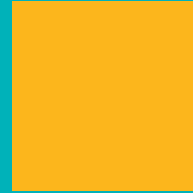
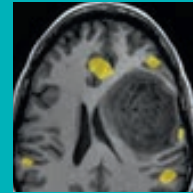
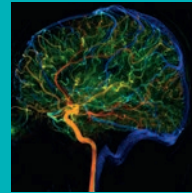
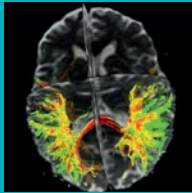
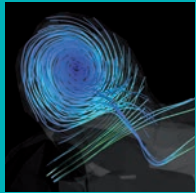


Clinical Research • Psychiatry • Neurosciences  
Translational Research • Reversible Continuum  
Pre-clinical / Clinical / Public Health Research  
Basic Research • Collaborative Research



## Research at the Centre Hospitalier Sainte-Anne Psychiatry and Neurosciences

RESEARCH ACTIVITY REPORT 2016

- 3** History of research at CHSA
- 4** The topics and domains of research
- 6** The advantages of the Sainte-Anne site for research
- 12** Typology / qualification and regulatory procedures of clinical research projects
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## The CH Sainte-Anne and its research activity

*The Sainte-Anne site has been at the forefront of major discoveries, advances and innovations in scientific and biomedical matters in the domain of fundamental and clinical psychiatry and neurosciences.*

*A pioneer amongst non-teaching hospital centres, the CH Sainte-Anne has the advantage of being a hospital specialising in brain disorders, combining different departments of psychiatry, child psychiatry and clinical neurosciences. Sainte-Anne, a unique site of interaction between psychiatry and neurosciences, covers a large population and a high number of active records (more than 34,000 patients treated every year at the hôpital Sainte-Anne).*

*Headquarters of the Regional Hospital Group (GHT - Groupement Hospitalier de Territoire) "Paris-Psychiatrie et Neurosciences", the CH Sainte-Anne is at the heart of Parisian psychiatric challenges and referrals for neurosciences. Lastly, Sainte-Anne also intends to strengthen its bonds with other actors in biomedical research, and especially with the Inserm (through the New Psychiatry and Neurosciences Centre) and the Pasteur Institute, with which Sainte-Anne is currently affiliated. The goal of the "Paris – Psychiatrie & Neurosciences" GHT is to find ways to better describe and to gain a better understanding of the brain and its disorders (pathophysiology) in order to ensure better prevention and better healthcare, owing to its strategic vision of integrating basic as well as clinical research in Psychiatry and Neurosciences. Sainte-Anne intends to continue to contribute to medical progress and innovation, with the goal of offering its patients rapid access to the latest innovations in diagnostic techniques, preventive medicine, the development of new treatments as well as innovative and effective treatment strategies.*

*This brochure, drafted by our Delegation to Clinical Research and Innovation (DRCI), draws up an overview of the research activity of CH Sainte-Anne and provides a glimpse of the advantages and potential of the Sainte-Anne site for biomedical research (basic and clinical).*

Céline Bez, Khaoussou Sylla



Sainte-Anne was ground zero for a major event in modern psychopharmacology: in 1952, Jean Delay and Pierre Deniker discovered the antipsychotic properties of Chlorpromazine (Largactil), a phenothiazine used in surgery by Henri Laborit for enhancing anaesthetics. The studies of these Sainte-Anne doctors had a resounding impact on the medical treatment of psychosis via the use of the first neuroleptic drugs and revolutionised treatment by proposing the first classification of psychotropic drugs.

In the Sixties and the Seventies, Jean Talairach and his colleagues threw together the basics of brain surgery in stereotactic conditions (technique used in neurosurgery for reaching areas of the brain with a high degree of precision).

In the Eighties, Sainte-Anne was also the site of the characterisation of the third dopamine receptor (an important brain neurotransmitter involved in the control of motor, emotional and cognitive functions) by Jean-Charles Schwartz and his team. This D3 receptor differs from the D1 and D2 receptors in its location in the brain and its pharmacology (Sokoloff P et al., Nature 1990 ; 347: 146-51).

Since then, Sainte-Anne's research teams have continued to be pioneers in research (basic and clinical) in domains such as: major psychiatric disorders (psychosis, schizophrenia, depression, mood disorders), addictions, eating disorders, neurophysiology and experimental neuropathology, neuroimaging, stroke and cognitive disorders related to ageing and neuro-oncology / Epileptology.

**Sainte-Anne, laureate at the 20 years of the Clinical Research Hospital Programme (PHRC - Programme Hospitalier de Recherche Clinique).**

CH Sainte-Anne's excellence in clinical research was recognised during the 20 years of the Clinical Research Hospital Programme (PHRC), where Pr. Jean-Louis Mas (head of department of Neurology) was the prize winner for the "EVA-3S" study.



14 March 2013- Ministry of Health



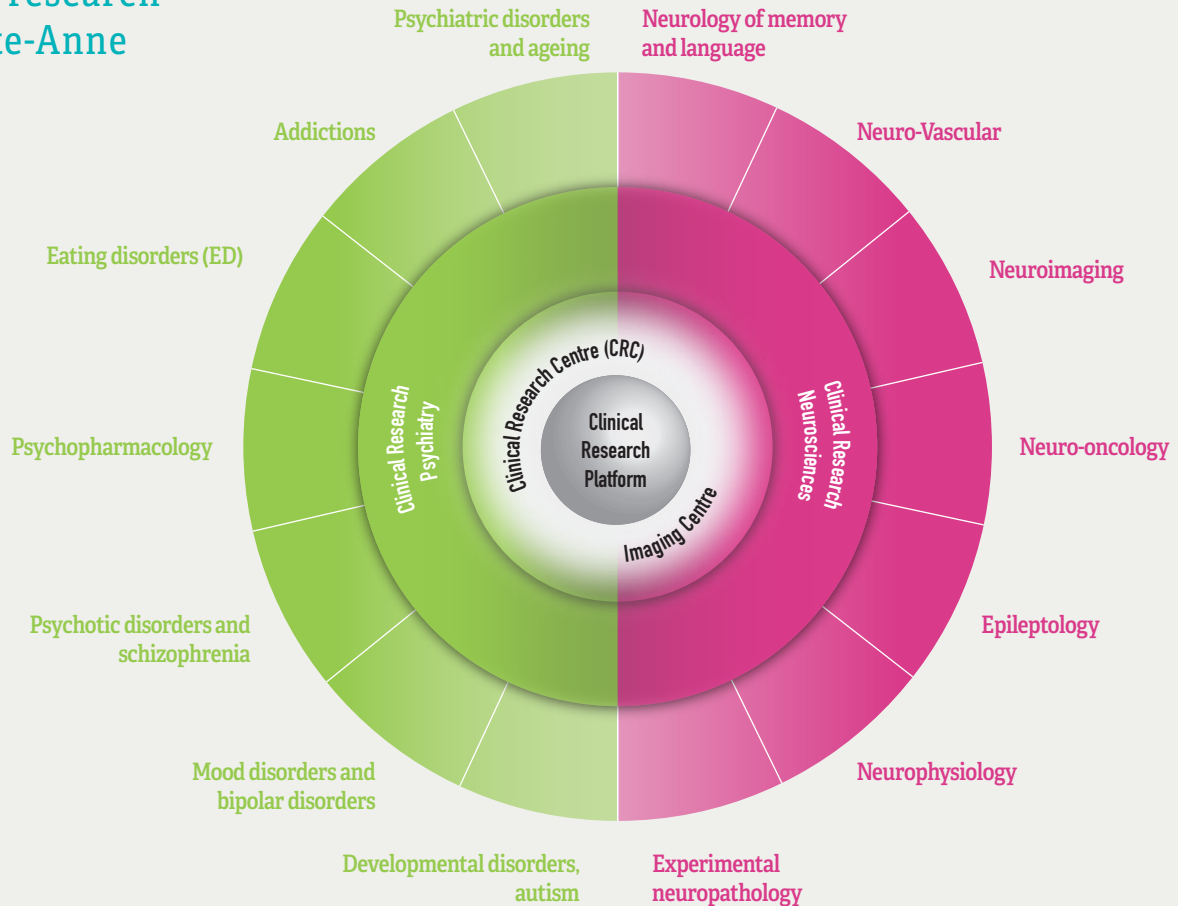
## History of research at CHSA



SHU-AUDIOVISUAL CHSA COMMUNICATION

**A site for excellence in matters of research**

# The topics and domains of research at CH Sainte-Anne



# Psychiatry

- Pathophysiology and psychotic disorders, schizophrenia, bipolar disorders, developmental disorders, depression
- Pharmacological model of psychosis: study on reasoning and decision making in the modelling of psychosis mediated by Ketamine
- Factors of vulnerability to psychiatric disorders
- Factors of vulnerability to addictive disorders (phenotypic, developmental and genetic analyses of addictive behaviour)
- Eating disorders (ED)
- Evaluation of the benefits of Cognitive Remediation Therapy (CRT) in the treatment of psychosis (patients with stable schizophrenia)
- Evaluation of Cognitive Behavioural Therapy (CBT) in subjects at risk of psychosis
- Mental disorders and Ageing (autobiographical memory loss in pathological ageing)
- Study of autobiographical memory in a subject suffering from gender dysphoria
- Child psychiatry (autism spectrum disorders, learning disorders, cognitive remediation therapy)
- Psychiatry and precariousness

# Neurosciences

- Vascular neurology
- Neurophysiology
- Neuro-oncology
- Neurology of memory and language
- Epileptology
- Experimental neuropathology
- Neuroimaging

## Thematic links between Neurosciences & Psychiatry

- Brain Banking “Mental Pathology”
- Development of neuromodulation: connected to neuroimaging and neurophysiology
- Neuropsychological approaches to neuropsychiatric cognitive deficits

# The advantages of the Sainte-Anne site for research

## OBJECTIVE: AN INTEGRATED RESEARCH SITE

→ strengthen the “reversible continuum” between preclinical, clinical, translational and public health research.

**A strategic vision integrating all biomedical research: preclinical, clinical, translational as well as public health (epidemiology, etc.) in the domains of Psychiatry and Neurosciences.**

## PRE-CLINICAL RESEARCH

The CH Sainte-Anne has the essential advantage of being a basic research centre backed with the clinical teams of the hospital, the active records of patients and clinical research facilities (Brain imaging centre, biological resources and collections), and aims at studying:

- the pathophysiology of psychiatric diseases (schizophrenia, mood or behavioural disorders),
  - the vulnerability related to addictive and psychiatric disorders
  - cerebrovascular accidents (strokes), cognitive disorders related to cerebral ageing
- It also involves developing new therapeutic approaches and identifying cognitive or predictive markers.

## TRANSLATIONAL RESEARCH

The Centre Hospitalier Sainte-Anne is a unique example of a hospital that is wholly dedicated to mental and neurological diseases, and has developed an original translational research on the basis of the combined expertise of clinicians and researchers who are in direct contact with the patients and their family. It involves translating the knowledge gained from basic research to clinical knowledge, or vice-versa by contributing to developing scientific questions using clinical observations.

## CLINICAL RESEARCH

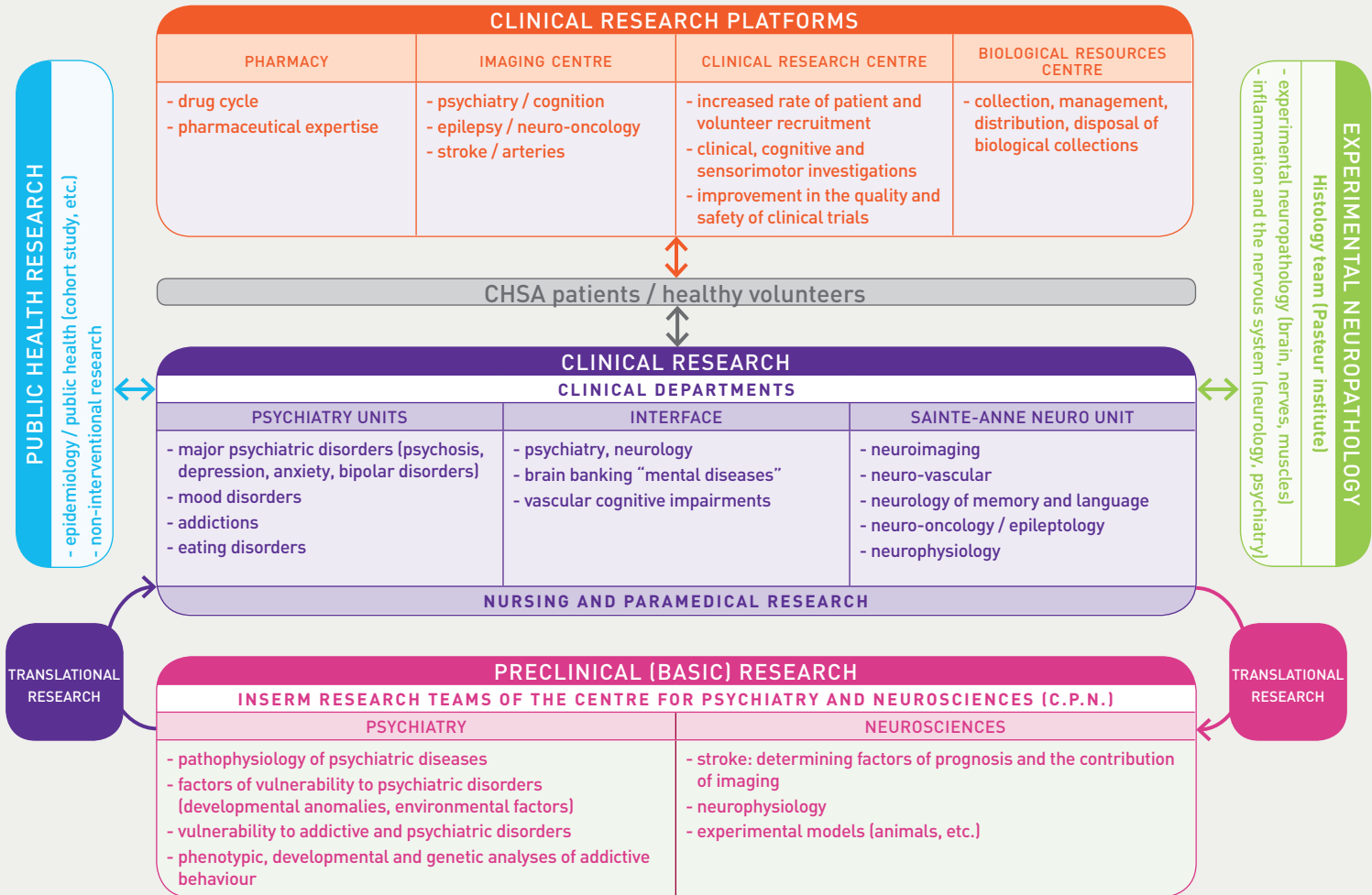
- Psychiatry (psychotic disorders, schizophrenia, bipolar disorders, depression, addictions and eating disorders)
- Neurosciences (Neurovascular, neurology of memory and language, neurophysiology, Epileptology, Neuroimaging, Neuro-oncology, experimental neuropathology)

## PUBLIC HEALTH RESEARCH

The Public Health theme, also present in Sainte-Anne, simultaneously includes all of the scientific disciplines that contribute to clinical and public health research:

- observational studies (epidemiology, cohort studies, etc.)
- studies on health data
- medico-economic studies
- studies in humanities and social sciences

# STRUCTURING OF RESEARCH AT THE CENTRE HOSPITALIER SAINTE-ANNE



# CHSA BIBLIOMETRIC INDICATORS: KEY FIGURES FOR THE PERIOD (2008-2016)

## NUMBER OF CHSA PUBLICATIONS PER YEAR

Year	Number of publications
2008	200
2009	156
2010	151
2011	152
2012	142
2013	163
2014	158
2015	168
2016	190
Total	1480

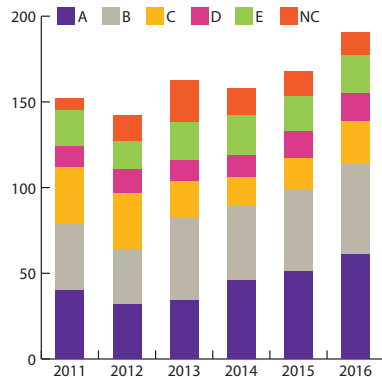
Source : SIGAPS

## NUMBER OF CHSA PUBLICATIONS PER YEAR AND PER CATEGORY

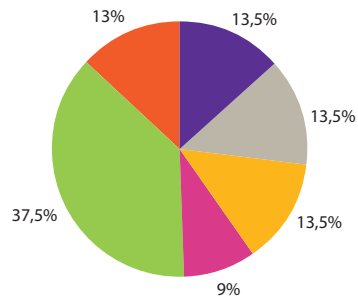
Year	A	B	C	D	E	NC	Total	Score
2008	27	27	27	18	75	26	200	1850
2009	30	19	31	14	47	15	156	1532
2010	40	28	32	14	26	11	151	1690
2011	40	39	33	12	21	7	152	1779
2012	32	32	33	14	16	15	142	1473
2013	34	48	22	12	22	25	163	1704
2014	46	43	17	13	23	16	158	1837
2015	51	48	18	16	20	15	168	1745
2016	61	53	25	16	22	14	190	2195
Total	361	337	238	129	271	144	1480	15805

Source : SIGAPS

## NUMBER OF PUBLICATIONS PER YEAR AND PER CATEGORY

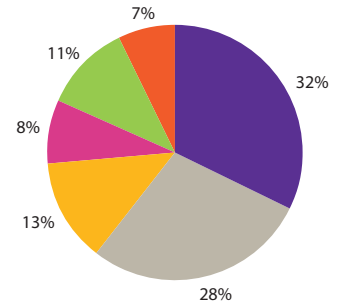


## CATEGORY-WISE DISTRIBUTION IN 2008



Publications categories (A,B,C)= 37%  
Publications categories (D,E,NC)= 63%

## CATEGORY-WISE DISTRIBUTION IN 2016



Publications categories (A,B,C)= 68%  
Publications categories (D,E,NC)= 32%



## CHSA BIBLIOMETRIC INDICATORS: KEY FIGURES FOR THE PERIOD (2008-2016)

These various graphs show a constant rise in the quality of the publications of the CHSA teams during the period 2008-2016:

- rise in the portion of high-quality publications (categories A, B and C)
- reduction in the portion of medium and low quality publications (categories D, E and NC).

### NUMBER OF PUBLICATIONS PER UNIT (period 2012 – 2016)

Pôles	Number of publications
Neuro-Sainte-Anne	353
S14+S15+S16+ ADDICTO	135
CMME-DIM	93
MEDICO-TECH	56
S3+S13+IJ6+IPP	13
S17+S18+ IJ8.	20
CP0A-soins somatiques	2
médico-social	2
SMPR	0
OTHER	1

Source : SIGAPS

### RESEARCH INDICATORS OF THE UNITS (Number of publications and SIGAPS score and Impact factor) of the CHSA; Period 2012-2016

Pôles	Number of publications	Score SIGAPS	Rang A	Rang B	Rang C	Rang D	Rang E	NC
Neuro-Sainte-Anne	<b>353</b>	<b>4317</b>	120	103	40	33	29	28
S14+S15+S16+ ADDICTO	<b>135</b>	<b>1301</b>	20	31	27	9	33	15
CMME-DIM	<b>93</b>	<b>877</b>	7	30	18	12	15	11
MEDICO-TECH	<b>56</b>	<b>483</b>	19	20	4	1	4	8
S3+S13+IJ6+IPP	<b>13</b>	<b>79</b>	0	2	0	1	7	3
S17+S18+ IJ8.	<b>20</b>	<b>180</b>	3	8	0	1	5	3
CP0A-soins somatiques	<b>2</b>	<b>12</b>	0	0	0	0	2	0
médico-social	<b>2</b>	<b>11</b>	0	0	0	1	1	0
SMPR	<b>0</b>	<b>0</b>	0	0	0	0	0	0
OTHER	<b>1</b>	<b>3</b>	0	0	0	0	0	1

Source : SIGAPS

For each discipline, the reviews were classified and then distributed into 6 categories:

A: excellent

B: very good

C: average

D: poor

E: very poor

NC: journal with no Impact Factor (in general, a national review or conference proceedings).

## HISTORY OF CHSA PROJECTS FUNDED BY THE PHRC

PROJECT SPONSOR	YEAR	FULL TITLE OF THE PROJECT	ACRONYM	MAIN INVESTIGATOR	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
PHRCN	1995	Prospective study of the risk of relapse of cerebral infarction in patients having a foramen ovale and/or an aneurysm of the interatrial septum	FOP/ASIA	Pr Jean-Louis Mas										
PHRCN	1997	Endarterectomy versus Angioplasty in patients having a symptomatic severe atherosclerotic carotid stenosis	EVA3S	Pr Jean-Louis Mas										
PHRCN	1998	"Prospective study on the development, over 2 years, of adolescents and young adults hospitalised for the first time in psychiatry wards"		Dr Spadone / Dr M.F.Poirier										
PHRCN	2001	Intermittent chronic stimulation of the vagus nerve in drug-resistant partial epilepsy in adults: evaluation of the impact on the quality of life and the cost-benefit ratio		Pr F.X Roux / Dr Elisabeth Landré										
PHRCI	2001	Genetic predisposition to coronary atherosclerosis: role of the ECE1 gene		Dr Benoit Funalot (Neurologie)										
PHRCN	2002	Prospective study of the risk of relapse of cerebral infarction in patients having patent foramen ovale and/or an aneurysm		Pr Jean-Louis Mas										
PHRCN	2002	High-resolution MRI of atherosclerotic stenosis of the internal carotid artery	HIRISC	Pr E Touze / Pr C Oppenheim										
PHRCN	2005	Evaluation of the impact of a telephone hotline service on the incidence of suicide attempts among borderline patients	borderline	Dr Guelfi / Pr Rouillon / Dr Pham										
PHRCN	2007	Influence of Cannabis on the emergence of psychopathological symptoms in Adolescents and young Adults having an at-risk mental state	ICAAR	Pr Marie-Odile Krebs										
PHRCN	2007	Patient compliance with the treatment in schizophrenia: study of determining factors in natural conditions	Observance	Pr Franck Baylé										

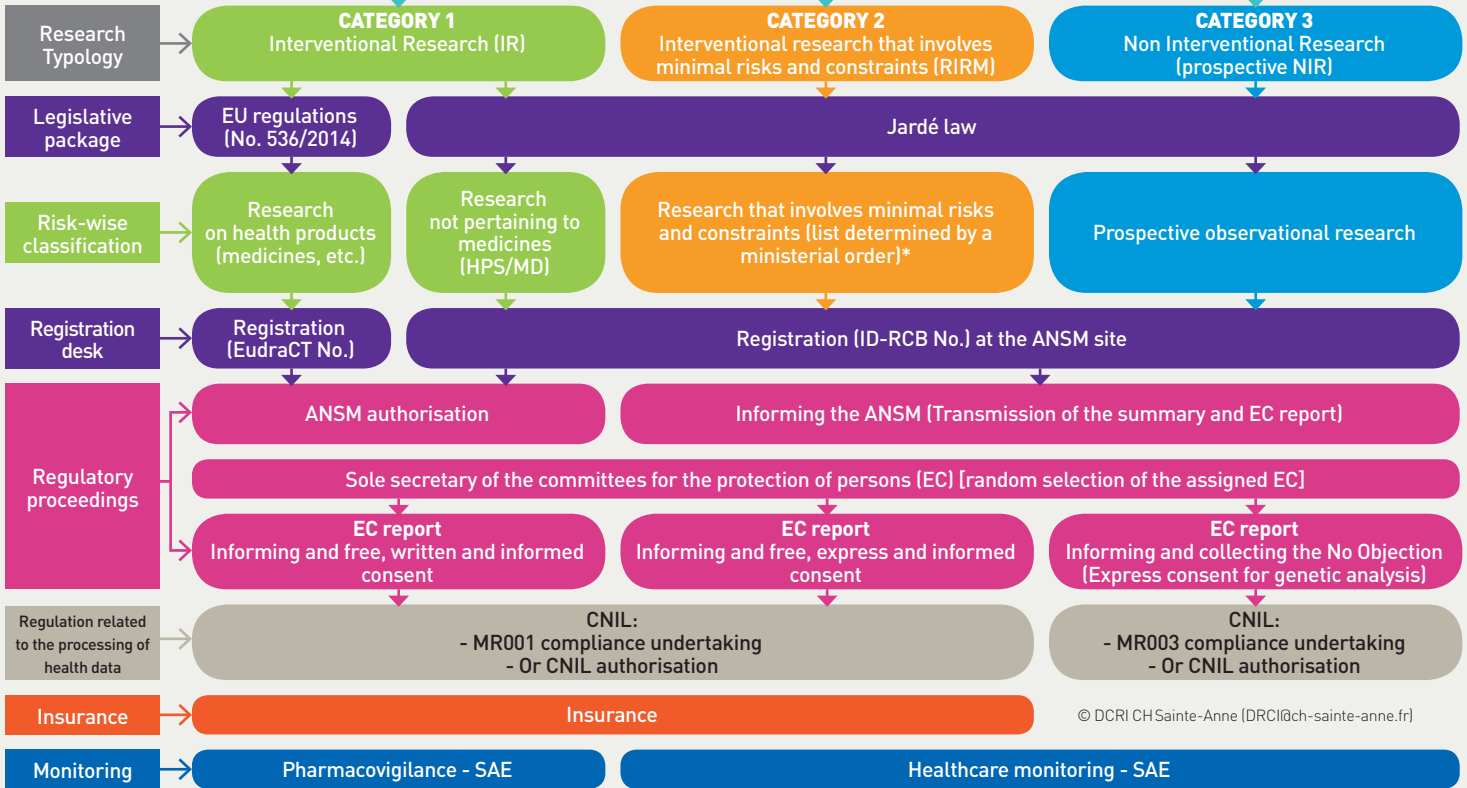
# HISTORY OF CHSA PROJECTS FUNDED BY THE PHRC

PROJECT SPONSOR	YEAR	FULL TITLE OF THE PROJECT	ACRONYM	MAIN INVESTIGATOR	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
PHRCI	2008	Treatment of severe chronic or recurring resistant depression by implanted cortical stimulation		Dr Baris Turak										
PHRCN	2008	Clinical, phenotypic and genetic markers of suicidal behaviour in anorexia nervosa	ENDANO	Pr Philip Gorwood										
PHRCN	2008	In search for lost time: Functional MRI study of autobiographical memory in normal and pathological ageing	NEMAUVI	Dr Thierry Gallarda										
PHRIP	2010	Impact of a nursing practice focused on body perception in anorexia nervosa	PIPA	Cécile Bergot / Dr A. PHAM										
PHRCN	2011	Being yourself in the other sex: Functional MRI study of autobiographical memory in subjects suffering from gender dysphoria	TRANSMEM	Dr Thierry Gallarda										
PHRCN	2013	Stress in young subjects having an at-risk mental state: efficacy of cognitive behavioural therapies	START	Pr Marie-Odile Krebs										
PHRCI	2013	Depersonalisation disorder: therapeutic efficacy of neuronavigated repeated transcranial magnetic stimulation of the right angular gyrus	PERSONA	Dr Marion Plaze										
PHRCN	2013	Characteristics of non-Alzheimer hippocampal sclerosis with progressive amnesia	SHATAU7	Pr Marie Sarazin										
PHRCN	2014	Endarterectomy and optimal medical treatment versus optimal medical treatment in patients suffering from asymptomatic carotid stenosis at a higher than normal risk of ipsilateral cerebral infarction	Actris	Pr Jean-Louis MAS										
PRME	2015	Pre-hospital initiation of the arterial re-canalisation treatment of acute cerebral infarction: randomised medical and economic evaluation of a mobile neurovascular unit	Asphalt	Dr. Guillaume TURC / Pr. Jean-Louis Mas										

Completed
  Inclusion
  Follow-up
  Preparation

Research involving human subjects (RIPH)

Sponsor



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ANSM: French Agency for the Safety of Medicines and Health Products | CNIL: French Committee on data protection and liberties | EC: Ethics Committee | DM: Medical Device | SAE: Serious Adverse Event | HPS: Non-Medicinal Products | MR001/002: Reference Methodology | IR: Interventional Research | RIPH: Research involving human subjects | RIRM: Interventional research that involves minimal risks and constraints | NIR: Non Interventional Researches

# PROCEEDINGS

Research pertaining to existing data (already collected: health data and/or existing biological collections, databases, theses/dissertations on medical records, etc.)

Manager

Retrospective Non Interventional Research (NIR)

Law on the Modernisation of the Healthcare System or MSS (Touraine law of 2016) / The revision of the Data protection and Liberties law

Retrospective studies pertaining to health data  
(health data / existing biological collections / post-MA health products / MD with CE marking)

Secretary of the French Institute for Health Data (INDS)\*\* for registration and assignment

Reuse of healthcare data that was previously acquired for another purpose

Expertise Committee for Research, Studies and Evaluations in the domain  
of Health (CEREES) for its opinion

CNIL for authorisation

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MA: Marketing Authorisation | CEREES: Expertise Committee for Research, Studies and Evaluations in the domain of Health | CNIL: French Committee on data protection and liberties | EC: Ethics Committee | DM: Medical Device | INDS: French Institute for Health Data | MR003: Reference Methodology 003 | MSS law: Law on the Modernisation of the Healthcare System (Touraine law of 2016) | NIR: Non Interventional Research

## LIST OF INTERVENTIONS THAT INVOLVE MINIMAL RISKS AND CONSTRAINTS (RIRM)

This annexe contains the list of interventions that involve only minimal risks and constraints, without prejudice to the provisions laid down in the second paragraph of Article 1 of the order of 02 December 2016:

**1.** Random assignment of act(s), medical or diagnostic strategies or intervention(s) to a person, or to a group of persons.

**2.** Administration of products when the conditions of use of these products comply with their intended use and their normal conditions of use.

**3.** Administration of medicines in accordance with their marketing authorisation or with conclusive and substantiated data from scientific publications concerning their safety and efficacy. In accordance with Article 1 of this order, these medicines cannot be the subject of the research.

**4.** Execution of acts that are commonly practised as part of research.

**5.** Drawing and collection of blood in accordance with the following conditions:  
The volume of the sample is defined based on the person's weight. It may be drawn:

- by puncturing a peripheral vein, for the purposes of the research or for treatment;

- by puncturing an artery for a sample taken for treatment;

- by capillary puncture of the finger, heel or ear;

- on the umbilical cord after birth and before delivery, or during pregnancy for a sample taken for treatment.

**6.** Sampling and collection of biological samples, other than blood, specifically for research purposes.  
(the number, volume and/or size of the collected biological samples are justified in the research protocol):

- collection of excreta: urine (including after catheterisation), sweat, faeces, saliva, sputum (including induced sputum), sperm, colostrum, breast milk and meconium;

- collection of amniotic fluid alongside the samples taken for treatment;

- swabbing or collection of secretions of the skin, the nose and the nasopharynx, the ears and the ear canal, the eye, the buccal cavity including the oropharynx, the anal opening, the vagina and the cervix, open wounds, other openings such as stoma.

- collection of fragments of nails, hair or body hair with the roots;

- collection of any kind of effusion alongside the samples taken for treatment;

- collection of teeth fragments taken for treatment;

- superficial skin biopsies, excluding biopsies of the face and folds;

- samples of tissues or expanded or additional biopsies taken during medico-surgical interventions performed for treatment;

- cerebrospinal fluid: collected alongside a sample taken for treatment;

## 7. Collection techniques and collection of data using sensors or imaging methods:

GENERAL CONDITIONS		COLLECTION TECHNIQUES	
- these techniques do not involve breaking the skin or mucous barrier, and are performed in accordance with the manufacturer's recommendations or the instructions for use of the devices that are used;	- the collection can be taken, depending on the research protocol, after moderate muscle exercise or other normal activities of daily life;	- electric or electromagnetic measurements or recordings, by non-invasive sensors, and especially by electrocardiogram (ECG), electroencephalogram (EEG) (especially neurofeedback), polysomnography, electromyogram (EMG), magnetoencephalography (MEG), magnetocardiography, electrooculography, tensiometry, transcutaneous measurements, force sensors, motion sensors or range of motion sensors;	- anthropometric measurements;
- collection of measurements during sensory or sensorimotor	- collection in modified environmental conditions;		- measurements by bio-impedancemetry, indirect calorimetry;
- collection in a virtual environment or a simulator;	- the measurements can be taken on an outpatient basis.		- non or minimally invasive imaging, not involving the injection of contrast mediums or radiopharmaceuticals, especially by standard X-rays, scanners, magnetic resonance imaging (MRI), ultrasonography, blood flow measurement, Doppler tests, spectroscopy;
<b>8. Medical interventions and examinations, rehabilitation nursing and/or medico-technical care in accordance with decree No. 2004-802 of 29 July 2004, relating to parts IV and V (regulatory provisions) of the public health code and amending certain provisions of the code published in the Official Journal No. 183 dated 9 August 2004.</b>		- collection by at least partially intracorporeal sensors, especially pulmonary function testing (PFT), endoscopy;	- collection of electrophysiological data through devices that are implanted or being implanted for treatment.
		- collection of intracorporeal pressures by balloon, probe or sensor;	

## 9. Medical techniques for treatment:

external stimulations (mechanical, electric or magnetic, such as transcranial direct current stimulation [tDCS] or transcranial magnetic stimulation [TMS] with the following limits:

- tDCS complying with the following conditions: duration  $\leq$  40 minutes, intensity  $\leq$  4 mA, Charge  $\leq$  7.2 C;

- Single-pulse or paired-pulse TMS, regardless of the frequency;

- Repetitive TMS (rTMS) at a frequency of less than 10 Hz.

## 10. Psychotherapy and cognitive behavioural therapy techniques.

## 11. Research on changes in practices caused by:

- a new organisation and/or standardisation of the treatments;

- implementation of recommendations issued by official bodies such as the Haute Autorité de Santé (French National Authority for Health), learned societies or consensus or expert conferences;

- implementation of programmes aimed at improving the health condition of the population (education, nutrition);

- training of medical and paramedical staff for research purposes, especially the training of practitioners using a simulator.

**12. Interviews, questionnaires and their results, in accordance with the protocol, may result in a modification of the normal treatment of the participant that no longer falls under the scope of the non-interventional research.**

# SAINTE-ANNE NEURO CENTRE



The Sainte-Anne Neuro centre is made up of the departments of neurology, neurosurgery, anaesthesia-revival, dental surgery, physical medicine - rehabilitation, neurophysiology, neuropathology and imaging. It is the adult neurosciences centre of the faculty of medicine at Paris Descartes; with new nominations, six departments will become teaching hospitals in 2017.

The main areas of clinical activity at the centre are: cerebrovascular pathology, neuro-oncology, epileptology, neurological disorders, memory and language disorders and spinal pathologies.

## TOPIC 1 NEURO-VASCULAR

Stroke is a major focus of the neurosciences centre of CHSA, which has all services needed for an optimum treatment of patients suffering from this illness. A university research team (EA 4055) on stroke was created in 2006 by Pr JL Mas. This team was certified by the INSERM in 2009 and extended for 5 years in 2014, following an A+ evaluation by the AERES. The head of this team (Prof. JL. Mas) and Prof. H. Chabriat (Lariboisière Hospital) jointly manage the NeuroVasc Teaching Hospital Department (DHU - Département Hospitalo-Universitaire) of Paris Sorbonne Cité.

The goals of this research team are: (i) to identify (or better define) the determining factors of prognosis of stroke in terms of response to treatments of the acute phase, the risk of cerebrovascular relapse and the consequences of brain injuries of vascular origin (neurological recovery, post-stroke depression, cognitive decline); (ii) to evaluate the risk-benefit profile of new therapeutic strategies as part of academic randomised clinical trials; (iii) to develop proof-of-concept studies as a prelude to large-scale clinical trials.

## TOPIC 2 INNOVATIVE DIAGNOSTIC AND THERAPEUTIC TOOLS IN NEURO-ONCOLOGY

- From January 2016 onwards, a functional unit for surgical neuro-oncology was created in the neurosciences centre, alongside the creation of the new research team IMA-BRAIN. It is headed by Prof. J. Pallud. The functional unit develops innovative and non-invasive diagnostic tools and new therapeutic methods for optimising the resection of brain tumours.
- The research will focus on:
  - 1) cohort studies for validating the diagnostic relevance of the developed tools (multimodal imaging, optical imaging) in comparison with the standard technique for neuropathology;;
  - 2) cohort studies for validating the diagnostic relevance of the developed tools (multimodal imaging, optical imaging) in comparison with the standard technique for neuropathology;

## TOPIC 3 IMAGING OF THE EPILEPTOGENIC AND FUNCTIONAL NETWORKS GENETICS AND INFLAMMATION IN EPILEPTOLOGY

- The functional unit for surgical epileptology of the neurosurgery department, headed by Dr. F. Chassoux, has developed a multimodal imaging IRM-PETscan (with SHFJ-CEA, Orsay) focusing on the pre-surgical assessment of focal epilepsy, minimally invasive and innovative surgical treatments (stereotactic thermocoagulation) and participates in multiple research protocols (PREDICT, ULYS, COMET, EPI-DEV, GEN-DYS, VIR-DYS, STIC France, initiated at the CHSA or in partnership with external agencies – SHFJ-CEA, UMRS 975, ICM, virology department, Hôpital Cochin, U663, CHU de Grenoble – )



- The future research program has multiple areas of focus:

- 1) a clinical leaning with a multimodal and multidisciplinary approach for diagnostic purposes (morphological, functional, metabolic neuroimaging), prognosis including the cognitive aspects and concurrent psychiatric disorders, and a basic and translational leaning, using human epileptic tissue obtained during cortical excisions performed for therapeutic purposes;
- 2) new therapeutic strategies based on the identification of specific biomarkers and targets of drug resistance, phenotyping of resection specimens, in vivo / in vitro correlations, genetics of cortical lesions;
- 3) the development of operative ultrasound and optical imaging - two-photon autofluorescence, full-field OCT, functional ultrasound and elastography - in partnership with the IMNC (CNRS, Orsay), ESPCI - Langevin institute (Waves and Images for Medicine laboratory);
- 4) new non-invasive neurophysiology techniques (EEG-HR, MEG) with the Clinical Neurophysiology department (Pr Martine Gavaret).

The common topics of epilepsy imaging in neuro-oncology and neuro-development could be an area of focus for IMA-BRAIN.

## TOPIC 4 ALZHEIMER'S DISEASE AND RELATED DISORDERS

Alzheimer's disease is the primary aetiology of neurodegenerative disorders. A primary cause of serious dependency, it represents a major challenge for public health. The Neurology of Memory and Language (NML) unit was inaugurated in September 2013. Organised as a multidisciplinary outpatient activity, the memory evaluation centre was certified by the ARS. The NML unit belongs to the network of expertise centres for early onset Alzheimer's (advance consultations) and rare forms of Dementia.

The team conducts clinical research of which the main objectives are to identify the markers of early diagnosis and prognosis in order to come up with new therapeutic designs and approaches. For this, research is conducted in close collaboration with the basic research teams\* (fundamental biology, mouse models) and with the brain imaging centres of the CEA\*\*, where the tools allow tracking intracerebral biological anomalies by positron emission tomography and high magnetic field MRI. This translational approach enables linking the knowledge gained from basic research and innovative imaging techniques for humans, through supervision provided by clinical experts. Currently, the team is particularly involved in two Hospital Clinical Research Programs (PHRC), one related to the role of neuro-inflammation in Alzheimer's, and the other on the role of the tau protein in non-Alzheimer amnesic disorders and neurological disorders with psychiatric behavioural markers (frontotemporal lobe degeneration). For the latter, a collaboration has also been set up with the Vision institute, the Quinze-Vingts Hospital and the Jérôme Lejeune institute.

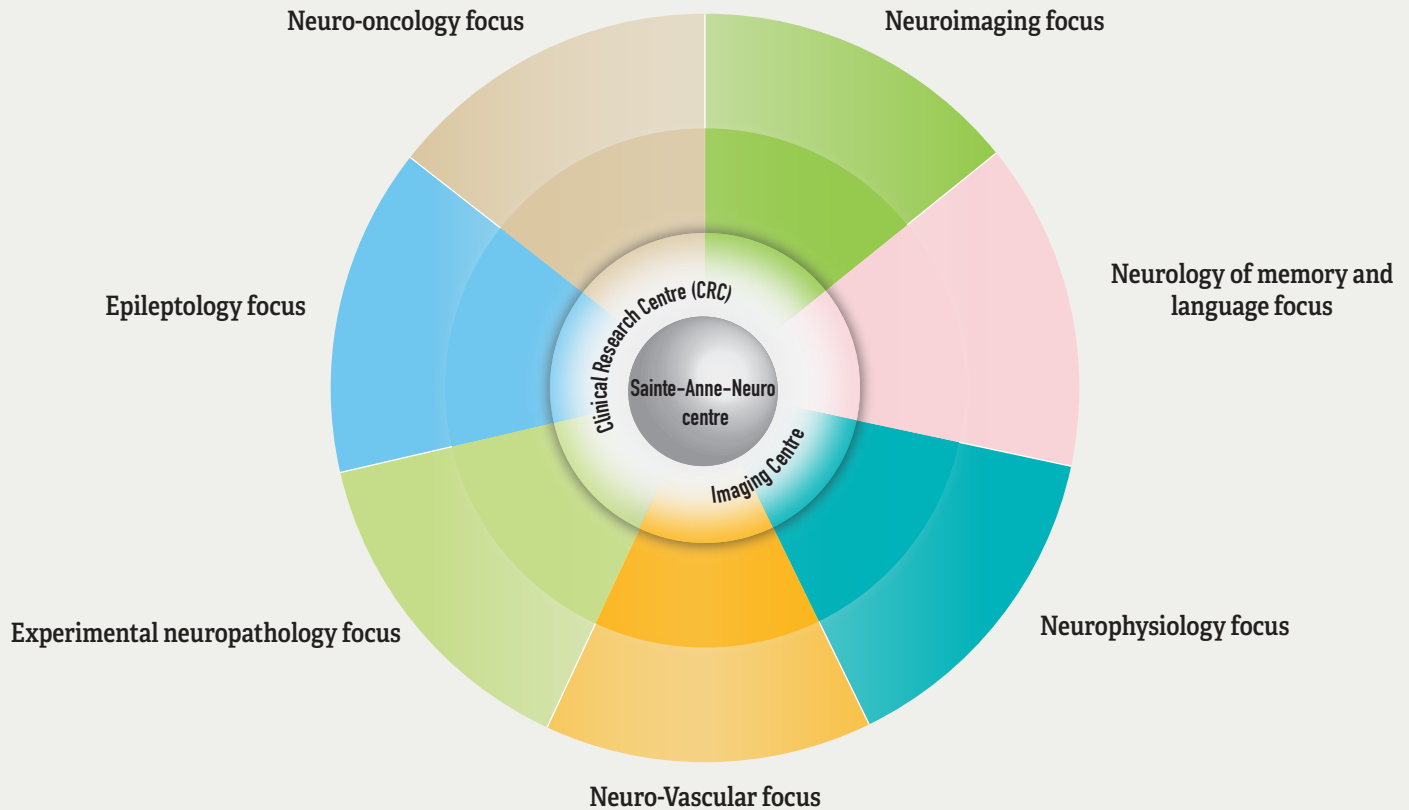
\*Saint Antoine research centre, Université René Diderot, ICM (Salpêtrière)

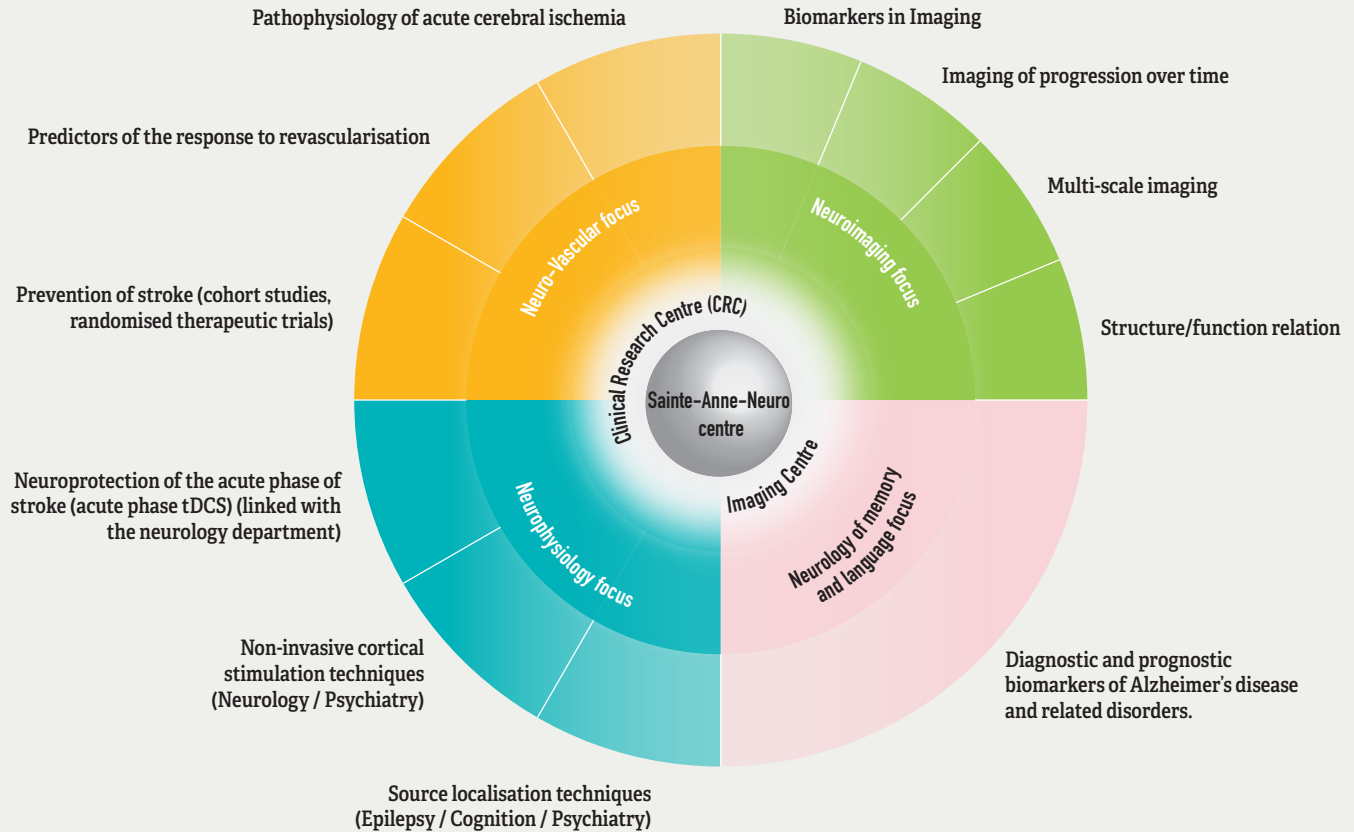
\*\*service Hospitalier Frédéric Joliot, Orsay and Neurospin, Gif Sur Yvette

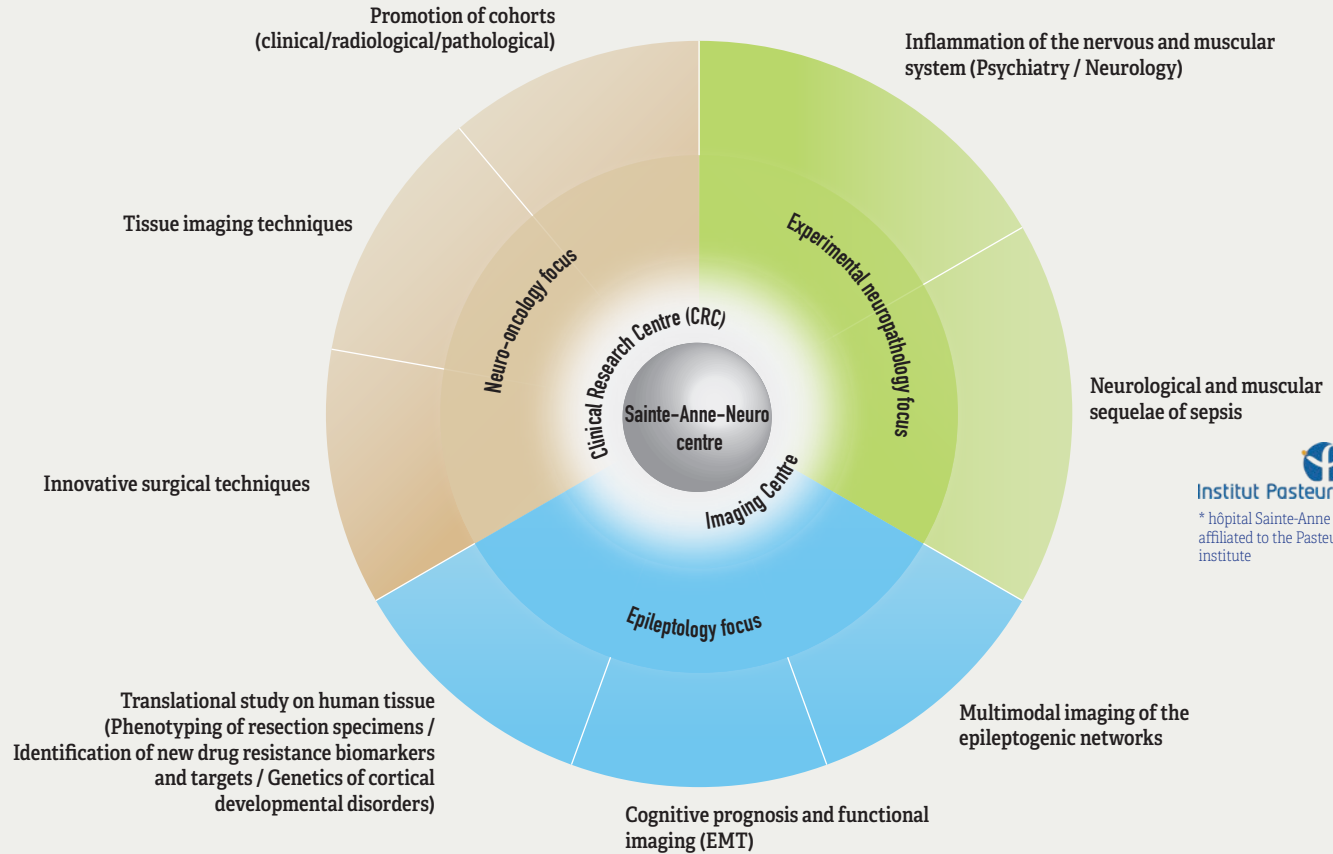
## TOPIC 5 RESEARCH ACTIVITIES NEUROPHYSIOLOGY DEPARTMENT

STICA, a placebo-controlled, double-blind, randomised, prospective, single-centre, proof-of-concept study was conducted in the department and in the neuro-vascular unit, as part of the INSERM UMR894 unit. Transcranial direct current stimulation (tDCS) applied in front of an acute cerebral infarction alongside revascularisation procedures could limit the ischemic growth. The purpose of tDCS is to inhibit excitotoxicity by blocking the abnormal electric activities of the ischemic penumbra area. Patients at the CHSA having a thrombolysis alert and/or thrombectomy with a cerebral infarction and eligible for a revascularisation strategy can be included. The intervention consists of delivering a transcranial electric stimulation (or placebo) in front of the cerebral infarction area for 20 min/h over 6 hours. The main evaluation criterion is the ischemic growth evaluated by a brain MRI after 24 hours. In addition, in neuro-resuscitation, the department has developed neurophysiological tools that enable a prognostic evaluation of comas. The objective is to provide expertise with combined 1/ clinical, 2/neuroradiological and 3/neurophysiological evaluations for patients in a persistent coma who could be taken over by the resuscitation partners of HEGP, Cochin and Necker.

Pr. Jean-François MEDER,  
*head of the Sainte-Anne-Neuro centre*







  
**Institut Pasteur**  
\* hôpital Sainte-Anne  
affiliated to the Pasteur  
institute

# BIBLIOMETRIC INDICATORS OF THE SAINTE-ANNE-NEURO CENTRE (2008-2016)

## NUMBER OF PUBLICATIONS PER YEAR

Year	Number of publications
2008	96
2009	69
2010	69
2011	59
2012	60
2013	80
2014	85
2015	77
2016	111
<b>Total</b>	<b>706</b>

Source : SIGAPS

## NUMBER OF CHSA PUBLICATIONS PER YEAR AND PER CATEGORY

Year	A	B	C	D	E	NC	Total	Score
2008	16	16	10	12	39	3	96	973
2009	17	10	14	10	15	3	69	700
2010	27	15	11	9	4	3	69	872
2011	20	12	16	6	4	1	59	678
2012	18	16	4	8	6	8	60	647
2013	20	25	10	5	11	9	80	891
2014	32	18	9	9	5	12	85	1079
2015	27	23	8	9	7	3	77	815
2016	41	37	13	10	6	4	111	1382
<b>Total</b>	<b>168</b>	<b>130</b>	<b>82</b>	<b>66</b>	<b>88</b>	<b>41</b>	<b>706</b>	<b>8037</b>

Source : SIGAPS

For each discipline, the reviews were classified and then distributed into 6 categories:

A: excellent

B: very good

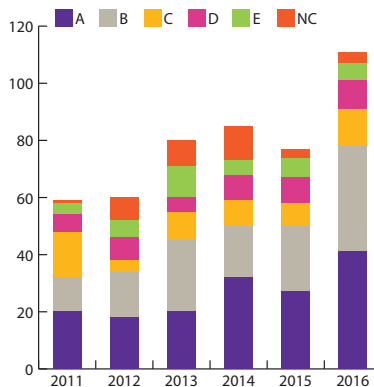
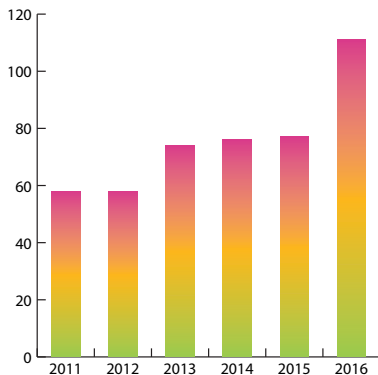
C: average

D: poor

E: very poor

NC: journal with no Impact Factor

(in general, a national review or conference proceedings).



## DISTRIBUTION OF INCLUSIONS BY TYPE OF PROMOTION (SIGREC)

Year	CHSA	Institutional
2008	220	10
2009	151	3
2010	176	17
2011	149	43
2012	130	45
2013	93	27
2014	71	10
2015	142	5
2016	162	0
<b>Total</b>	<b>1294</b>	<b>160</b>

Source : SIGREC

CLINICAL RESEARCH PROTOCOLS IN PROGRESS

Coordinator	Study	Title	Type of research	Risk
Dr David CALVET	Lp-PLA2	Lp-PLA2 expression in relation with carotid plaque inflammation and composition: a PET/CT and 3T-MRI study with histological correlations	RBM, HPS	B
	Blood Platelets	Evaluation of haemorrhage in the carotid plaque in patients suffering from asymptomatic stenosis. Benefits of the 3D fast spin echo sequence in comparison with HR-MRI	standard care	NA
	Long term Precoris	Long term PRECORIS: long term follow-up of patients who participated in the PRECORIS study (PREVALENCE OF ASYMPTOMATIC CORONARY ARTERY DISEASE IN ISCHEMIC STROKE PATIENTS)	RNI	NA
Dr Florence COLLE	MADECCS - P. Lindberg	Manual dexterity control after stimulation of the cerebellum	RBM, DM	
Dr Benoît CREPON	SIMULANG-TMS	Effect of affordance of objects on memory: Study on transcranial magnetic stimulation	RBM, HPS	B
Pr Bertrand DEVAUX	ULYS	Contribution of ultrasound brain imaging for the surgical treatment of epilepsy in focal cortical dysplasia	RBM DM	D
Dr Martine GAVARET	tDCS	Transcranial Direct Current Stimulation in the acute phase of cerebral infarction in humans	RBM, DM	B
Dr Catherine LAMY	EFLUSTIM	Evaluation by transcranial magnetic stimulation of the benefit of Fluoxetine on motor recovery after stroke	RBM, ME	C

# SAINTE-ANNE-NEURO CENTRE

Coordinator	Study	Title	Type of research	Risk
Pr Jean-Louis MAS	NETs	“Neutrophil extracellular traps and response to thrombolysis in cerebral infarction”	RBM, HPS	A
	ACTRIS	Endarterectomy combined with optimal medical therapy versus optimal medical therapy alone in patients with asymptomatic severe atherosclerotic carotid artery stenosis at higher-than-average risk of ipsilateral stroke	standard care	NA
Dr. Guillaume TURC/ Pr. Jean-Louis Mas	Asphalt	Pre-hospital initiation of the arterial re-canalisation treatment of acute cerebral infarction: randomised medical and economic evaluation of a mobile neurovascular unit	RBM, HPS	NA
Dr Charles MELLERIO	Cube DIR	Exploration of epileptogenic cortical lesions: contribution of inversion recovery double fast spin echo T2 volume imaging (Cube DIR)	standard care	NA
Pr Catherine OPPENHEIM	4D FLOW	4D FLOW: feasibility study of a 4D flow sequence applied to cervico-encephalic vascular disorders	RBM, HPS	A
	APEXADO	Brain bases from cognitive learning to executive control in adolescence (APEX-ADO)	RBM, HPS	A
Pr Marie SARAZIN	SHA TAU 7	Characteristics of non-Alzheimer hippocampal sclerosis with progressive amnesia	RBM, HPS	A
Dr Pascale VARLET	Gliadome	Malignant glioma in adolescents	RNI	NA

Study completed
Study in progress
Study under preparation

## 15-SHU CENTRE :

S14 + S15 + S16 + ADDICTO

The teaching hospital centre of the 15<sup>th</sup> arrondissement provides specialised care in psychiatry in the 15<sup>th</sup> arrondissement of Paris (239,673 inhabitants, approximately the population of Bordeaux).

It annually handles active records of approximately 12,000 patients (120,000 outpatient procedures and 55,000 days of full-time hospitalisation).

The departments of the centre also provide secondary or tertiary-level healthcare expertise for specific populations: resistant disorders, disorders of young adults, cognitive therapies and evaluation, cross-sectoral addictology, healthcare for the hearing impaired, and psychoanalysis-inspired treatment at the Psychoanalysis Hospital Institute.

### THERAPEUTIC INNOVATION: FROM PREVENTION TO RESISTANT DISORDERS

Backed by its vast heritage in psychopharmacology, the teaching hospital centre of the 15<sup>th</sup> arrondissement has turned towards therapeutic innovation by defining a secondary or tertiary-level goal: definition of new targets, therapeutic methods or strategies, in connection with the Pathophysiology team for psychiatric disorders (Inserm-Paris Descartes University, Centre for Psychiatry and Neurosciences) and with national (Psychiatry institute, GDR 3557) or international networks. We combine multimodal evaluations (clinical, cognitive, biological, imaging) and therapeutic approaches for gaining a better understanding and providing better treatment for psychotic, mood and addictive disorders.

- In drug-resistant disorders, we study the benefits of Ketamine or its derivatives, the benefits of stimulation techniques, e.g. transcranial stimulation in depersonalisation disorder (inter-regional PHRC, M Plaze, in progress) and the effects of electroconvulsive therapy on hippocampal neurogenesis, in collaboration with the neuroradiology department of Sainte Anne and multiple teams of the Pasteur institute.
- In a personalised medicine approach, we adapt treatments where rare mutations<sup>1</sup> are identified and coordinate an international programme studying the developmental continuum between autistic and schizophrenic disorders (EraNET Neuron AUSZ, in progress) or the motor aspect of schizophrenic disorders<sup>2</sup> (ANR CIMOCS, I Amado).
- The Cognitive remediation and psychosocial rehabilitation resource centre (C3RP) develops new methods of cognitive remediation and psychoeducation for patients and their families<sup>3,4</sup>;



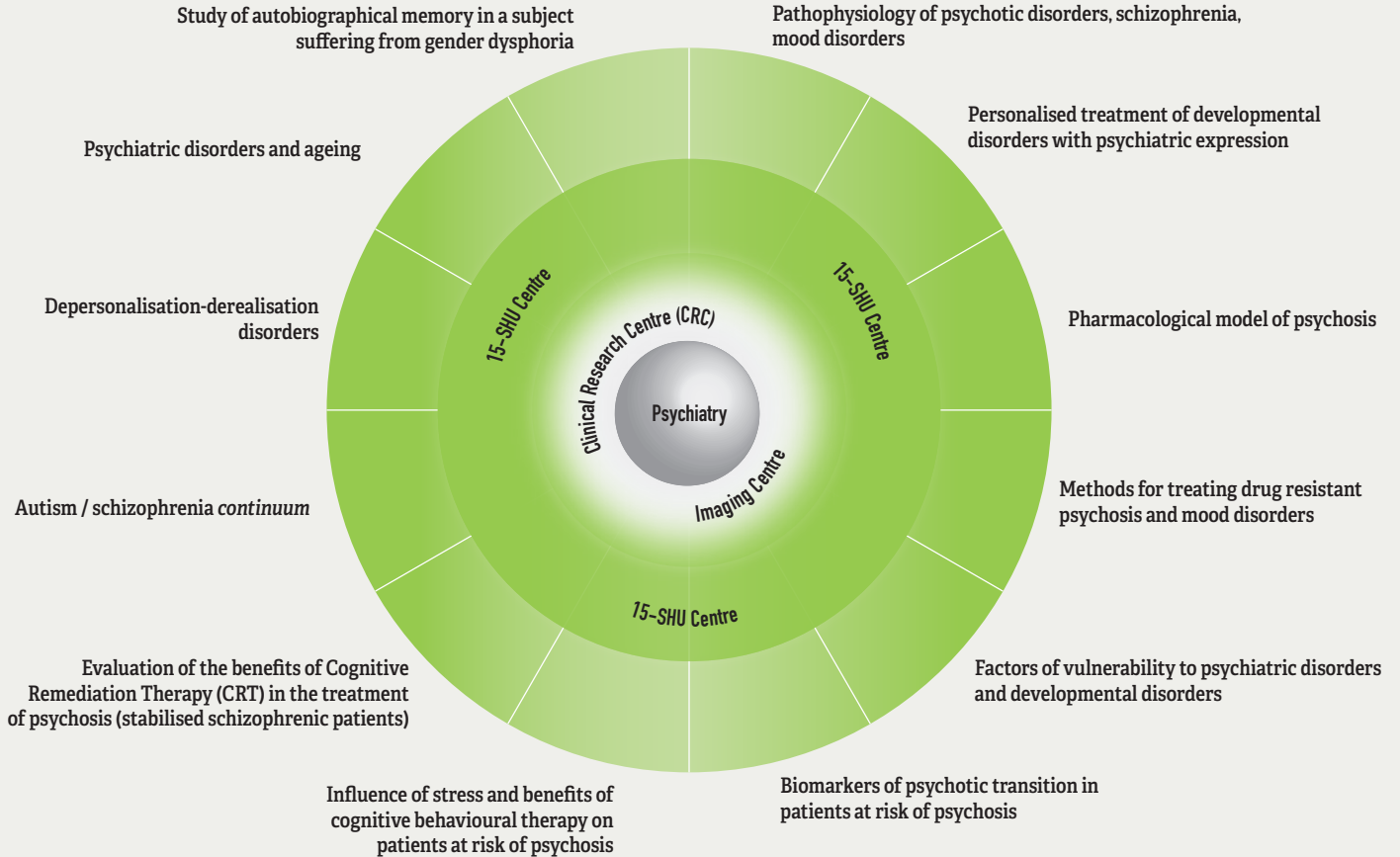
- The Psychoanalysis Hospital Institute has the three-fold task of healthcare, teaching and research. It coordinates the teaching of psychoanalysis in psychiatry and works with the Paris Diderot university, the Institute for Higher Studies in Psychoanalysis, and Labex TransferS with B. Cassin, Pr. C. Xiaoquan at the Fudan university in Shanghai;
- A pioneer of early intervention in emerging disorders in France, the Evaluation Centre for Young Adults and Adolescents (C'JAAD) develops research as part of a national PHRC (ICAAAR, MO Krebs) aiming at (i) understanding the healthcare process<sup>5</sup>; (ii) understanding the mechanisms in play in the emergence of a first episode on the cognitive<sup>6</sup> or biological<sup>7,8</sup> front; (iii) exploring the therapeutic approaches linked with stress control (START National PHRC, in progress). Our works mainly enabled identifying the involvement of neuroinflammation in depression<sup>9</sup> or in the emergence of psychotic disorders in addition to the possible role of oxidative stress<sup>6</sup>.
- Lastly, in a reversible continuum of translational research, we were able to prove, in rodents, the impact of cannabis on the plasticity of the prefrontal cortex-hippocampus<sup>10,11</sup> that plays an essential role in the process of autobiographical memory and the construction of the self, and which is involved in the adaptive response to stress, studied simultaneously among young adults having emerging disorders.

Pr. Raphael GAILLARD,  
head of the 15-SHU centre

#### Référence :

- 1.Paradoxical Improvement of Schizophrenic Symptoms by a Dopaminergic Agonist: An Example of Personalized Psychiatry in a Copy Number Variation-Carrying Patient. Alexandre C et al. Biol Psychiatry..
2. Altered cortical processing of motor inhibition in schizophrenia. Lindberg PG, et al. I. Cortex..
3. A Serious Game to Improve Cognitive Functions in Schizophrenia: A Pilot Study. Amado I, et al. Front Psychiatry.
4. [Therapeutic benefit of a registered psychoeducation program on treatment adherence, objective and subjective quality of life: French pilot study for schizophrenia]. Sauvanaud F, et al. Encephale..
5. The C'JAAD: a French team for early intervention in psychosis in Paris. Oppetit A, et al. Early Interv Psychiatry.
6. Confidence and psychosis: a neuro-computational account of contingency learning disruption by NMDA blockade. Vinckier F. Mol Psychiatry.
7. Methyloic changes during conversion to psychosis. Kebir O et al Mol Psychiatry.
8. Salivary cortisol in early psychosis: New findings and meta-analysis. Chaumette B, et al. Psychoneuroendocrinology.
9. Mast cells' involvement in inflammation pathways linked to depression: evidence in mastocytosis. Georjin-Laviolle S, et al. Mol Psychiatry.
10. Chronic cannabinoid exposure during adolescence leads to long-term structural and functional changes in the prefrontal cortex. Renard J, et al., Eur Neuropsychopharmacol.
11. The hippocampal to prefrontal cortex circuit in mice: a promising electrophysiological signature in models for psychiatric disorders. Tripathi A, et al. Brain Struct Funct.

# 15-SHU CENTRE



# BIBLIOMETRIC INDICATORS OF THE 15-SHU CENTRE (2008-2016)

## NUMBER OF PUBLICATIONS PER YEAR

Year	Number of publications
2008	48
2009	49
2010	42
2011	41
2012	21
2013	28
2014	25
2015	35
2016	47
<b>Total</b>	<b>336</b>

Source : SIGAPS

## NUMBER OF CHSA PUBLICATIONS PER YEAR AND PER CATEGORY

Year	A	B	C	D	E	NC	Total	Score
2008	8	4	7	2	23	4	48	459
2009	8	3	9	3	16	10	49	455
2010	7	8	9	2	15	1	42	404
2011	9	17	5	2	7	1	41	530
2012	2	5	8	3	3	0	21	232
2013	2	6	6	2	7	5	28	216
2014	2	8	5	2	7	1	25	226
2015	5	9	7	3	7	4	35	341
2016	11	8	9	2	12	5	47	470
<b>Total</b>	<b>54</b>	<b>68</b>	<b>65</b>	<b>21</b>	<b>97</b>	<b>31</b>	<b>336</b>	<b>3333</b>

Source : SIGAPS

For each discipline, the reviews were classified and then distributed into 6 categories:

A: excellent

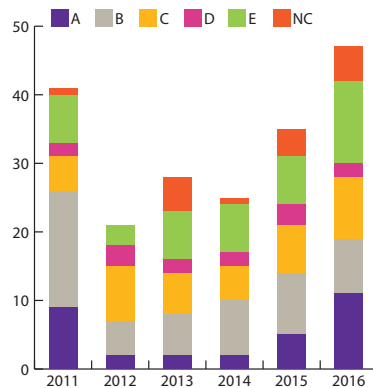
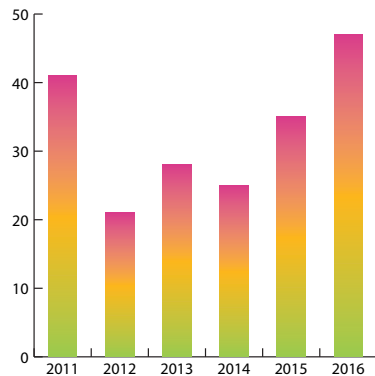
B: very good

C: average

D: poor

E: very poor

NC: journal with no Impact Factor (in general, a national review or conference proceedings).



## DISTRIBUTION OF INCLUSIONS BY TYPE OF PROMOTION (SIGREC)

Year	CHSA	Institutional
2008	704	15
2009	165	0
2010	201	5
2011	151	10
2012	135	3
2013	142	5
2014	109	9
2015	162	1
2016	228	3
<b>Total</b>	<b>1997</b>	<b>51</b>

Source : SIGREC

CLINICAL RESEARCH PROTOCOLS IN PROGRESS

Coordinator	Study	Title	Type of research	Risk
Dr Isabelle AMADO	COORDI-R	Cognitive remediation: quantification of progress in motor coordination linked to minor neurological signs in schizophrenia	standard care	NA
	RE-V-PLANI-R	Study of the effects of cognitive remediation on the action planning function in schizophrenia, evaluated in actual conditions of daily life and in virtual reality	RBM, HPS	A
	MaDOCS	Dexterity and oculomotor control: biomarkers of vulnerability to Schizophrenia	RBM, HPS	intermediate
Pr Raphaël GAILLARD	KETABI	Reasoning and decision making in a pharmacological model of psychosis: study of the effects of an anaesthetic at low doses, Ketamine	RBM, ME	C
	SCHIZOBAT	Characterisation of motivational deficit in schizophrenia and in depression	RBM, HPS	A
Dr Thierry GALLARDA	TRANSMEM	Being yourself in the other sex: Functional MRI study of autobiographical memory in subjects suffering from gender dysphoria	RBM, HPS	A
Dr Marion PLAZE	PERSONA	Depersonalisation disorder: therapeutic efficacy of neuronavigated repeated transcranial magnetic stimulation of the right angular gyrus	RBM, HPS	B
Pr Marie-Odile KREBS	ICAAR	Influence of Cannabis on the emergence of psychopathological symptoms in Adolescents and young Adults having an at-risk mental state	RBM, HPS	A
	AUSZ	Autism and schizophrenia continuum: research of phenotypic, clinical, cognitive, biological and imaging markers	RBM, HPS	A
	START	Stress markers and efficacy of cognitive behavioural therapies in young subjects having an at-risk mental state	RBM, HPS	A

Study completed
  Study in progress
  Study under preparation

## CLINIC FOR MENTAL AND BRAIN DISEASES (CMME) AND PSYCHOTHERAPY CENTRE

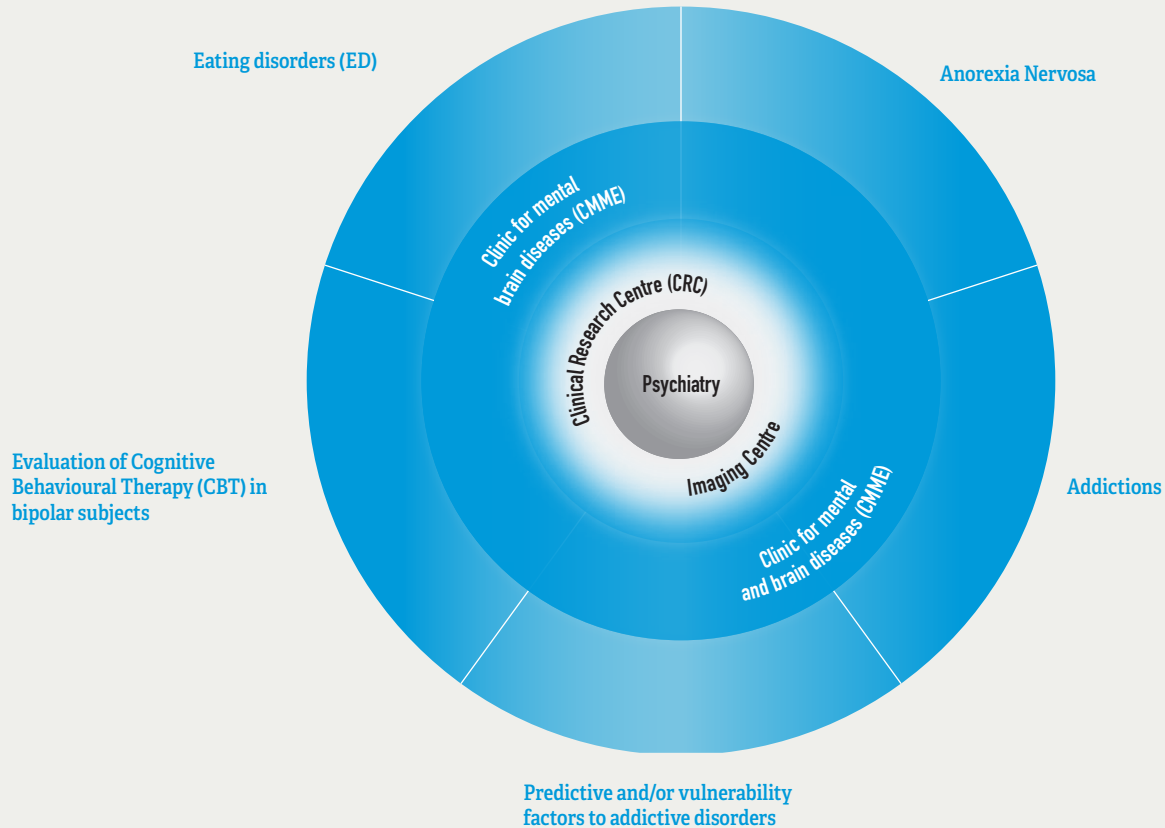
**The studies** pertained to the markers of vulnerability to different psychiatric disorders, essentially focusing on reward systems and addictive behaviours, substance abuse disorders (dependence) and eating disorders to start with, alongside research on suicidology and mood disorders.

**The research** basically uses genetic and epigenetic approaches, but fall under a diversity of analysis of mental pathologies, not just syndromic (disorders), but also criteriological (digitisation of questionnaires), biological (determination of peripheral markers), neurocognitive (automation of cognitive tests), emotional (measurement of variations in the diameter of the pupil when exposed to standardised stimuli) and experimental (impact of physical stress).

The team therefore participates in re-conceptualising mental illnesses based on simplified cognitive-emotional dysfunctions, in order to gain a better understanding of the mechanics, and thus target (personalised) treatments or even propose new therapeutic approaches.

Pr. Philip Gorwood,  
*Head of the Clinic for Mental and Brain Diseases (CMME) centre "CMME/Psychotherapy"*

**The Clinic for Mental and Brain Diseases (CMME) centre "CMME/Psychotherapy" conducts its research as part of the Centre for Psychiatry and Neurosciences (CPN), also located in Sainte-Anne, and is INSERM certified (U894, Team 1).**



# BIBLIOMETRIC INDICATORS OF THE CMME CENTRE (2008-2016)

## NUMBER OF PUBLICATIONS PER YEAR

Year	Number of publications
2008	42
2009	26
2010	41
2011	36
2012	36
2013	28
2014	27
2015	19
2016	19
<b>Total</b>	<b>274</b>

Source : SIGAPS

## NUMBER OF CHSA PUBLICATIONS PER YEAR AND PER CATEGORY

Year	A	B	C	D	E	NC	Total	Score
2008	4	6	8	4	6	14	42	334
2009	5	6	6	1	7	1	26	284
2010	7	5	12	3	7	7	41	379
2011	4	8	11	3	6	4	36	359
2012	1	5	20	1	5	4	36	304
2013	0	9	5	5	3	6	28	246
2014	5	11	3	2	5	1	27	279
2015	2	4	4	4	4	1	19	183
2016	0	6	6	1	3	3	19	169
<b>Total</b>	<b>28</b>	<b>60</b>	<b>75</b>	<b>24</b>	<b>46</b>	<b>41</b>	<b>274</b>	<b>2537</b>

Source : SIGAPS

For each discipline, the reviews were classified and then distributed into 6 categories:

A: excellent

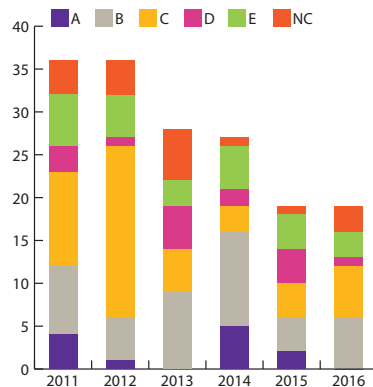
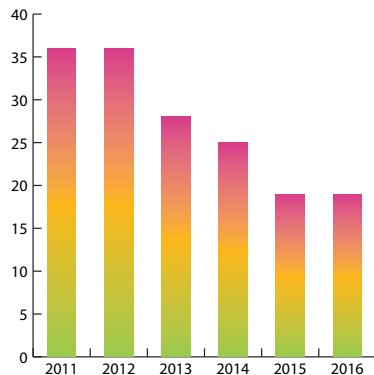
B: very good

C: average

D: poor

E: very poor

NC: journal with no Impact Factor (in general, a national review or conference proceedings).



## DISTRIBUTION OF INCLUSIONS BY TYPE OF PROMOTION (SIGREC)

Year	CHSA	Institutional
2008	25	0
2009	98	42
2010	170	8
2011	174	1
2012	161	0
2013	138	0
2014	61	0
2015	12	0
2016	8	0
<b>Total</b>	<b>847</b>	<b>51</b>

Source : SIGREC

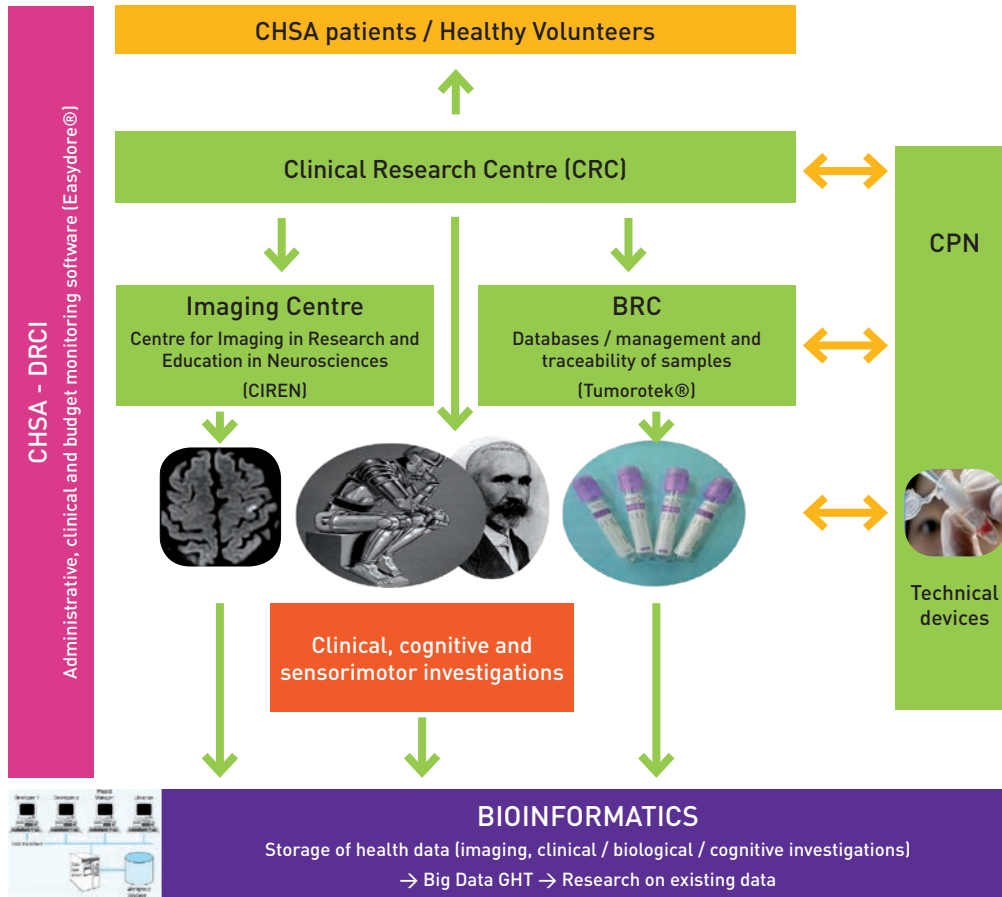
CLINICAL RESEARCH PROTOCOLS IN PROGRESS

Coordinator	Study	Title	Type of research	Risk
Dr Alexandra PHAM-SCOTTEZ	PIPA	Impact of a nursing practice focused on body perception in anorexia nervosa	RBM, HPS	A
	TCC-MBCT	Efficacy of a CBT followed by MCBT and predictive factors (genetic, clinical and cognitive) of response	RBM, HPS	A
	CAPANOX	Analysis of the inability to regulate stress and to evaluate its intensity as endophenotype of anorexia nervosa, owing to a specific impact of physical stress at the emotional, cognitive, pain and biological level	RBM, HPS	A
	Jeu pathologique	Study of compulsive gambling using an integrated approach combining neuroimaging and genetics	RBM, HPS	A
Pr Phillip GORWOOD	PReDicT	Interventional, multi-centre, controlled, randomised, open-label, parallel-group study, evaluating the effects of the PReDicT test to guide the anti-depression treatment of depressive patients.	European project (H2020) 5 countries involved RBM, DM	A

Study completed
  Study in progress
  Study under preparation



# Innovative and integrated clinical research platforms



The CHSA has dedicated its efforts to develop and strengthen its research-dedicated platforms.

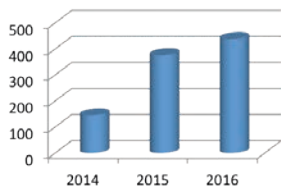
## THE TASKS OF THE CLINICAL RESEARCH CENTRE (CRC)

- The provision of resources to optimise clinical research in the CHSA
- The increase in the rate of recruitment of subjects, both patients and healthy volunteers
- The improvement in the quality of clinical trials

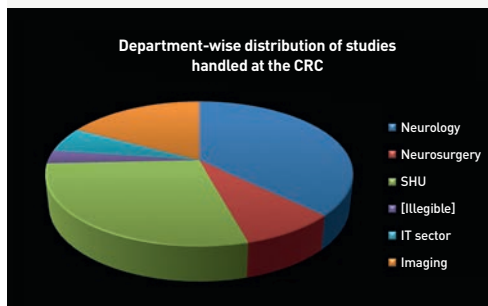
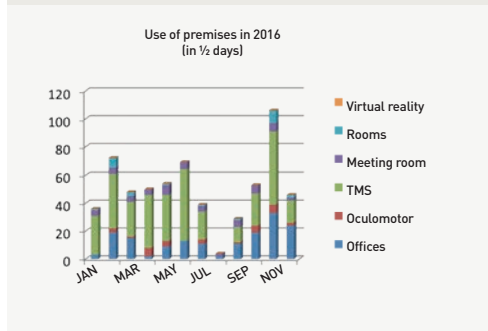
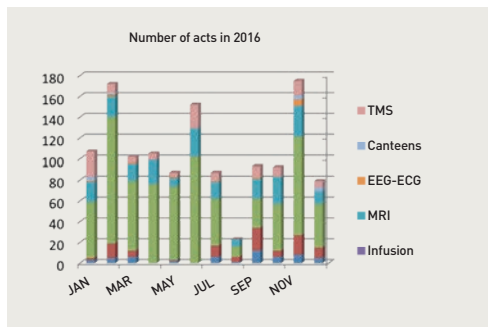
### The CRC of CHSA, a support platform for clinical investigations

- Execution of clinical research projects
- Implementation of operating procedures
- Compliance with the good clinical practices
- Methodological support on investigation tools
- Inclusion of subjects
- Medical and paramedical acts
- Data acquisition
- Collection of samples
- Treatments and product administration
- Longitudinal tracking

### The CRC ensures the implementation of institutional and industrial clinical trials



The number of subjects included and monitored at the CRC since it opened has been on a constant rise.



### → A TEAM OF PROFESSIONALS TRAINED IN CLINICAL RESEARCH

- Doctor
- Psychologist
- Clinical research nurses (CRN)
- Radio operator
- Clinical trial technicians (CTT)

### → AN ENVIRONMENT DEDICATED TO INVESTIGATING THE BRAIN

- Examination rooms
- Treatment and sample collection rooms
- Canteen (open 24 hours)
- Testing rooms: cognition, sensorimotor ability, psychopathology, etc

### → CRC INVOLVED IN 34 CLINICAL TRIALS

- 17 trials use the rooms
- 28 trials involve staff
- Direct involvement in 17 pre-projects

## CENTRE FOR IMAGING IN RESEARCH AND EDUCATION IN NEUROSCIENCES (CIREN)

The MRI platform of the Centre for Imaging in Research and Education in Neurosciences (CIREN) is located at the site of the hôpital Sainte-Anne (<http://www.ch-sainte-anne.fr/Plateforme-imagerie>).

It specialises in the Imaging of the human nervous system.

It received the IBISA Label in 2016 and is part of the network of the Life Imaging platform (<http://piv.parisdescartes.fr/>) where it represents the in vivo component in humans.

The CIREN's activity focuses on clinical and cognitive neurosciences, with MRI equipment enabling a complete investigation of the central nervous system (functional, anatomical, diffusion-weighted, perfusion, flow, proton spectroscopy MRI), with two main foci: research in diagnostic imaging (vascular pathology, tumours, epilepsy and mental pathology) and the evaluation of new image acquisition and processing techniques for the study of the brain, applied to disorders of the central nervous system.

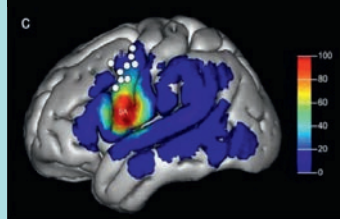


Fig 1. Individual variability of the human cortex in the presence of a diffuse glioma. Mapping by perioperative electro stimulation. From Pallud et al. World Neurosurgery. In press.

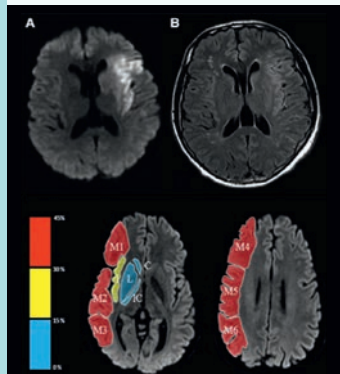


Fig 2. A, B. Stroke in MRI. From Legrand et al. Stroke 2016. Regional distribution of hyperfused areas in 232 patients suffering from proximal arterial occlusion. From Lasalle et al. Stroke 2016.

### → EQUIPMENT

2 MRIs: 1.5 Tesla and 3 Tesla (→12,000 /year)  
Scanner (64 detectors)  
3D Rotational Angiography Unit  
Echographs  
Interventional radiology

### → TOPICS

- Psychiatry / Cognition
- Neuro-Oncology / Epilepsy (Fig1)
- Neuro-vascular pathology (Fig 2)

### → RESEARCH ACTIVITY OF THE IMAGING CENTRE

- Implementation of experimental protocols for optimising MRI sequences
- Acquisition and processing of images of patients included in the protocols: complete brain investigation by MRI (functional, diffusion-weighted, perfusion, flow, spectroscopy, etc.) or other methods (arteriography, etc.)
- Data analysis: specific scientific and methodological expertise of the engineers of the platform, dedicated computing resources, research and industrial software.
- Archiving and anonymisation of research data: Storage system dedicated to research (research PACS / dedicated locations)
- Promotion of trials
- Training of students

Contact [plateforme.imagerie@ch-sainte-anne.fr](mailto:plateforme.imagerie@ch-sainte-anne.fr)

### → HUMAN RESOURCES

12 FTE Doctors (including 3 university professors, HDR)  
15 operators including 1 research radio operator,  
2 Research engineers  
CCA-Assistant  
Interns

## → FOCUS ON THE APEX-ADO TRIAL IN 2016

**Coordination:** LaPsyDÉ (UMR Paris Descartes CNRS 8240)

**Collaboration:** CIREN and CRC

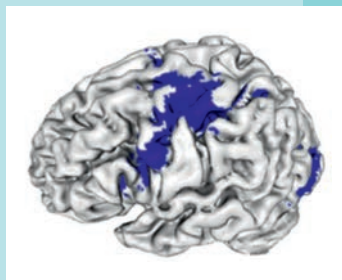
**Challenge:** to study the effect of cognitive training in adolescents and the cerebral factors that influence it

**Social interest:** to personalise cognitive training in a dual educational/therapeutic perspective.

**Methods:** Anatomical MRI, functional MRI (active and rest states), diffusion-weighted MRI

**Staff:** one PhD student, 2 researchers of the LaPsyDÉ, 2 engineers and the operator of the CIREN

**Activity in 2016:** 64 functional MRIs before and after 5 weeks of cognitive training on touch-screen tablets of 32 students from the schools of Ile-de-France.



## → 3T MRI UPGRADE (MR 750)

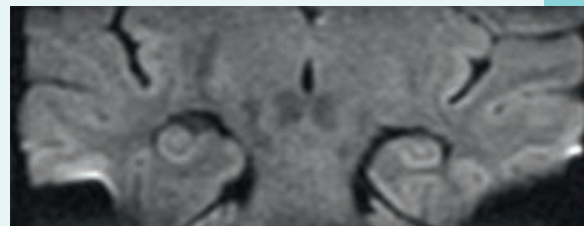
Upgrade to version DV25 in 2016  
(2nd stage in 2017)

### Hardware upgrade :

- operator's console, rebuilders, acquisition ergonomics, etc.

### Software upgrade :

- new sequences (3D double inversion recovery, Diffusion Focus, synthetic imaging, etc.),  
- improvement in the image quality and/or reduction in the duration of the sequences



## BIOLOGICAL RESOURCES CENTRE (BRC)

The task of the Biological Resources Centres is to collect, manage, characterise, preserve, enrich, distribute and dispose of biological samples. For this, the BRCs implement quality assurance procedures, techniques and databases that must be standardised and optimised.



The BRC is a structure designed to:

- promote clinical research at the CHSA
- enhance closeness with the site's researchers
- and participate in its development with constant and smooth back-and-forth between samples and clinicians

## CENTRE FOR PSYCHIATRY AND NEUROSCIENCES (CPN)



The Centre for Psychiatry and Neurosciences of the Inserm-Paris Descartes University (CPN) will inaugurate, in 2016, a new 4500 m<sup>2</sup> building within the compound of the hôpital Sainte-Anne. The CPN will host multidisciplinary teams using clinical research, physiology, cellular and molecular biology approaches. The decision to create a reference Centre at hôpital Sainte Anne is part of a strategic vision for the integration of basic and clinical researches in Psychiatry and Neurosciences. This strategy is based, on the one hand, on the Hôpital Sainte Anne that is a historical site dedicated to disorders of the Central Nervous System (CNS) and on the other hand, on the operating mode of the CPN, based on the importance of interactions between basic, clinical and translational research.

The CPN is formed by a multidisciplinary community connecting more than 100 clinical researchers and basic researchers, as well as teacher-researchers who work

in the domains of: Neurodevelopment and Psychiatry, Behaviour, Memory and Cognition, Neuro-vascular, multi-scale Imaging (of molecules in the brain), translational Neurosciences, Intra and Inter-cellular communication, Brain Tumours.

The mission aims at:

- Gaining a better understanding of the functioning of the brain at all levels, the molecular mechanisms in cells, the neural networks of the organ in its whole, via innovative and multidisciplinary research.
- Promoting the application of discoveries of basic research to advances such as the development of new therapies, techniques or diagnostics for neurological and psychiatric disorders.
- Training a new generation of doctors and scientists who will conduct collaborative and creative scientific research.

Dr. Thierry Galli, director of the nCPN

# Sainte-Anne, a site of collaborative research

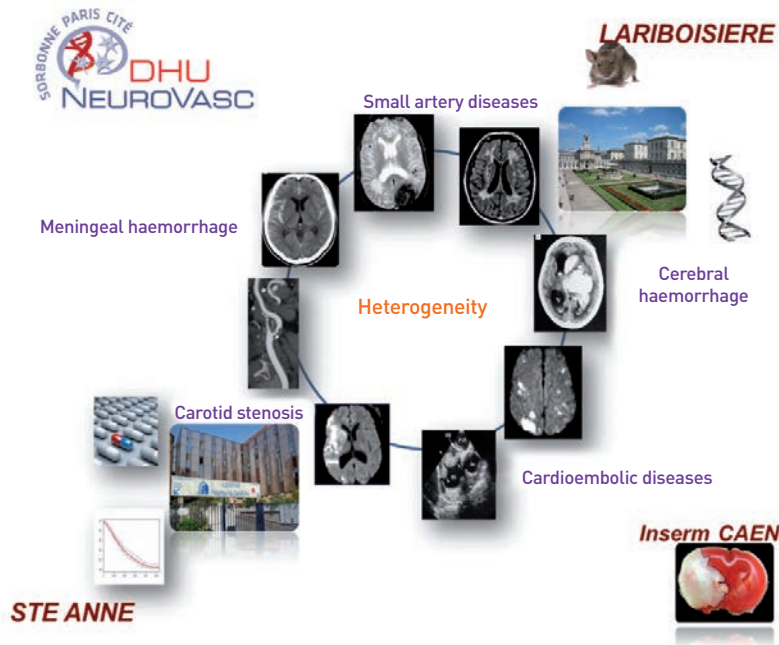
## DHU NEUROVASC

The DHU falls under the scope of a teaching hospital perimeter that geographically includes:

- the Lariboisière-Saint-Louis hospital group (Assistance-Publique Hôpitaux de Paris) and the Sainte-Anne Hospital Centre;
- the universities of Paris Diderot and Paris Descartes

A Research and treatment programme focussing on four major themes:

- Improvement of the etiological diagnosis of transient ischemic accidents, intracerebral haemorrhage and small vessel diseases;
- Identification of new predictive factors of cerebrovascular diseases using clinical, imaging, genetic and proteomic markers;
- Development of the prevention and treatment of cerebrovascular diseases through:
  - clinical or pre-clinical therapeutic trials;
  - the use of biomarkers;
  - a better understanding of the cellular and molecular mechanisms of cerebrovascular diseases and animal models.
- Optimisation of available resources, networks and channels for improving the diagnosis and treatment of patients suffering from a cerebrovascular disease.



## THE PSYCHIATRY INSTITUTE (PSYCHIATRY RESEARCH GROUP - GDR 3557)

The psychiatry institute is a national structure created based on the GDR 3557, under the aegis of Aviesan. It supervises 34 research or clinical teams in a partnership between the CEA, INRIA, INRA, INSERM, CNRS and 16 universities. Its goal is to create a collaborative research space for developing a shared scientific strategy focusing on the priority topics of Psychiatry and methodological developments related to it. Its objectives are:

- To develop common quantifiable evaluation procedures in order to facilitate the sharing of data collections
- To develop partnerships between clinical teams and research teams in common projects at the national or international level, by building a critical mass and promoting the emergence of new teams
- To promote training and research by organising training days open to the entire community (Master Class), by promoting inter-team mobility and exchanges with students or post-doctorates.

### The priority subjects concern:

- Longitudinal study of the development paths at post-puberty maturation, focussing on prevention prospects
- Drug resistant and neuropsychiatric disorders
- The approach is trans-nosographic and concerns developmental disorders, psychosis, schizophrenia, substance abuse, bipolar disorders, depression, severe anxiety disorders, obsessive-compulsive disorders.

### The developed approaches include:

- A translational approach: behavioural, clinical and critical analysis of animal, cognitive, computational or cellular models
- A multimodal approach on the development of common characterisation tools (cognitive, behavioural, physiological and imaging) with the implementation of a shared bioinformatics infrastructure.
- The study of innovative therapies: stimulation - psychopharmacology
- therapeutic innovation and cognitive remediation.

In addition to organising an Annual Forum, a place for scientific exchanges and interactions between team leaders and younger members, the Psychiatry institute organises a day, every year, for Meeting with associations of users with "Differing Perspectives", under the patronage of the Ministry of Health and in partnership with SciensAs, the Deniker Foundation and the Mission des usagers of the Inserm. Its members participate in several events for training, information diffusion and de-stigmatisation.

### "Understand better to treat better"

- The approach proposed by the Psychiatry institute will provide a better definition of psychiatric disorders using heterogeneous syndromic tables, which make it easier to identify the biological bases of these disorders (Understand better), to recognise emerging disorders at an early stage and prevent them, as well as to improve the handling of mental disabilities and therapeutic resistance (Treat better).

[www.institutdepsychiatrie.org](http://www.institutdepsychiatrie.org)



Promote cross-disciplinary collaborations in research



Promote the sharing of knowledge and skills



Pool databases



Promote young researchers



Promote training, information and education in therapy



FONDATION  
Pierre Deniker  
POUR LA RECHERCHE & LA PRÉVENTION EN  
SANTÉ MENTALE

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