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## ICHN - Imagerie cérébrale et handicaps neurologiques

Rapport Hcéres

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# HCERES

High Council for the Evaluation of Research  
and Higher Education

Research units

HCERES report on research unit:

Cerebral Imaging and Neurological Handicaps

ICHN

Under the supervision of the following  
institutions and research bodies:

Université Toulouse 3 - Paul Sabatier - UPS

Institut National de la Santé Et de la Recherche

Médicale - INSERM

# HCERES

High Council for the Evaluation of Research  
and Higher Education

Research units

*In the name of HCERES,<sup>1</sup>*

Didier HOUSSIN, president

*In the name of the experts committee,<sup>2</sup>*

Fabienne COLLETTE, chairwoman of the  
committee

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Under the decree No.2014-1365 dated 14 november 2014,

<sup>1</sup> The president of HCERES "countersigns the evaluation reports set up by the experts committees and signed by their chairman." (Article 8, paragraph 5)

<sup>2</sup> The evaluation reports "are signed by the chairman of the expert committee". (Article 11, paragraph 2)

## Evaluation report

This report is the result of the evaluation by the experts committee, the composition of which is specified below.

The assessments contained herein are the expression of an independent and collegial deliberation of the committee.

Unit name:	Cerebral Imaging and Neurological Handicaps
Unit acronym:	ICHN
Label requested:	U
Present no.:	825
Name of Director (2014-2015):	Mr Pierre CELSIS
Name of Project Leader (2016-2020):	Mr Pierre PAYOUX

## Expert committee members

Chair:	Ms Fabienne COLLETTE, Université de Liège, Belgique
Experts:	Mr Damien GALANAUD, La Pitié Salpêtrière, Paris (representative of the CCS Inserm)
	Mr Olivier GODEFROY, Hôpital Roger Salangro, Lille
	Mr Olivier MUNDLER, Hôpital de la Timone, Aix-Marseille Université (representative of the CNU)

### Scientific delegate representing the HCERES:

Mr Jacques NOËL  
Ms Céline SOUCHAY

### Representatives of the unit's supervising institutions and bodies:

Ms Armelle BARELLI, Inserm

Mr Alain CAZARRE (représentative of the Doctoral School ED n°323 GEET "Génie, Électrique, Électronique, Télécommunication")

Ms Marie-Josèphe LEROY-ZAMIA, Inserm

Mr Alexis VALENTIN, Université Paul Sabatier

Ms Chantal ZAOUCHE (représentative of the Doctoral School ED n°326 CLESCO "Comportement, Langage, Education, Socialisation, Cognition")

## 1 • Introduction

### History and geographical location of the unit

The unit was open in the early 1980s, and since has been continued through the uninterrupted succession of three Inserm/Université Toulouse 3 Paul Sabatier (UPS) research units (U 230, U 455 and U 825). The unit is located at the Purpan Hospital (Toulouse) and has a long research tradition on the main central nervous system diseases, using neurological, neuropsychological, neuropharmacological and neurosurgical investigations coupled with neuroimaging explorations and brain stimulation/rehabilitation techniques. The research programs of the unit are centered on neurological diseases and handicaps, in particular those occurring in the aging context (Alzheimer's and Parkinson's diseases, stroke and other pathologies of the aging brain). In 2011, the unit moved to a new pavillon, pavillon Baudot at the Purpan hospital, with more space available. A full-time research 3T MRI platform operated under the responsibility of the unit was installed. This unit continued to progress during the reference period on its research topics, both at a methodological and theoretical level, and can be considered as an expert in these domains. The unit was composed of three teams in the previous period. Two of them were closely interconnected, and will be grouped together in the next reference period (under the label "DEVIN") while a new "iDREAM" team will be in direct continuation of the former team 3 "Therapeutic innovations in cerebrovascular disease". The objective of team 1 "Clinical and cognitive neuroimaging" was to develop neuroimaging tools that can be used in clinical and cognitive brain research and, ultimately, in clinical practice. The aim of team 2 "Language, memory and action in neurological diseases" was to improve diagnosis and treatment of brain diseases affecting language, memory and action systems, but also to address the cognitive functioning of specific components of these systems in the normal human brain. Team 3 "Therapeutic innovations in cerebrovascular disease" project aimed at developing an experimental approach to therapeutic strategies likely to be transferable to clinical studies of advanced treatments of ischemic, hemorrhagic or traumatic brain lesions.

### Management team

The unit was directed by Mr Pierre CELSIS, DR1 Inserm, also responsible of the team 1. Mr Jean-François DEMONET, DR1 Inserm, was responsible of the team 2, but left in 2011. Ms Isabelle LOUBINOUX, DR2 Inserm, was responsible of the team 3. For 2016-2020, Mr Pierre PAVOUX, PUPH UPS, will be responsible of the unit, reorganised in two teams (DEVIN, under the responsibility of Mr Patrice PÉRAN, CR1 Inserm, and iDREAM, under the responsibility of Ms Isabelle LOUBINOUX). The layout of the unit facilitates interactions and collaborations between researchers, as can be seen in common publications. Moreover, interactions between clinicians and researchers are frequent and lead to fruitful research projects. The unit can be considered as really multidisciplinary and fostering the exchange of information between researchers of various specializations.

### HCERES nomenclature

SVE: SVE1 "Biologie, Santé"; LS7 "Epidémiologie, santé publique, recherche clinique, technologies biomédicales"

## Unit workforce

Unit workforce	Number as at 30/06/2014	Number as at 01/01/2016
<b>N1:</b> Permanent professors and similar positions	23	29
<b>N2:</b> Permanent researchers from Institutions and similar positions	4	2
<b>N3:</b> Other permanent staff (without research duties)	14	23
<b>N4:</b> Other professors (Emeritus Professor, on-contract Professor, etc.)		
<b>N5:</b> Other researchers (Emeritus Research Director, Postdoctoral students, visitors, etc.)	1	
<b>N6:</b> Other contractual staff (without research duties)		
<b>TOTAL N1 to N6</b>	<b>42</b>	<b>54</b>

Unit workforce	Number as at 30/06/2014	Number as at 01/01/2016
Doctoral students	20	
Theses defended	28	
Postdoctoral students having spent at least 12 months in the unit	1	
Number of Research Supervisor Qualifications (HDR) taken	3	
Qualified research supervisors (with an HDR) or similar positions	24	

## 2 • Overall assessment of the unit

### Global assessment of the unit

Pluri and interdisciplinarity is a characteristic of the unit that must be emphasized: the group has long been bringing together specialists of various disciplines, in medicine, applied mathematics, signal processing and image analysis.

The main lines of the research effort are to develop imaging markers of brain macro and micro structures, of brain dysfunction and therapeutic efficiency (team 1); to better characterize brain anatomic and functional correlates of developmental language disorders and post-stroke aphasia, of pain and behavioral symptoms in Parkinson's disease, of cortical reorganization related to memory impairment in Alzheimer's disease and of language, orthographic production and writing processes in normal subjects and patients (team 2); to evaluate the impact of drug treatment, rehabilitation programs and brain direct stimulation in stroke recovery, and the feasibility and impact of combining stem cells graft and nanotechnology in post-stroke motor recovery in animal models (team 3). So, the unit elaborates and develops specific tools to improve clinical practice. The scientific production of the unit as a whole is very high with 349 original publications in peer-reviewed journals, and publications in high-level journals occur frequently

(Lancet Neurology, Brain, Annals of Neurology). The unit benefits from a high-level technological platform dedicated to research, whose the utility is reinforced by constant interactions with clinical staffs. The unit is organised in an optimal way, that favor efficient development of research programs. Importantly, the departure of the leader of the team 2 "Language, memory and action in neurological diseases" in 2011 did not impede deeply the scientific production of the team. The unit is highly involved in teaching and training, and also in diffusion of scientific information to large audiences. The three teams of the unit have proved their capacity to find the financial support to attain their scientific objectives.

### Strengths and opportunities in relation to the context

The main strength of the Unit is to build on in parallel methodological developments, more particularly in brain imaging, and cognitive and clinical researchs in neuropsychology and cognitive neurosciences. In that context, the relationships established since years between the Unit and clinicians from the Neurology department of the Toulouse University Hospital offers unique opportunities for recruiting carefully selected patients for the research programs. Generally speaking, the unit is well integrated in a clinical settings and develops major thematics in the health domain. The access to neuroimaging and electrophysiological facilities full-time dedicated to research is also an unique opportunity to the efficient realization of the neuroimaging research projects. Otherwise, the multidisciplinary nature of the research is an incontestable strong point of the unit that brings together specialists from many disciplines: clinical and cognitive neurosciences, medical imaging, as well as specialists in the methodologies and techniques that support these research lines. A wide range of competences is thus on hand within the unit to enable it to carry through the project. The multidisciplinary nature of the members of the team enables it to rapidly set up effective cooperation with specialists when the project requires specific knowledge or know-how. Importantly, there is large cohesion between the members of the unit, and the directors have a clear overall view of the research objectives and how to develop the unit expertise in the various domains investigated. In that context, it must be stressed the optimal and thoughtful way by which the three teams were re-organised in two for the next five-year period. The moving of the entire unit, by the mid-2011, to the new office space in the newly renovated pavillon Baudot at CHU Purpan, the opening of the 3T full-research MRI facility and the opening in 2013 of the L2 laboratory are undoubtedly key events that will increase the scientific production of the unit during the next period. Moreover, the proximity of the CERCO Unit in the same building naturally leads to increase the collaboration projects between the two labs. The unit has a great attractivity for master and PhD students. The pluridisciplinarity of the team is also evidenced by their involvement in three doctoral schools (ED n°323 GEET "Génie Électrique, Électronique, Télécommunications", ED n°326 CLESCO "Comportement, Langage, Éducation, Socialisation, Cognition" and ED n°475 MITT "Mathématiques Informatique Télécommunications de Toulouse"). The unit trains a large number of PhD students who actively contribute to the research activity. The PhD students finalize their thesis in 3-4 years, with several scientific publications most of the time, that certify the quality of the supervision. The professional insertion of these students after their thesis is also very good. Finally, the scientific production of the unit is important, and of high quality. In that context, the experts committee must emphasize the quality of the scientific presentations during the visit.

### Weaknesses and threats related to the context

The methodological and scientific developpement proposed by the unit are very ambitious by reference to the actual human resources. The departure of Mr Jean-François DEMONET could slightly impact on the scientific production of the Devin team more specifically dedicated to neuropsychological questions. However, the team is aware of this threat and will pay attention to continue the development of these questions in the context of the multimodal neuroimaging studies performed. Two related other weaknesses are (1) the weak recruitment of high-level foreign post-docs that could improve "out-of-the-lab" recruitment of talented young researchers on permanent position in the unit, and (2) the retirement in the next years of several permanent members of the team (two researchers and two research ingeneers), for which no replacements were planned. Consequently, the projects proposed by the unit for the next five years could suffer from a lack of human ressources to help for supervision, administration and coordination tasks.

### Recommendations

The experts committee recommand to the directors to pursue the development of an active policy to recruit more high-level post-doc staff from other countries. More precisely, the contacts initiated with Stanford University and the Fondazione Santa Lucia at Rome must be reinforced. This will lead indirectly to increase the international visibility of the unit. It also seems essential to pursue the development of the preclinical technnological platform, to

optimize the use of the cyclotron platform and to update the IRM equipment. In that context, the grouping of all technological tools (humans and non-humans) on a same site will facilitate data acquisition by the unit. To keep the high level of scientific work, it will also be necessary to ensure the continued existence of human resources (both in the scientific, technical and administrative staffs). To note that the current lack of administrative staff could be compensated by a supplementary half-time secretary in 2015. Finally, the unit must pay attention to the risk of dividing its attention and resources too broadly between the various research thematics proposed in the five-years project, and to assure an optimal follow-up these research projects.