivided into a cryopreservation of rodents embryos zone (CryME) and a transgenic animal breeding zone, a part of the Bordeaux University common animal facilities, and a third IINS/IMN common animal experimentation zone (PIVExpe).
Animals are generated in EOPS zone and then transferred to the PIVExpe for experimentation.
PIVEXPE is a Neuroscience platform for rodents. It implicates fundamental and clinical research projects that propose several surgery protocols, electrophysiological recordings and behavioral tests for motor disorders, psychotic disorders, pain and mental disabilities.

Financial support of LabEx BRAIN

2019 : 24 374 €
2018 : 39 457 €
2017 : 46 318 €
2016 : 51 739 €
2015 : 53 906 €
2014 : 43 850 €
2013 : 46 686 €
2012 : 21 400 €

Magendie's facility

In order to ensure this quality of service, the animal facility offers users on one hand to house and produce their animals, while making the necessary crosses to obtain the desired genotypes for their research projects. It also proposes to maintain multiple transgenic lines and, if necessary, purify them by retro-crossing them. And on the other hand, access to so-called conventional animal facilities where researchers can carry out their research projects and where animal owners also take care of these animals.
The platform is used to provide animals for 18 research teams from all EPSTs, representing 141 ongoing projects in the institute. It is divided on a surface area of 1800 m^2.

Financial support of LabEx BRAIN

2019 : 110 435 €
2018 : 110 435 €
2017 : 110 435 €
2016 : 144 600 €
2015 : 151 051 €
2014 : 154 725 €
2013 : 149 797 €
2012 : 149 797 €

Primate facility

The primate animal house was designed so as to house 40 monkeys in enclosures and individual cages, supporting behavioural, physiological, genetic or vigilance study.
The surgery unit comprises an operating room enabling any kind of surgeries including stereotaxis, and a digital radio system providing front and profile images with an enlargement of 10.
Users can use 4 electrophysiological recording stations, a room for experimentations with TMS (Transcranial Magnetic Stimulation) also equipped with the Neuronave tracking system and an electrophysiological recording station, 2 rooms for behavioural analyses equipped with an observation cage and with a motion analysis device (Vigiprimate), a big adjustable room (housing a maze), a virtual reality device.

Financial support of LabEx BRAIN

2019 : 21 313 €
2018 : 21 313 €
2017 : 22 626 €
2016 : 27 500 €
2015 : 30 000 €
2014 : 40 000 €
2013 : 40 500 €
2012 : 40 500 €

Genotyping

To face the increasing use of transgenic models, Neurocentre Magendie has developed in 2008 a unique genotyping service aimed at characterizing the genetic modifications of these models.
For more than 10 years, this platform has developed its expertise, and has established automated and standardized methods for fast and reliable analyses. Now the platform proposes more than 200 PCR, qPCR or RFLP protocols, for the analysis of more than 500 transgenic models.
Today, a team of 4 experts is mobilized to meet the expectations of the scientific community. More than 50,000 samples are processed each year -from genomic DNA extraction to complete genotype analyses- in order to meet the growing demand of many research institutes in France.

Financial support of LabEx BRAIN

2020 : 29 050 €
2019 : 29 050 €
2018 : 64 050 €
2017 : 29 050 €
2016 : 35 000 €
2015 : 35 000 €
2014 : 35 000 €
2013 : 35 195 €
2012 : 35 195 €

NeuroPsychoPharmacology

The Neuro-Psychopharmacology facility is a unique Service and Research platform dedicated to Clinical Research, open to the academic community and industry.

The platform aims to exploit the latest technological developments in electrophysiology, interface brain/machine, chronobiology, neurophysiology, cognitive psychology and virtual reality to identify new innovative biomarkers and to develop or investigate personalized treatments or countermeasures both in patients with neurological or psychiatric disorders and healthy subjects.

The facility offers a medical and technologic expertise and provides a qualified staff in methodology and clinical studies.

It has a research site authorization (patients and healthy volunteers) issued by the ARS and is labeled by the GIS IBISA.

Financial support of LabEx BRAIN

2020 : 74 120 €
2019 : 74 120 €
2018 : 74 200 €
2017 : 74 120 €
2016 : 89 300 €
2015 : 89 300 €
2014 : 89 300 €
2013 : 89 300 €
2012 : 89 300 €

Motricity analysis platform

The facility is dedicated to the analysis of motor skills and posture in humans and animals. It provides an integrated set of tools for researchers and clinicians to analyze body movements (kinematics, kinetics, eyetracking,...) as well as psychophysiological and physiological data (EMG, EEG...). PAM offers a controlled environment for patients whose sensorial cues can be modified by virtual reality or direct physiological stimulation. We support basic and clinical research, we are open to private partners for industrial projects, and we offer an exceptional pedagogical support for training students in medicine and science. The vicinity of Bordeaux University Hospital offers to the patients the possibility of high-level analysis of gaits and movements.

Financial support of LabEx BRAIN

2020 : 19 713 €
2019 : 19 713 €
2018 : 32 476 €
2017 : 19 713 €
2016 : 23 750 €
2015 : 19 000 €
2014 : 19 000 €
2013 : 10 000 €
2012 : 10 000 €

Hosting of foreing scientists

Call for proposals

The LabEx BRAIN aimed at promoting excellence of the research, transfer, training and international visibility of Bordeaux Neuroscience. Therefore, the LabEx BRAIN wish facilitated sabbatical stays (1-6 months) in its affiliated laboratories for oustanding-level senior scientists coming from foreign countries.

These visitors brought their expertise to the Bordeaux Neuroscience community during their stay and acted as our ambassadors when they return to their own countries.

2019

Stéphanie Fulton (Montréal, Canada) in the team of Guillaume Ferreira at NutriNeuro
LabEx grant : 4 000 €

Motohiro Nozumi (Niigata University, Japan) in the team of Valentin Nägerl at IINS
LabEx grant : 6 000 €

Julien Sage (Stanford University Medical Center) in the team of Grégory Giannone at IINS
LabEx grant : 3 500 €

2018

Sun Kwang Kim (University of Korea) in the team of Valentin Nägerl at IINS
LabEx grant : 6 000 €

2016

Thomas Biederer (Tufts University School of Medicine, Boston) in the team of Olivier Thoumine at IINS
LabEx grant : 5 000 €

2015

Henrique von Gersdorff (Oregon Health & Science University) in the teams of Didier Dulon at the laboratory INSERM UMR1120 Genetics and Physiology of Hearing & David Perrais at IINS
June 2015
LabEx grant : 2 000 €

Andrew Plested (Leibniz-Institut für Molekulare Pharmakologie (FMP) & Cluster of Excellence NeuroCure,
Charité Universitätsmedizin) in the team of Daniel Choquet at IINS
October 2015 - January 2016
LabEx grant : 6 000 €

2014

Frédéric Meunier (Queensland Brain Institute) in the team of Daniel Choquet at IINS
May - April 2014
LabEx grant : 4 000 €

Peter Kind (University of Edinburgh) in the team of Valentin Nägerl at IINS
June - September 2014
LabEx grant : 6 000 €

2013

Giamal Luheshi (McGill University) in the team of Sophie Layé at NutriNeuro
LabEx grant : 6 000 €

Adrian Palacios (Centro Interdisciplinario de Neurociencia de Valparaiso) in the team of Frederic Alexandre at IMN
LabEx grant : 2 640 €

2012

Frédéric Meunier (Queensland Brain Institute) in the team of Daniel Choquet at IINS
March - June 2012
LabEx grant : 6 000 €

Mouna Maroun (Laboratory of Neurobiology of Emotions, Israel) in the team of Guillaume Ferreira at NutriNeuro
August - October 2012
LabEx grant : 2 000 €

Keith Thomas Sillar (University of St Andrew, UK) in the team of John Simmers at INCIA
September 2012 - January 2013
LabEx grant : 4 000 €

PhD extension grant

The LabEx BRAIN offered to students from Bordeaux a fellowship to complete their Ph.D thesis, either before or after the defense.
The fellowship aimed at funding either a fourth year of Ph.D or up to one year immediately after a 3 year Ph.D, covering up a period to finish projects before leaving for a post-doc.

Laureates

2019

Eleonore BERTIN (IMN - Boué-Grabot) : Implication du récepteur P2X4 de l'ATP dans la pathogenèse de la Sclérose Latérale Amyotrophique

Ashley CASTELLANOS (NCM - Cota) : Role of hypothalamic bile acid-TGR5 receptor signaling in the regulation of energy balance

Filipe NUNES VICENTE (IINS - Giannone) : Décrypter la régulation mécanique de la motilité du cône de croissance et de l'élongation axonale

Roman WALLE (NutriNeuro - Trifilieff) : Impact de la composition lipidique membranaire sur les hétéromères de récepteurs dopaminergiques et comportements associés

Nanci WINKE (NCM - Herry) : Neuronal circuits involved in the emotional modulation of pain behavior

Ana DORREGO-RIVAS (NCM - Montcouquiol / Sans) (financement exceptionnel) : Etude fonctionnelle de 2 gènes de polarité planaire dans l'établissement de la polarité neuronale

2018

Tiago CAMPELO (IINS - Choquet) : Dynamique in vivo des récepteurs AMPA (AMPARs) dans les processus de plasticité corticale dépendante de l'expérience

Léa CLAVERIE (IINS - Choquet) : Dynamique d'échange de la dynamine mesurée dans les cellules vivantes pendant la formation de vésicules d'endocytose

Sandra DUBES (IINS - Thoumine) : Rôle du microARN miR-124 dans la plasticité homéostatique via le contrôle de l'expression de la synaptopodine et des récepteurs AMPA dans les neurones de l'hippocampe

Vernon GARCIA-RIVAS (NCM - Deroche) : Corrélats psychobiologiques des variations individuelles dans le contrôle de la recherche de drogue par la nicotine et les indices environnementaux associés à la nicotine

Stéphanie MAURIAC (NCM - Montcouquiol / Sans) : Bases moléculaires de la physiopathologie de la voie de signalisation de la polarité planaire dépendante des protéines Gi

2017

Estelle DUMAS-MALLET (IMN - Boraud / Burbaud) : Recherche biomédicale et journalisme en situation d'incertitude. Validité des résultats de la recherche biomédicale et couverture médiatique

Thomas KERLOCH (NCM - Abrous)

Suzana KHODER (NCM - Herry) : Role of the prefrontal-brainstem pathway in mediating avoidance behavior

Thomas ORRE (IINS - Giannone) : Mécanismes moléculaires d'activation des intégrines par la kindline-2 lors de l'adhésion cellulaire

Marion RINCEL (NutriNeuro - Layé) : Role of the gut-brain axis in early stress-induced emotional vulnerability

Laurie ROBIN (NCM - Marsicano) : Roles of astroglial cannabinoid type 1 receptors (CB1) in memory and synaptic plasticity

2016

Corey BUTLER (IINS - Sibarita) : Quantitative single molecule imaging deep in biological samples using adaptive optics

Charline KAMBRUN (IINS - Landry) : Contrôle des réseaux spinaux de la lamina II de la moelle épinière par les fibres C-LTMRs : approches optogénétique et pharmacologique

Vincent PLANCHE (NCM - Oliet) : Pathophysiology and imaging of early memory impairment in multiple sclerosis

Houda RADWANI (IINS - Landry) : Modulation de la transmission nociceptive par les récepteurs métabotropiques du glutamate de groupe I et les canaux calciques de type L dans la moelle épinière : approche électrophysiologique in vivo

Benjamin ROBERT (NCM - Montcouquiol / Sans) : Rôle de la signalisation de la polarité cellulaire planaire dans les processus mnésiques

2015

Fabien ALCARAZ (INCIA - Coutureau) : Circuits thalamocorticaux de la prise de décision

Benjamin BESSIERES (IMN - Bontempi) : Implication fonctionnelle des récepteurs NMDA corticaux au cours des processus de consolidation systémique et d'oubli de la mémoire associative chez le rat

Mathieu BOURDENX (IMN - Bézard) : Approche multifactorielle de la dégénérescence parkinsonienne

Marine CHAZALON (IMN - Baufreton / Georges) : Caractérisation de la transmission GABAergique dans le globus pallidus externe chez des modèles rongeurs des maladies de Parkinson et de Huntington

Brice DE LA CROMPE (IMN - Boraud / Burbaud) : Etude dynamique de la génération des oscillations Beta dans la maladie de Parkinson : approche électrophysiologique et optogénétique

Julie JEZEQUEL (IINS - Groc) : Impact of psychotomimetic molecules on glutamatergic N-Methyl-D-Aspartate receptors surface trafficking

Julia KRAPIVKINA (IINS - Choquet) : Identification de protéines SNARE de l'exocytose des endosomes de recyclage dans les dendrites neuronales

Charlotte RIMBAULT (IINS - Choquet) : Modulation des interactions impliquant les domaines PDZ par une approche d'évolution dirigée

Xiaomin ZHANG (IINS - Humeau) : Axonal homeostasis of VGLUT1 synaptic vesicles in mice

2014

Elisabetta ALOISI (NCM - Frick) : Involvement of mGluR5/Homer crosstalk disruption in the pathophysiology of Fragile X Syndrome

Alexis BEDECARRATS (INCIA - Thoby-Brisson) : Etude cellulaire de la genèse et de l'apprentissage d'un comportement motivé chez l'aplysie

Makhlad CHAHID (IINS - Sibarita) : Echantillonnage compressif appliqué à la microscopie de fluorescence et à la microscopie de super résolution

Tifany DESPREZ (NCM - Marsicano) : Rôle(s) du récepteur aux cannabinoïdes mitochondrial de type 1 dans le cerveau

Christelle GLANGETAS (IINS - Groc) : The Bed Nucleus of the Stria Terminalis between Stress and Reward

Senka HADZIBEGOVIC (IMN - Bontempi) : Behavioral, molecular and electrophysiological characterization of the learning and memory deficits induced in mouse models of Alzheimer's disease

Morgane ROSENDALE (IINS - Choquet) : Visualisation et perturbation de la dynamique spatio-temporelle de l'endocytose

2013

Philipp BETHGE (IINS - Nägerl) : Development of a two-photon excitation STED microscope and its application to neuroscience

Chloé BOITARD (NutriNeuro - Ferreira) : L'adolescence, une période de vulnérabilité aux effets de régimes obésogènes sur la mémoire : études des fonctions hippocampiques et amygdaliennes

Julien COURTIN (NCM - Herry) : Role of cortical parvalbumin interneurons in fear behaviour

Mikaël GARCIA (IINS - Thoumine) : Rôle du couplage N-cadhérine/actine dans les mécanismes de motilité et de différentiation synaptique dans les neurones

Matthias HABERL (NCM - Frick) : Studying Neuronal Connectivity in the Mouse Brain in Normal Condition and Fragile X Syndrome

Anne-Sophie HAFNER (IINS - Choquet) : Regulation of AMPA receptor surface trafficking through auxiliary protein interaction with PSD-95

Vera PINHEIRO (NCM - Montcouquiol / Sans) : L'interactome de Scrib1 et son importance pour la plasticitè synaptique & les troubles de neurodéveloppement

Johan-Till POUGNET (IMN - Boué-Grabot) : Rôle physiologique de l'organisation des récepteurs AMPA à l'échelle nanométrique à l'état basal et lors des plasticités synaptiques

Stefano ZUCCA (IINS - Mulle) : Analysis of synaptic function of CA3 microcircuit in vivo using optogenetic tools

2012

Audrey BONNAN (NCM - Frick) : Pathophysiologie du traitement de l'information dans les dendrites néocorticales dans le Syndrome de l'X Fragile

Pierre CARDINAL (NCM - Cota) : Rôle du récepteur aux cannabinoïdes de type 1 (CB1) hypothalamique dans la régulation de la balance énergétique et de l'homéostasie du glucose

Anaël CHAZEAU (IINS - Thoumine) : Rôle de l'organisation du cytosquelette d'actine branché et des adhésions N-cadhérine dans la dynamique des épines dendritiques

Laurent LADEPECHE (IINS - Groc) : Rôle du trafic des récepteurs NMDA au cours de la maturation et plasticité synaptique

Thomas LARRIEU (NutriNeuro - Layé) : Impact d'une déficience en acides gras polyinsaturés (AGPI) de la série n-3 sur les comportements émotionnels et la plasticité cérébrale chez la souris

Bordeaux School of Neuroscience

Cajal course in 2018 and 2019

2019

Brain Homeostasis and Neurovascular Coupling
19 May – 8 June 2019
Course director:
Martin Lauritzen - University of Copenhagen - Denmark
Edith Hamel - Montreal Neurological Institute and Hospital - Canada
Jérôme Badaut - CNRS - INCIA - University of Bordeaux France

Biosensors and actuators for cellular and systems neuroscience in partnership with the Bordeaux Imaging Center
23 June – 13 July 2019
Course director:
Ofer Yizhar - Weizmann Institute of Science - Israel
Michael Lin - Stanford University - USA
Sandrine Pouvreau - IINS - University of Bordeaux France

Whole brain imaging
8-28 September 2019
Course director:
Katrin Amunts - Jülich Research Centre - Germany
Bernard Mazoyer - CNRS - Neurodegeneratives Diseases Institute - UMR 5293 - University of Bordeaux - France
Sylvain Miraux - CNRS - RMSB - UMR 5536 - University of Bordeaux - France

Advanced Techniques for Synapse Biology in partnership with ERA-NET Neuron
13 October – 1 November 2019
Course director:
Patrik Verstreken - VIB-KULeuven - Belgium
Laurent Groc - CNRS - IINS - University of Bordeaux France
Nathalie Sans - INSERM U862 - University of Bordeaux France

2018

Advanced Imaging Methods for Cellular Neuroscience
10-28 September 2018
Course directors:
Volker Haucke - Leibniz Institute for Molecular Pharmacology (FMP) - Berlin - Germany
Britta Eickholt - Charité – Universitätsmedizin - Berlin Germany
David Perrais - IINS, CNRS – University of Bordeaux France

Developmental Neurobiology and Pathologies
3-21 April 2018
Course directors:
Alain Chedotal - Institut de la Vision - INSERM - UPMC France
Eloisa Herrera - Neuroscience Institute in Alicante Spain
Julia Ladewig - Institute of Reconstructive Neurobiology University of Bonn - Germany
Mireille Montcouquiol - Neurocentre Magendie - INSERM University of Bordeaux - France

Linking Neural Circuits and Behaviour
8-26 October 2018
Course directors:
Antoine Adamantidis - University of Bern - Switzerland
Frederic Gambino - CNRS – University of Bordeaux France

Neuroinflammation and How to Study It
25 June – 7 July 2018
Course directors:
Colm Cunningham - Trinity College - Ireland
Sophie Layé - INRA - University of Bordeaux - France
Agnès Nadjar - University of Bordeaux - France
Andy Greenhalgh - University of Bordeaux - France

2017

Advanced Techniques for Synapse Biology
July 3 -21, 2017
Course directors:
Monica Di Luca - University of Milan
Fabrizio Gardoni - University of Milan (Co-director)
Nathalie Sans - University of Bordeaux (On-site chair)

Connectomics: from Micro- to Meso- and Macro-Scales
October 2 -21, 2017
Course directors:
Andreas Frick - University of Bordeaux, France
Laurent Petit - University of Bordeaux, France
Olaf Sporns - Indiana University, USA

Ion channels in the brain in health and disease
September 4 -22, 2017
Course directors:
Florian Lesage - University of Sophia Antipolis, France
Teresa Giraldez - University of La Laguna, Spain
Eric Hosy - University of Bordeaux, France (On-site chair)

2016

Neuronal Cell Biology – Cytoskeleton and Trafficking (NCB-CT)
11 – 30 July 2016
Course directors:
Casper Hoogenraad - Utrecht University, Utrecht - The Netherlands
Monica M Sousa - University of Porto - Portugal
On-site chair:
Olivier Thoumine - University of Bordeaux - France

Nutrition and Brain Functions (NBF)
19 September – 7 October 2016
Course directors:
Richard P Bazinet - Toronto University, Toronto - Canada
On-site chair:
Sophie Layé - University of Bordeaux - France

Hippocampus from Circuits to Cognition (HCC)
10 - 29 October 2016
Course directors:
Jozsef Csicsvari - Institute of Science and Technology, Klosterneuburg - Austria
Charan Ranganath - UC Davis Center for Neuroscience, University of California - US
On-site chair:
Christophe Mulle - University of Bordeaux - France
Mario Carta - University of Bordeaux - France

CAJAL-ISN course - Glial Cells in Health and Disease (GCHD)
28 November - 10 December 2016
Course directors:
Ismael Galve Roperh - Complutense University, Madrid - Spain
Frank Kirchhoff - Saarland University, Homburg - Germany
Serge Nataf - University of Lyon 1 - France
On-site chair:
Stéphane Oliet - University of Bordeaux - France

Bordeaux Neurocampus Graduate Program

Selected as a French Initiative of Excellence, the Graduate Program focuses on research training through research, knowledge and innovation, from Master to Doctoral level. It provides high value and cross-disciplinary training from fundamental to applied and translational neuroscience.

The trainees benefit from a variety of educational programs, cutting-edge research facilities, ambitious training initiatives, partners'network and international conferences in diverse neuroscience disciplines within a vibrant scientific community.

The international and integrated Graduate Program includes:

- The Master of Neuroscience (MSc) with French and international tracks implemented in collaboration with international academic partners
- The International Doctoral Program (PhD) in Neuroscience within the dynamic research laboratories of Bordeaux Neurocampus
- Training Activities, including hands-on training workshops in cutting-edge facilities, international seminars, transverse training, etc.
- Partners' network through private and academic international collaborations

ORGANIZATION OF SCIENTIFIC SYMPOSIUMS

CALL FOR PROPOSALS

The LabEx BRAIN wished to support the organisation of school or symposia projects in addition to and in consultation with the Bordeaux Neurocampus department. Events must be held in Bordeaux.

LAUREATES

2019

1st meeting Olfaction & Neuroscience (IINS - Roux / NutriNeuro - Ferreira) : 1 500 €

Le neurofeedback, un outil pour la recherche en neurosciences cognitives ? (SanPsy) : 1 500 €

Adult neurogenesis in physiology and disease (NCM - Abrous) : 4 500 €

Les enseignants dans les laboratoires / Journée scientifique du Réseau INSERM franco-marocain (IINS - Landry) : 1 000 €

International Brain Conference (Bordeaux Neurocampus) : 17 000 €

Semaine du cerveau (Bordeaux Neurocampus) : 1 250 €

Les nouvelles approches de pointe en microscopie électronique (BIC) : 1 500 €

12e meeting Nutrition & Neurosciences (NutriNeuro - Layé) : 1 125 €

Workshop on Advanced methods for preclinical Alzheimer research (Ecole des Neurosciences de Bordeaux) : 2 500 €

13e meeting International basal ganglia society (IMN - Boraud / Burbaud) : 6 750 €

2018

International Bordeaux Neurocampus Brain Conference : 17 000 €

Innovation technologique et maladies neurodégénératives (IMN) : 1 500 €

Synapse day (Bordeaux Neurocampus) : 1 500 €

Réseau INSERM franco-marocain (IINS - Landry) : 750 €

Semaine du cerveau (IMN - Benazzouz) : 1 250 €

Unraveling the mysteries of dynamic neural networks (INCIA - Thoby-Brisson) : 1 500 €

Workshop Mysterious medial prefrontal cortex (INCIA - Coutureau) : 2 250 €

2017

10e meeting Nutrition & Neurosciences (NutriNeuro - Ferreira) : 1 500 €

15e colloque national de la Société française des microscopies (BIC) : 2 000 €

Circuit development, dynamics and cognition (NCM - Montcouquiol / Sans) : 800 €

International Bordeaux Neurocampus Brain Conference : 17 000 €

Decision making (IMN - Boraud / Burbaud) : 3 500 €

FINS (IINS - Choquet) : 4 500 €

FOM (IINS - Choquet) : 6 000 €

International Bordeaux Neurocampus Brain Conference : 17 000 €

NeuroFrance 2017 (Bordeaux Neurocampus / Société des Neurosciences) : 15 000 €

Journée Bordeaux Neurocampus : 8 400 €

La motricité dans tous ses états (INCIA - Bertrand) : 3 000 €

Neuromorphic, nonlinear, neurofluidic engineering (IMS - Levy) : 1 500 €

2016

14e Journée Synapse
(Bordeaux Neurocampus) : 3 000 €

Feuille de lumière (IINS - Sibarita) : 2 250 €

GDR Neurobiologie de la mémoire
(INCIA - Coutureau) : 5 000 €

International Bordeaux Neurocampus Brain Conference (Bordeaux Neurocampus) : 17 000 €

Journée Bordeaux Neurocampus : 4 500 €

L'animal, modèle ou objet d'étude, une perspective euro-méditerranéenne
(IINS - Landry) : 2 250 €

Meeting Nutrition & Neurosciences
(NutriNeuro - Ferreira) : 750 €

Mini-symposium 01/12/2016
(NCM - Montcouquiol / Sans) : 800 €

Stand à la FENS
(Bordeaux Neurocampus) : 1 500 €

Symposium NutriNeuro (Layé) : 750 €

2015

13e journée Synapse
(Bordeaux Neurocampus) :1 500 €

GFATG (IMN - Bézard) : 3 000 €

International Bordeaux Neurocampus Brain Conference (Bordeaux Neurocampus) : 17 000 €

Journée Bordeaux Neurocampus : 5 000 €

Molecular mechanisms of endocytosis and neuronal function (IINS - Choquet) : 750 €

Neurocognitive bases of decision making (INCIA - Coutureau) : 1 500 €

Neurogenesis (NCM - Abrous) : 4 500 €

Neuropatho (IMN - Bézard) : 4 500 €

Single molecule localization microscopy
(IINS - Sibarita) : 3 000 €

VGLUT (IINS - Humeau) : 750 €

2014

12e Journée Synapse
(Bordeaux Neurocampus) : 1 000 €

Cannabinoids (NCM) : 3 000 €

Biosensors (IINS) : 3 000 €

TDA (SanPsy) : 1 500 €

External globus pallidus
(IMN - Baufreton / Georges) : 1 500 €

Imaging the cell : 4 500 €

Réussir avec une thèse de Neurosciences
(Bordeaux Neurocampus) : 1 250 €

Meeting du COST (IMN - Benazzouz) : 300 €

Voyage d'étude du Master de Neuroscience de l'Université d'Amsterdam (INCIA - Cador) : 2 000 €

2013

1re journée Synapse (Bordeaux Neurocampus) : 750 €

3e colloque international Frontières en Neurophotonique (IINS) : 5 000 €

4e congrès européen Synapse (IINS) : 4 500 €

Symposium 22/11/2013 (IMN - Bézard) : 1 500 €

ELMI (IINS) : 4 000 €

MitoBrain (Bordeaux Neurocampus) : 20 000 €

Néoneurogénèse (NCM - Abrous) : 4 500 €

Cours EMBO (BIC électronique) : 5 000 €

Ecole NutriBrain (NutriNeuro) : 10 500 €

GDR Multielectrode systems and signal processing for Neuroscience (LaBRI) : 3 000 €

Mini-symposium 11/12/2013
(IINS - Choquet) : 1 500 €

Réseau INSERM sur la douleur
(IINS - Landry) : 3 000 €

Parkinson (IMN) : 3 000 €

Systems biology on dopaminergic neurons
(IINS - Groc) : 1 500 €

Vivre ensemble (NCM) : 3 000 €

2012

4e colloque du club adhérence cellulaire (IINS - Thoumine) : 3 000 €

Addiction et trouble de l'attention/hyperactivité (SanPsy - Philip) : 1 500 €

Ecole NutriNeuro (NutriNeuro - Layé) : 15 000 €

ENCODS (NCM) : 10 000 €

Neuron-glia interactions: from metabolism to activity : 800 €

Symposium F. Nagy (IINS - Landry) : 1 500 €

Troubles cognitifs de la sclérose en plaques et des maladies inflammatoires du système nerveux central (INSERM U1049 - Brochet) : 1 500 €

Communication to the general public

One of the objectives of LabEx BRAIN was to open the doors of Bordeaux neuroscience laboratories and to share knowledge of neuroscientists with the general public. LabEx BRAIN supported many events organized each year to make science more accessible to all!

Neuroscience in Bordeaux Association

The Neuroscience in Bordeaux Association (NBA) was created in 2012 by and for students in Neuroscience of Bordeaux.
LabEx BRAIN supports this student association that contributes to the dissemination of scientific knowledge in Neuroscience to the general public through the organization of Neurodon and Pint of Science.
LabEx support : 1000 € per year

Dealers de Science

Dealers de Science is a student association created in October 2009 which brings together students of the professional master's degree «Information et Médiation Scientifique et Technique» (IMST) of the University of Bordeaux Montaigne. This master's degree is also co-authorized by the University of Bordeaux.
This student association requested LabEx BRAIN to organize a scientific event on the theme of brain.
LabEx support : 1000 € in 2013, 2019 and 2020

Science Festival

Annual event which is an essential part of scientific culture, the Science Festival invites young and old to observe, experiment, question and exchange in order to understand the impact of science on their daily lives. It provides keys to understanding, in a playful way, through experiences, meetings, debates... In a word, it arouses curiosity!

LabEx BRAIN supports this event which gives the opportunity to many high school and college students to visit our laboratories, participate to scientific workshops, interact with those who practice science on a daily basis and discover the research jobs...

Brain Awareness Week

Organized every year in March since 1998, the Brain Week is coordinated in France by the Société des Neurosciences.
LabEx BRAIN supports this international event, organized simultaneously in about 100 countries and more than 120 cities in France, which aims to raise awareness among the general public of the importance of brain research. It is an opportunity for many researchers, doctors and student volunteers to meet the public and share with them the advances made in neuroscience research laboratories, to present the challenges for brain knowledge and the implications for our society.
LabEx support : 1500 € per year

Our teams

- Neurocentre Magendie
- Institute for Interdisciplinary Neuroscience
- Institute of Neurodegenerative Diseases
- Aquitaine Institute for Cognitive and Integrative Neuroscience
- NutriNeuro
- SANPSY

NEUROCENTRE MAGENDIE

Created in January, 2007, the Neurocentre Magendie counts around 190 researchers, teachers-researchers, technicians, post-PhD students and students today, distributed in 11 research teams and 6 common technical platforms. Rich in about 40 different nationalities, the members of the research center arrange 8000 m^2 at the heart of the campus of Carreire. So that each takes advantage of wealth of this community, the life of the Neurocentre is given rhythm by weekly scientific and friendly meetings, monthly meetings between the post-docs and annual big symposium.
The Neurocentre Magendie offers an international environment, scientifically stimulating and dynamic.

NEUROGENESIS AND PATHOPHYSIOLOGY

NORA ABROUS

A growing body of evidences suggests that plasticity in the adult brain is involved in the pathophysiology of behavior. Recently, neurogenesis has been evidenced in the dentate gyrus (DG) of the hippocampal formation (HF), a brain structure involved in memory and emotion. This phenomenon has stimulated the interest for its potential involvement in the physiology and pathophysiology of hippocampal-dependant behavior. Our research has been dedicated to demonstrate that adult-born hippocampal neurons are a key player in memory and emotion and that a reduction of adult neurogenesis leads to the development of memory disorders, anxiety-like behavior and drug addiction. Our current project is designed to understand when and how adult neurogenesis impacts hippocampal-dependent behavior. In addition, the role of neurons born during DG development will be also scrutinized. In conclusion, this research proposal will provide a better understanding of the role of adult neurogenesis in normal and pathological behaviors. This knowledge will allow the development of new therapeutics tools for behavioral pathologies.

NEURAL CIRCUITS OF ANXIETY

ANNA BEYELER

Anxiety disorders include nine classes of psychiatric diseases and represent the most prevalent psychiatric conditions with an estimated prevalence of 18% among adults, and more than 28% over a lifetime. Despite the high personal and societal costs of anxiety disorders, relatively few therapeutic targets have been identified and current threatments are limited and have side effects. The main reason for these limitation is that we still do not understand the neural substrate underlying these pathologies. A leading hypothesis posits that anxiety disorders are caused by dysfunctions of neural circuits encoding emotional valence. Brain regions encoding emotional valence have been identified in humans and animal models, but the functional role of the circuits including these regions are just starting to be identified.

The insular cortex, or insula, is a brain region responding to emotional stimulation in healthy individuals, and has been shown to be overactivated in patients with different types of anxiety disorders such as generalized anxiety disorder, social anxiety disorder or specific phobia. However, very few is known regarding the anatomo-functional organization of this brain region, and the circuits involving the insula.

Our research program aims at defining the circuit, cellular and synaptic organization of the insular cortex in healthy conditions using mice models, and to determine whether alterations of this organization is causally linked to pathological level of anxiety. The long term goal of our research is to restore the neural dysfunctions underlying anxiety disorders in pre-clinical models to translate our findings to develop novel strategies to treat anxiety disorders.

Energy balance and obesity

Daniela Cota

Obesity represents a global epidemic lacking efficient therapeutic options. This highlights the insufficient knowledge of the biological mechanisms regulating energy balance and the absence of therapeutically relevant targets. The brain and in particular the hypothalamus plays a key role in the regulation of energy balance. Hence, the main scope of our research is to understand how exactly hypothalamic cells and circuits adapt and respond to energy availability in order to control food intake, body weight and peripheral metabolism. To reach this goal, we study energy-sensing mechanisms, such as the mechanistic target of rapamycin (mTOR) pathway and the endocannabinoid system (ECS), and use an integrated approach spanning from the generation and in depth metabolic characterization of genetic animals models to the use of state-of-the-art neuroscience techniques for the investigation of the neuronal circuits of interest. In addition, we perform clinical research studies aimed at better characterizing obese phenotypes in humans, which will lead to better, personalized therapies.

Psychobiology of drug addiction

Véronique Deroche-Gamonet

Our team works at the understanding of the psychobiological mechanisms of addiction, notably to cocaine and tobacco.

Drug use can lead to behavioral disorders of which an extreme version is addiction. This psychopathology is not a mere excessive drug use, but is defined as a loss of control over use, which is particularly reflected in the maintenance of use despite its adverse effects. Critically, all users are not equally at risk for addiction, however.

Our experimental strategy consists in integrating these characteristics of the pathology, i.e. loss of control over drug use and individual vulnerability, for an increased face and predictive validity of our models. We were pioneer in this context with the first multi-symptomatic DSM-based model of cocaine addiction (Deroche et al., Science, 2004).

We apply methods of experimental psychology and psychopharmacology that we combine with complementary techniques for neurobiological exploration; from molecular level to functional connectivity.

Cortical plasticity

Andreas Frick

Neocortical circuits are highly complex, functionally sophisticated and diverse circuits. They perform computations that ultimately give rise to cognition and behavior. We seek to understand the mechanisms that shape these circuits during processes such as memory formation or in autism spectrum disorders. Deciphering the underlying neurobiological mechanisms requires a description of these circuits and their components, in terms of function, structure, synaptic connectivity between them and other brain structures, and gene expression. Our key expertise lies in investigating how the intrinsic excitability features of neurons give rise to the computational power of neocortical circuits. We use innovative transgenic and viral tracing methodology, together with in vivo and in vitro electrophysiological and calcium imaging, opto-/pharmacogenetic, anatomical tracing, and behavioral approaches to address these key questions.

Neuronal circuits of associative learning

CYRIL HERRY

Our research is focused on the identification of the neuronal circuits and mechanisms mediating aversive associative learning. Using a combination of state of the art, behavioral, single unit and local field potential recrodings, optogenetic and anatomical tracing we aim to decipher the specific neuronal elements, circuits and mechanisms involved in the control of fear behavior and to understand how alteration sin such circuits promotes the development of pathological fear behavior.

Endocannabinoids and Neuroadaptation

GIOVANNI MARSICANO

Our team aims at uncovering the functions of the endocannabinoid system in the brain as well as the cannabinoids regulation of behavior and psychotic disorders. By using conditional mutagenesis, we are currently dissecting the roles of cannabinoid receptors type-1 (CB1) in different cellular and subcellular localizations towards a better understanding of the general rules governing behavior such as higher order memory processes, locomotor activity and sensory perception.

Pathophysiology of declarative memory

ALINE MARIGHETTO

Our aim is to identify psychobiological bases of declarative memory (DM) alterations occurring in aging and post-traumatic stress disorder (PTSD). We have developed specific behavioral models of age- and PTSD-related memory alterations in the mouse. Using these models, we search correlates of the cognitive changes at the system, cellular and molecular levels of brain activities. To establish causality links between neurobiological and cognitive changes, we then combine interventional approaches with pharmacological tools/optogenetics to our behavioral testing.

Planar polarity and plasticity

MIREILLE MONTCOUQUIOL
NATHALIE SANS

Planar Cell Polarity (PCP) genes strongly affect neurulation, leading to a complete failure of neural tube closure and craniorachischisis, the most severe form of neural tube defects. This neurodevelopmental pathology is associated with massive structural disruption of the entire central nervous system and deficits in sensory systems, and is incompatible with life, preventing the study of potential roles of core PCP genes later in life. In our group, we want to understand the molecular and cellular mechanisms controlled by PCP signaling as well as the structural and functional consequences of their early (during embryonic development) or late (in adult) deletion, in correlation with specific subregions of the brain and in specific sensory organs (inner ear).

For this, we use classical molecular and cellular biology approaches and various types of imaging (from confocal, to light sheet microscopy to super-resolution, and live imaging), but also a variety of conditional mouse models (Cre-Lox), stereotaxic injections of viruses combined with complex behavioral protocols, electrophysiology, anatomical and immunohistological approaches.

Neuron-glia interactions

STEPHANE OLIET

Our aim is to understand the biological bases of glia-neurons interactions in healthy and diseased nervous system (chronic pain, Alzheimer disease and multiple sclerosis). We showed the contribution of astrocyte to synaptic functions by showing the role of D-serine, a gliotransmitter released by astrocytes, in gating synaptic NMDA receptors and their dependent long-term plasticity. We are now also interested in analyzing fine morphological plasticity of astroglial cells as well as monitoring membrane trafficking of key proteins at the surface of astrocytes.

Physiopathology and therapeutic approaches of stress-related diseases

JEAN-MICHEL REVEST

Our team aims at characterizing the neurobiological basis of addiction and molecular basis of traumatic memories. By applying a translational research, our work is dedicated to offer and develop new treatment for addiction. We successfully revealed neurobiological substrates involved in the transition to cocaine addiction. We recently demonstrated that pregnenolone can protect the brain from cannabis intoxication, that serves as a ground for clinical research.

Innovative techniques: neurosteroids biochemistry, In vivo HPLC-microdialysis, model of addiction, rodent behavioral testing.

Institute for Interdisciplinary Neuroscience - IINS

The Institute for Interdisciplinary Neuroscience (IINS) is a research center that opened its doors on January 1st, 2011. Currently, IINS is home to about 160 scientists. The director is Daniel Choquet.
IINS undergoes pluridisciplinary research by associating chemists, biologists, biophysicists and neurobiologists. They particularly study synaptic transmission, i.e. the communication between brain cells and the impact of this communication on neuronal networks and behavior.
IINS scientists put a strong emphasis on developments of new investigation technologies combined with use of advanced tools. This allows the forefront research of subcellular nanoscopic protein organization, synapse dynamic and physiology of neuronal systems in normal or pathological behavioral situations.
The IINS research methodologies are imaging, chemistry, cellular biology and the physiology of synapses and neuronal networks.
The laboratory is leader in the field of neuronal molecules dynamics. Thanks to IINS studies, synaptic function and receptors are being better understood.

Dynamics of Synapse Organization and Function

DANIEL CHOQUET

Our team pursues a transdisciplinary approach, to study the interplay between the dynamics of the molecular components of synapses and synaptic transmission. Based on advanced imaging techniques and physiology, we study AMPA receptors and its molecular partners. We obtained breakthrough data on nano-scale organization, dynamics and interaction of synaptic proteins and membrane trafficking. Our efforts are focused on the understanding of the dynamics of synaptic components involved in higher cognitive functions and pathologies, such as Alzheimer disease.

Structural biology and engineering of neuronal signalling

JONATHAN ELEGHEERT

The interests of our team lay at the interface of structural biology, protein engineering, and cellular neuroscience. We aim to understand molecular principles of neuronal signalling in health and disease, and to translate these to the cellular and organismal level.

We use mammalian protein expression, protein chemistry, biophysical methods, X-ray crystallography and cryo-electron microscopy to study the interaction determinants and structures of synaptic protein complexes involved in neurodevelopmental disorders and neuronal disease. We use combinatorial methods and protein engineering to discover novel binders and manipulate protein sequence, structure and function, both to facilitate structural studies as well as enable therapeutic targeting of these complexes.

Computational and Systems Neuroscience

FREDERIC GAMBINO

Neocortical function and plasticity underlie the remarkable adaptive skills of mammals. Among different projects, our team is studying how the prefrontal cortex computes and adapts its strategies through experience and learning to optimally select the sequence of actions that is expected to produce the most beneficial outcome. We developed an entirely in vivo multidisciplinary approach combining electrophysiology and functional imaging (intrinsic and voltage-sensitive dyes imaging), multiphoton laser-scanning microscopy, gene transfer and optogenetic during behavior in head-fixed and freely-moving mice.

Innovative techniques: in vivo patch-clamp and optogenetic, chronic two-photon imaging during behavior. decision-making in virtual reality. high-dimentional analysis of brain circuit.

Spatio-temporal and mechanical control of motile structures

GREGORY GIANNONE

Our goal is to decipher at the molecular level the spatiotemporal and mechanical mechanisms which control the architecture and dynamics of motile structures. First in the context of cell migration by studying integrin-based adhesion sites and the actin-based lamellipodial protrusions, in healthy and cancer cells. Second in the context of neuronal structural plasticity by studying integrins and the actin cytoskeleton in axons and dendritic spines. And finally, in the context of multicellular organism by focusing on integrin-mediated adhesion in living Drosophila tissues. Exploration of all these new dimensions requires an innovative and multidisciplinary approach combining cell biology, biophysics, biomechanics and advanced optical microscopy techniques including super-resolution microscopy, single protein tracking and quantitative image analysis.

Development and Adaptation of Neuronal Circuits

LAURENT GROC

A great challenge for our comprehension of the brain development is to identify how different biological signals converge and drive the maturation of excitatory synapses in the healthy and diseased brain. The goal of our lab is to use a multi-scale approach to decrypt the molecular mechanisms underpinning the maturation of the glutamatergic NMDA receptor-mediated signaling. How is this signaling regulated by scaffold proteins, transmembrane partners (e.g. dopamine receptors), molecules from the extracellular space, and the immune system? In addition, we investigate the instrumental role(s) of these molecular complexes in models of psychosis, in order to propose innovative therapeutical strategies.

Synapse in Cognition

YANN HUMEAU

Synapses are plastic. They change their efficacy depending on various parameters, including the respective activities of pre- and post-synaptic neurons. Numerous in vitro studies explored the plasticity repertoire of numerous synaptic populations in the mouse brain, but more rarely with regards to their endogenous inducers. It is no doubt that synaptic plasticity is associated and mediates learning and memory, thus our goal is to identify the neuronal activities that are associated with the learning and execution of cognitive abilities, and to understand how, when and where synaptic plasticity is generated. We are developing cooperative in vivo and in vitro strategies to study the link between synapse and cognition. These include behavioral tests, in vivo pharmacology and optogenetic, and in vitro electrophysiological recording in various brain regions of identified synaptic populations. Future projects will focus on various aspects of spatial learning, and will more and more includes in vivo electrophysiological recordings in freely behaving mice. Ex. Our main objective is to understand the link between synapse and cognition at the synaptic and circuit level. Our recent results show

that several mental retardation (MR) mouse models exhibit functional synaptic deficits at cortical projections to the lateral amygdala (LA), a structure involved in the coding of fear memory. We will examine the role of MR proteins in the process of memory formation by analysing biochemical, morphological and physiological changes of cortico-LA synapses in mice submitted to fear conditioning.

Central Mechanisms of Pain sensitization

MARC LANDRY

The aim of our project is to elucidate basic mechanisms responsible for cellular and network dysfunctions in rodent models of chronic inflammatory and neuropathic pain. We are particularly interested in the overlapping circuits that underlie both chronic pain and associated comorbidities, e.g. anxiety, ADHD, neurodegenerative diseases. Our hypothesis is that these comorbidities play a crucial role in maintaining chronic pain states by disrupting calcium-dependent sensory integration in the dorsal horn of the spinal cord through the modulation of brain to spinal cord descending pathways. Our focus is on peptidergic, serotoninergic, and miRNA-based mechanisms that influence descending controls and their spinal effects.

Synaptic Circuits of Memory

CHRISTOPHE MULLE

The research carried out in our group ambitions to link cell biological mechanisms of proteins and lipids involved in glutamatergic synaptic function and dysfunction. Much of our work has focused on the roles of kainate receptors, a subject in which the group is internationally recognised. We elucidated new biophysical and pharmacological properties of kainate receptors in the developing hippocampal circuits and in temporal lobe epilepsy. Our group has also broken new ground with highly original work on the role of prostaglandins and other lipids in synaptic plasticity. Great efforts are made to develop new methods for investigating the connectivity and function of local circuits in vivo contributing to memory.

Synaptic Plasticity and Superresolution Microscopy

VALENTIN NÄGERL

The biology of synapses is an extremely productive and interdisciplinary scientific endeavor, harboring central questions of cell biology and neuroscience. Synapses are physical sites of intercellular contact that transmit and transform information in a very rapid and flexible way, playing a pivotal role for learning and memory formation as well as neurological diseases of the mammalian brain.

Since synapses are tiny and densely packed in light-scattering brain tissue, understanding their dynamic behavior in mechanistic terms under physiological conditions is a serious experimental challenge. Fortunately, recent technological innovations, particularly in labeling and live-cell imaging techniques, are helping to break new ground. The advent of fluorescence microscopy beyond the diffraction limit has opened up huge experimental opportunities to directly image and resolve key physiological signaling events inside single synapses in intact brain tissue, a possibility which was considered a pipedream until recently.

Our group is invested in harnessing these exciting technological developments to study synapses in their natural habitat and under realistic conditions, aiming to better understand higher brain function and disorders in terms of the underlying synaptic mechanisms.

To this end, we are applying novel super-resolution microscopy approaches (STED microscopy), giving us a much more complete and refined view of the dynamic behavior and plasticity of neuronal synapses and their interactions with glia cells inside living brain slices and in the intact mouse brain in vivo. These approaches are complemented by a combination of 2-photon imaging & photoactivation and patch-clamp electrophysiology aided by tools from molecular genetics.

Quantitative Imaging of the Cell

JEAN-BAPTISTE SIBARITA

Our team aims at developing novel imaging and microtechnologies to decipher protein organization and dynamics at high spatial and temporal resolutions. More precisely, four main research areas are dedicating to develop:

1) Novel instruments to improve the penetration depth and the spectral content of high and super-resolution microscopy methods for the imaging of complex and physiologically relevant living samples,

2) Analytical tools for the visualization and the quantification of 3D multi-colour data-sets,

3) Imaging and analysis tools that combine High Content Screening microscopy and super-resolution microscopy approaches to quantify the dynamics and organization of proteins within the living cells and

4) Novel microtechnologies to control the in vitro cellular microenvironment.

Cell Adhesion Molecules in Synapse Assembly

OLIVIER THOUMINE

Our team aims at characterizing the molecular mechanisms of synapse formation, with a focus on the function of cell adhesion molecules including neurexins and neuroligins. We are studying the membrane dynamics and nanoscale organization of these adhesion molecules at synapses, and their contribution to the recruitment of scaffolding proteins and glutamate receptors, by combining single molecule detection and computer simulations. We are also characterizing a neuroligin-1 phosphotyrosine signaling mechanism regulating the differential assembly of excitatory versus inhibitory synapses, by using a combination of electrophysiology and optogenetic approaches. Finally, we are investigating the trafficking and function of neurexins and neuroligins harboring genetic mutations identified in autism spectrum disorders.

INSTITUTE OF NEURODEGENERATIVE DISEASES - IMN

The Institute of Neurodegenerative Diseases (IMN) was created on January 1st, 2011. It resulted from the merging of several teams originating mainly from two former CNRS units. It led to the pooling of CNRS, INSERM and University personnel and resources dedicated to mainly studying Movement Disorders and Dementias.

Its establishment is the result of considerable effort, and represents a major step forward in the structuring of the Neuroscience research conducted at this site as part of the "Neurocampus" project.

The IMN includes both preclinical and clinical researchers with a clear goal of:

- developing new therapeutic approaches of neurodegenerative disorders by facilitating the translational research from bench to bedside.
- increasing its scientific visibility and attractiveness in translational (Parkinson, Alzheimer, Obsessive compulsive disorders, Addiction) and fundamental neurosciences (Action planning, Cognition, molecular substrates of synaptic transmission) by building on the potential of its teams and the dynamics set in motion since its creation.

PATHOLOGICAL DECISION-MAKING IN ADDICTION

SERGE AHMED

Our research aims at identifying the psychological and neurobiological determinants of the different stages of addiction, drug choices and preferences in order to develop/improve strategies to prevent relapse. To successfully tackle these goals, we compare drug- versus nondrug-preferring rats to elucidate the psychological and neurobiological substrates underlying the abnormal preference for the drug. Our efforts are also concentrated in investigating the long-term preventive effects of a cue exposure procedure against relapse to reveal the brain regions that play a critical role in interoception, behavioral inhibition and motivation. Innovative techniques: in vivo recording, behavioral procedures for drug choices and preferences.

MNEMOSYNE : MNEMONIC SYNERGY

FREDERIC ALEXANDRE

Mnemosyne is a research team in computer science modeling neural networks, with the aim to study synergies between different kinds of learning. Our objective is to better understand these synergies and the impact of certain dysfunctions by realizing efficient computer models and by driving reproducible experiments dedicated to the emulation of autonomous behaviors and the realization of cognitive functions. They have an impact in the fields of Machine Learning, Artificial Intelligence and Situated Cognition, but they also question our neuroscientific and medical colleagues and offer them new objects of study at the level of neuronal and behavioral phenomena. Our research can be presented according to themes corresponding to learn to predict values and to learn to control behavior.

Dopamine and Neuronal Assemblies

JEROME BAUFRETON
FRANÇOIS GEORGES

Our laboratory examines the functions of the « extended basal ganglia network », a neuronal network composed of interconnected limbic and motor nuclei. We aim at characterizing this network at the synaptic level, focusing on how synaptic transmission and plasticity are controlled by dopamine. Our research will provide new understandings of physiological functions (voluntary movements, associative learning...) and of dopamine-associated disorders (Parkinson's disease, addiction...).

Pathophysiology of neuron-oligodendrocyte interactions

ARNE BATTEFELD

Bidirectional neuron-glia interactions provide the framework for the organization of the brain. One type of glia cell, the oligodendrocyte is well known for the establishment of myelin sheaths around axons, the neuronal output structure. Myelin enables fast communication between neurons, but oligodendrocytes fulfill additional physiological functions which we only start to understand. Our research aims to address this knowledge gap by understanding the physiology of oligodendrocytes and their impact on neuronal communication and vice-versa. We address our research questions on the single cell and micro-circuit level. Alterations of oligodendrocytes are a common feature among several neurodegenerative diseases. By combining our knowledge of physiological oligodendrocyte function we address the functional impact of pathophysiological alterations of oligodendrocytes on neuron-oligodendrocyte communication in neurodegenerative disease. To address our key questions, we combine state of the art methods that include electrophysiology, advanced cellular imaging and genetic approaches.

Neurochemistry, deep brain stimulation and Parkinson's disease

ABDELHAMID BENAZZOUZ

Our research project aims to better understand the pathophysiology of Parkinson's disease in order to improve the existing therapeutic approaches and to develop new therapies for the disease. Currently, we especially focus our work on the role of monoaminergic systems (noradrenaline, dopamine, serotonin) in the pathophysiology and therapy of Parkinson's disease. The team is acknowledged for its neurochemical and electrophysiological inputs unraveling the mechanisms of action of the deep brain stimulation of the subthalamic nucleus and L-DOPA medication in animal models of Parkinson's disease.

Pathophysiology Of Parkinsonian Syndromes

ERWAN BEZARD

The team has authored or co-authored over 200 professional publications in the field of neurobiology, most of which are on Parkinson's disease and related disorders, since 2014 only, placing it at the forefront of international translational research in neurology. The team is known for his work on the compensatory mechanisms that mask the progression Parkinson's disease, on the pathophysiology of levodopa-induced dyskinesia, on the intimate mechanisms of cell death in Parkinson's disease, on the modelling of disease progression and for the development of new strategies to alleviate symptoms and/or to slow disease progression. Even more important is the translational nature of the work, from bench to bedside, in close proximity with IMNc.

Dynamics of neuronal and vascular networks underlying memory processing

BRUNO BONTEMPI

Our team aims at elucidating the spatio-temporal evolution of memory traces and of their underlying cerebral support during memory processing in healthy and pathological conditions such as Alzheimer's disease. We have made important breakthroughs, such as the identification of early tagging of cortical networks as a prerequisite for the formation of enduring associative memory. We also unraveled some of the molecular mechanisms involved in the formation of remote memories, including the interaction of the CaMKII protein with NMDA receptors known to play a key role in neuronal plasticity. Currently, our research focuses on the functional contribution of NMDA receptors subtypes and of their molecular partners, as well as that of vascular networks, to the stabilization of remote memories during the course of systems-level memory consolidation.

Physiology and pathophysiology of executive functions

THOMAS BORAUD
PIERRE BURBAUD

Our objective is to unravel the neural mechanisms underlying cognitive and motor executive functions. Our main interests are the physiology of the planning, decision making, learning processes and their pathophysiological aspects such as dystonia and obsessive-compulsive disorder. We adopted a phylogenetic approach that drive us to address the question in a broad variety of vertebrates such as salamander, rodents, primates (both human and non-human) and songbirds in order to unravel the emerging complexity of the system studied along the evolution tree. We based our research on system level theoretical models validated by experimental data. Our experimental procedures range from optogenetic approaches coupled with single cell electrophysiology in anaesthetized animals to multiple electrode recording in awake and behaving primates. We also conduct several clinical studies in the fields of dystonia, OCD and Parkinson's disease.

Molecular Mechanisms of Synaptopathies

SANDRA SOUKUP

Neurodegenerative diseases are a major issue for Public Health in Europe and their prevalence will significantly increase worldwide. There is no treatment to cure of effectively reduce the progression for the most common neurodegenerative diseases like Alzheimer (AD) or Parkinson's (PD). Hence, it is essential to understand the early events acting at the initial state of these diseases, before irreversible neuronal damage occurs.

The key question we want to answer is how previously healthy neurons start to die. Interestingly, the decrease in synaptic density is much more accused than the loss of neurons in patients suffering neurodegenerative diseases. For instance, synaptic degeneration is a hallmark in the initial phases of AD and PD.

Therefore, deciphering how synaptic decay precedes neuronal loss is essential to fully understand the earliest steps in neurodegeneration and, by extension, the early onset in neurodegenerative diseases. Identification of central molecular players and pathways acting at the "roots of neurodegeneration" will undoubtedly open new avenues to diagnose and even treat neurodegenerative diseases before the pathological/clinical symptoms start.

To fulfill these aims, we take advantage of the powerful genetic tools available in the "fruit-fly" Drosophila -a successful model to study neurodegeneration and many other human diseases- together with ex vivo models like mouse primary cultures and human induced pluripotent stem cells (iPSC).

Neurofunctional imaging group (GIN)

NATHALIE TZOURIO-MAZOYER

We are a multidisciplinary research team gathering scientists from various domains: mathematics medical imaging, nuclear medicine, signal processing, psychiatry and cognitive neurosciences. Our scientific project ambitions at understanding the determinants of the development of brain networks underlying cognitive functions. In particular, we investigate the anatomo-functional, genetic and cognitive underpinnings of the human brain hemispheric specialization (HS). We recently designed and acquired the Brain Imaging Lateralization & GIN, a unique multimodal database in the world dedicated to the fundamental question of brain connectivity, in particular the roles of intra- and inter-hemispheric connectivity that underlie HS.

AQUITAINE INSTITUTE FOR COGNITIVE AND INTEGRATIVE NEUROSCIENCE - INCIA

The Aquitaine Institute for Cognitive and Integrative Neuroscience (INCIA) brings together researchers specialised in cognitive and integrative neurosciences.

Our Institute, which comprises nearly 60 researchers and faculty members covers various research fields which include cognitive neuropsychology, neuroscience, psychophysics and computational science to address basic scientific themes such as neural network operation underlying adaptive motor behavior, addiction, executive functions, motivation, emotion and memory, perception and attention, cognitive deficits and disability.

The research topics at INCIA range from cellular and circuit properties to behavior and cognition in a wide range of models, from invertebrate to human. This multi-level perspective requires approaches at the crossroads between neuroscience and other disciplines including molecular biology, biophysics and biomechanics, experimental psychology, neuroeconomy and engineering.

BRAIN MOLECULAR IMAGING

JEROME BADAUT

Our translational research is to decode the pathophysiological mechanisms after acute brain injuries (traumatic brain injury and stroke) in order to identify new biomarkers in neuroimaging and therapeutic targets. We focus on the changes in interactions between cells in the neurovascular unit formed in part by the endothelium, smooth muscle layer, astrocyte and neuron. Dysfunctions in the neurovascular unit are contributing to alterations of the blood-brain barrier properties and cerebral blood flow. For this work, we are using a vertical-integrated approach from the molecule such as the glycoproteins of the extracellular matrix to the behavior outcomes and non-invasive neuroimaging (MRI with diffusion tensor imaging, perfusion weighted imaging).

Innovative techniques: pre-clinical models (traumatic brain injury, stroke), magnetic resonance imaging (MRI), Bioorthogonal chemical reporter, neurovascular evaluation.

MOTOR CONTROL & COGNITION

ARNAUD BADETS
THOMAS MICHELET

The main goal of the Motor Control and Cognition team is to understand the link between motor control, motor learning and higher cognitive functions in healthy and pathological conditions. We explore the human capacity to plan different actions and form decisions from an abstract level (e.g number processing) to more concrete situation (e.g the ability to use tools). We also seek to understand the impact of mental effort and consecutive mental fatigue on these activities.

We study behaviour and address its neural underpinnings with electrophysiology, pupillometry, transcranial magnetic stimulation and functional neuroimaging. In addition, we use computational models to emulate the cognitive processes at play.

Memory interacting Networks under Drugs and Stress


DANIEL BERACOCHEA
VINCENT DAVID

Our research is interested in the impact of positive or negative emotions on memory processes and associated neuronal networks. Emotions/memory interactions are studied in normal conditions, but also in chronic pathological states such as stress, alcoholism, aging or during neurodegenerative diseases (Alzheimer). Once the substrates of either beneficial or pathogenic effects of emotions will be better understood, we aim at restoring or improving altered cognitive processes.

Coordination and Plasticity of spinal Generators

SANDRINE BERTRAND

In our team, we aim at studying how the mammalian spinal neural networks produce the locomotor activity. We are particularly interested in (1) how the different intra- and extraspinal neuromodulatory influences received by the spinal motor networks could shape the motor output, (2) to assess the plastic properties of these spinal networks and (3) to understand the interactions between spinal motor networks and other neuronal networks engaged during locomotion such as the axial network, the respiratory network and more recently the sympathetic nervous system in charge of the vascular control. These different points are studied in physiological condition and in pathophysiological situations such as after a spinal cord injury that disconnects the spinal networks from the descending pathways and in a murine model of amyotrophic lateral sclerosis (ALS), a neurodegenerative disease characterized by the loss of spinal motoneurons.

Development of spinal motor networks

PASCAL BRANCHEREAU

The objective of our team is to better understand the mechanisms involved in the construction and maturation of mammal motor networks. We use wild-type (WT) mice and mice models of the disease amyotrophic lateral sclerosis (ALS). We focus our efforts on: 1) understanding, in WT mice, how early spinal motor networks generate a recurrent and powerful spontaneous activity that is necessary for developmental processes, 2) identifying early cellular and molecular mechanisms involved in the motor deficits observed in spinal motoneurons from two ALS mouse models and 3) decipher the implication of stress in the development of pathological motor networks and ALS symptoms.

Neuropsychopharmacology of addiction

MARTINE CADOR

The aim of the team is, using rodent models, to elucidate the factors which favor and aggravate the development of pathologies related to the processing of reward, be they natural (sugar) or pharmacologic (drugs of abuse). The consequences of overconsumption of these rewards during critical periods such as adolescence or during adulthood are studied at the behavioral level (executive functions, emotional memories, motivation..) and at the neuronal level (genetic models, functional neuroanatomy, in vivo electrophysiology, activation/inhibition of neuronal circuits).

Neurobiology of Behavior

YOON CHO

Our team aims at dissecting at the molecular, cellular, synaptic, and network levels, the neural bases of cognitive functions and behaviors in normal and pathological conditions. Special emphasis is placed on multilevel analysis of social behaviors combining genetic, molecular, cellular, and biochemical approaches, as well as in vivo electrophysiological recordings in freely behaving or head-restrained mice.

Searching Targets to Regulate Stress Systems

ANGELO CONTARINO

Our team develops two different lines of research. Using clinically-relevant rodent models, our main objective is to understand the brain mechanisms underlying behavioral disorders and vulnerability to stress induced by drugs of abuse. Notably, we contributed to highlight a key role for the stress-responsive corticotropin-releasing factor (CRF) system in the behavioral and brain alterations induced by drugs of abuse. Besides, we use transgenic Drosophila models to understand the role of neuropeptides in physiology and behavior.

Decision and Adaptation

ETIENNE COUTUREAU
MATHIEU WOLFF

The main scope of our research is to understand the cognitive and neural bases of adaptive decision-making. Successful adaptation to complex and dynamic environments requires flexible use of our current knowledge about the world, including our ability to predict and control events under changing circumstances. These processes can be readily modelled and studied in rodents using approaches founded in experimental psychology and behavioural neuroscience. By employing both descriptive and functional neuroanatomical techniques (viral vectors, chemogenetics), we aim to understand the interplay between cortical and subcortical brain regions in such adaptive cognition. Ultimately, our research will elucidate the foundations of decision-making in the mammalian brain, both in normal and pathological conditions.

Auditory perception

LAURENT DEMANY

Our current research is devoted to the phenomenon of harmonic fusion in normal and hearing-We use psychophysical techniques to clarify the mechanisms of auditory perception in normal and hearing-impaired listeners (including cochlear implant wearers). Our current research is mainly devoted to the phenomenon of harmonic fusion and to automatic change detection in complex acoustic scenes.

Hybrid Sensorimotor Performance (HYBRID)

AYMAR de RUGY

Our team uses hybrid systems, which mix biological control with artificial devices, in order to (i) increase our understanding of sensorimotor control and (ii) exploit this knowledge to restore and optimize movement. Instead of being pre-programmed in the brain, movement coordination largely depends upon multiple feedback loops that operate at different levels of the sensorimotor control system. For instance, muscle mechanics provides an instantaneous functional response to small perturbations, while segmental and transcortical reflexes are able to absorb increasingly larger perturbations by precisely coordinating muscle responses for the complex musculoskeletal design of our limbs. These loops are typically violated in the case of artificial devices, such as with prosthetic limbs whose biomechanics differs from that of original limbs, and which lack sensory feedback. We use a range of closed loop hybrid systems to investigate how these lower feedback loops interact with limb's biomechanics, how they contribute to the production of normal, coordinated movements, and how to improve the design of hybrid control strategies to restore movements.

Neuroimaging and human cognition


IGOR SIBON
JOEL SWENDSEN

The principal objective of our team is to combine advanced neuroimaging techniques and state-of-the-art mobile assessments of daily life behaviors, emotions and cognitive processes in order to understand the etiology and pathophysiology of CNS disorders. MRI allows for the characterization of neural networks involved in cognitive and emotional processes and their dysfunction, assessing the structural and functional integrity both of brain regions and the connections between regions of the brain network. Recent studies have also demonstrated the contribution of jointly using MRI and PET techniques, an approach which opens numerous new opportunities to identify structural and functional brain dysfunction and neuropathological tissue damage. The coupling of imaging data with that acquired through mobile technologies, including cellular telephones and actigraphy, provides highly novel information concerning the daily life correlates of brain markers as well as new perspectives for treatment strategies.

Innovative techniques: multimodal neuroimaging, ecological momentary assessment, mobile cognitive testing, actigraphy.

Organization and adaptability of motor systems

MURIEL THOBY-BRISSON

By combining behavioral analysis with electrophysiology, dynamic clamp, functional imaging, and neuroanatomy technology, our team's overall research objective is to decipher the neuronal basis of the short- and long-term functional plasticity of motor systems, with the principal experimental goal of trying to relate cellular, synaptic and neural network physiology to particular aspects of adaptive behaviors. Using three complementary animal models, from invertebrate to mammal, we analyze the intimate interactions between intrinsic and neuromodulatory processes in shaping either spontaneous or sensory-evoked motor programs, and controlling their lifespan adaptations.

BORDEAUX neurocampus NutriNeuro

NUTRITION AND INTEGRATIVE NEUROBIOLOGY - NUTRINEURO

NutriNeuro (Nutrition and Integrative Neurobiology) is a research unit with more than 80 scientists, clinicians and students trained in Neuroscience and Nutrition. Since its creation in 2011, the number of scientists in this unit has grown steadily thanks to its dynamism and attractiveness. The research programs conducted at NutriNeuro are multi-disciplinary and translational to tackle significant societal challenges in the promotion of brain health: How nutrition influences the brain functioning and protects from mood and cognitive disorders? Can we decipher the mechanisms of nutrients (sugar, fatty acids, vitamins, polyphenols) sensing in the brain? How does nutrition contribute to the physiopathology of depression or protect against cognitive decline? What are the links between obesity, stress and cognition in adolescents?

In 2014, NutriNeuro developed a transfer research unit (NutriBrain) to set up partnerships with industries and to promote innovation and transfer. Finally, NutriNeuro has developed a unique partnership with Laval University in Quebec City through the International Associated Laboratory (LIA) OptiNutriBrain. This innovative and original research at the interface of Neurosciences and Nutrition gives NutriNeuro a unique position in France.

NUTRITION AND PSYCHONEUROIMMUNOLOGY: EXPERIMENTAL AND CLINICAL APPROACHES


LUCILE CAPURON
SOPHIE LAYE

Axis 1: depression :

Our multidisciplinary team aims at understanding how nutrition may modulate brain functions and vulnerability to psychiatric disorders with a particular attention paid to major depression. We test the hypothesis that Western diet, diabetes or obesity through the modulation of inflammatory and metabolic pathways participate to the pathophysiology of depression and impact response to antidepressant treatments. We are currently exploring the specific role of: i) enzymatic pathways involved in inflammatory processes, such as the indoleamine2,3-dioxygenase (IDO) and the guanosine triphosphate cyclohydrolase 1 (GTP-CH1) ; ii) gut-brain axis dysfunctions and iii) early life stress in the pathophysiology of depression in a context of altered nutritional status. For this purpose, we adopt a translational research approach from humans to animal models and vice versa, combining the skills and expertise of researchers and clinicians.

Axis 2: Molecular and cellular mechanisms of nutrients/micronutrients in the brain; role in mood and cognitive disorders (Equipe FRM) :

The research program develop aims to unravel the mechanisms underlying nutrients (sugar, fatty acids, amino-acids) and micronutrients (vitamins) activities in the brain, at the cellular (neurons, microglia) and brain circuit level. This knowledge will help to decipher how nutrition promotes brain health and protects from mood and cognitive disorders. We study in particular how:

1 / Omega 3 and their metabolites (oxylipins, endocannabinoids) regulate neuroinflammation and neuronal networks (focusing on the hippocampus and fronto-striatal circuits),

2/ sugar (glucose, fructose) control of food intake (hypothalamus) and emotional behavior (raphe nucleus)

3/ micronutrients or plant extracts protect from cognitive decline, with clinical approaches developed in aged subjects with V Pallet (team 2).

Nutrition, memory and glucocorticoids


MARIE-PIERRE MOISAN
GUILLAUME FERREIRA

The objective of our team, in a perspective of healthy brain aging, is to better understand how unbalanced diets alter memory processes, and how specific micronutrients (vitamins, polyphenol) prevent memory decline. Two populations vulnerable to memory decline are targeted: obese children/adolescents and elderly. At the mechanistic level, the impact of nutritional status on glucocorticoid and endocannabinoid regulation is specifically studied knowing that they are critical for memory processes and metabolic response to nutrition. These scientific questions are tackled through animal models using behavioral , molecular and cellular analyses but also throgh clinical studies (FUI Nutrimémo, FUI Neurophénol, PHRC Corticodiab, ANR Obeteen, ANR ORUPS, LabEx Brain Clinique Obeteen, LabEx Brain HippoMeal).

BORDEAUX neurocampus SANPSY

Sanpsy

The SANPSY unit, created in 2011, is located at the CHU Pellegrin and a few steps from the Charles Perrens psychiatric hospital. It is composed of 27 people, under the direction of Pierre Philip.

This clinical research unit focuses specifically on sleep, addiction and neuropsychiatric diseases. The unit has a platform equipped with a sleep recording chamber and virtual reality equipment (flight simulators and driving, Controlled Automatic Virtual Environment (CAVE) funded by EquipEx Project «PHENOVIRT», etc. .). This virtual environment allows to study the effects of sleep deprivation and fatigue on attention, cognitive functions and accident risks.

The main goals of Sanpsy are to understand the determinants of somnolence and attention disorders in patients. Researchers are also working on the relationships between sleep disorders and psychiatric conditions, particularly addiction, craving, depression, and Attention Deficit Hyperactivity Disorder (ADHD).

GENPPHAASS (Study group of neurophysiology, pharmacology, sleep and sleepiness)

PIERRE PHILIP

This team is devoted to study Sleep and Neuropsychiatric disorders with a specific emphasis on new technologies (E-health) and computer sciences, human behaviors, biological and psychological markers, pathophysiological mechanisms and consequent risk factors impacting daily life functions of healthy subjects and patients.

Addiction

MARC AURIACOMBE

We study substance and non-substance addiction and have developed a human model of addiction. Our studies tend to better characterize the common phenomenology accross addictions and its determinants, using a multidisciplinary approach (clinical neurobiology, epidemiology, psychology and sociology), with a special interest on craving and its behavioral correlates. The main research tool is an open prospective cohort (ADDICTAQUI) started in 1994, of over 3500 patients requesting treatment for addiction. Innovative techniques: Patient prospective cohort, Addiction Severity Index, Ecological Momentary Assesment

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