

HCERES

High Council for the Evaluation of Research
and Higher Education

Research units

HCERES report on interdisciplinary unit:

Lyon Neuroscience Research Center

CRNL

Under the supervision of the following
institutions and research bodies:

Université Claude Bernard Lyon 1 - UCB

Centre National de la Recherche Scientifique - CNRS

Institut National de la Santé et de la Recherche

Médicale - INSERM

Université Jean Monnet Saint-Étienne - UJM

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In the name of HCERES,¹

Didier HOUSSIN, president

In the name of the experts committee,²

Christoph MICHEL, chairman of the committee

Under the decree N°2014-1365 dated 14 november 2014,

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

² 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: | Lyon Neuroscience Research Center |
| Unit acronym: | CRNL |
| Label requested: | UMR_S INSERM, UMR CNRS |
| Present no.: | UMR_S 1028, UMR 5292 |
| Name of Director (2014-2015): | Mr Olivier BERTRAND |
| Name of Project Leader (2016-2020): | Mr Olivier BERTRAND |

Expert committee members

| | |
|----------|---|
| Chair: | Mr Christoph MICHEL, University Geneva, Switzerland |
| Experts: | Ms Valerie CREPEL, Aix-Marseille Université (representative of the CoNRS) |
| | Mr John FOXE, Albert Einstein College of Medicine, New York, USA |
| | Ms Anita LUETHI, University Lausanne, Switzerland |
| | Mr Pascal MAMASSIAN, École Normale Supérieure, Paris (representative of the CoNRS) |
| | Mr Philippe PEIGNEUX, Université Libre de Bruxelles, Belgium |
| | Mr Cyriel PENNARTZ, University of Amsterdam, The Netherlands |
| | Mr Mathias PESSIGLIONE, Hôpital Pitié-Salpêtrière, Paris (representative of the CSS INSERM) |
| | Mr Michel POHL, Université Paris Descartes, France |
| | Mr Jean-Philippe RANJEVA, Aix-Marseille Université (representative of the CNU) |
| | Mr Stefano SERI, Birmingham Children's Hospital and Aston University, UK |
| | Ms Daniela VIRGINTINO, Bari University, Italy |

Scientific delegates representing the HCERES:

Mr Jacques NOËL
Ms Celine SOUCHAY

Representatives of the unit's supervising institutions and bodies:

Ms Michèle COTTIER, Université Jean Monnet

M. Remi GERVAIS (representative of the Doctoral School NsCo - n°476)

M. Germain GILLET, UCBL

Ms Anne ROCHAT, INSERM

M. Jean Louis VERCHER, CNRS

1 • Introduction

History and geographical location of the unit

The CRNL was created in January 2011 with the aim of merging the different research laboratories in the area that already had tight scientific interactions and that shared facilities within the Lyon Neuroscience Federative Institute. The Center was organized in 11 teams coming from Inserm, CNRS, the University Claude Bernard Lyon 1 and the University Jean Monnet Saint-Étienne. These four institutions now form the supervisory authority of the CRNL. The Lyon University Hospitals and the Vinatier Psychiatric Hospital are the clinical partners.

It was planned that a new building of 5600 m² will be constructed on the East-Lyon Hospital site and that the teams that are currently at remote places in Lyon would be hosted in this building to allow most of the CRNL teams being located on the same campus (Neurocampus). The opening of the building was originally scheduled for 2013 but completion of this estates project has been delayed and only a first part of the building (3700 m²) is foreseen to be available in 2017. Funding for the second phase with further 2000 m² hasn't been secured yet. As a consequence of this, the various teams and platforms are still scattered on different sites across the City.

The CRNL staff is currently made of 374 persons, 135 of them permanent researchers (84 FTE), 67 technical staff and 172 students (Masters and PhD). There are 9 CRNL-internal technical platforms and an independent multimodal neuroimaging facility for animals and humans that the CRNL uses on a fees-for-service basis.

Management team

The CRNL is composed of an Executive Team (director and deputy-director), the Executive Bureau (Executive team & 4 CRNL members), the Board of Team leaders and a Center Council consisting of 15 CRNL members who meet 2-3 times a year). Director and deputy-director are also both leaders of a CRNL team.

A General Assembly is organized once a year.

A Scientific Advisory Board has been instated, consisting of ten international experts. The Board made a site visit in 2014 and provided advice on existing projects and the creation of new teams.

The CRNL has established nine research platforms that are operated by CRNL members and are accessible for all teams. The platforms provide technical infrastructure and expertise for neurochemical quantification, optogenetics, microscopy and electrophysiology for animal experimentation, as well as facilities for immersive reality, EEG, neurostimulation (TMS and tDCS), 3D assessment of motor behavior and intracranial recordings in humans. There is also a CRNL-internal IT support platform.

The CRNL makes extensive use on a fees-for-service basis of the Life Imaging Center (CERMEP) located on the East-Lyon Hospital Campus. Some of the facilities are coordinated or headed by senior members of CRNL from the BIORAN and DYCOG teams. The imaging Center includes an animal imaging platform with micro-PET, 7T MRI and human imaging platforms including PET with a cyclotron facility, 3T MRI, MEG/EEG, and since summer 2014 an MRI-PET system.

The CRNL has particularly strong connections to clinical groups and this facilitates access to clinical resources and patient cohorts for clinical research. A new Epilepsy Institute (IDEE) with a 1500 m² purpose-built facility is predicted to be available in late 2015. IDEE will be coordinated by the TIGER team, while the research space (500 m²) will belong to the Neurocampus and will be managed by the CRNL.

HCERES nomenclature

SVE1 Biologie, santé

SVE1_LS4 Physiologie, physiopathologie, biologie systémique médicale

SVE1_LS5 Neurobiologie

SHS4_2 Psychologie

SVE1_LS7 Épidémiologie, santé publique, recherche clinique, technologies biomédicales

Unit workforce

| Unit workforce | Number as at 30/06/2014 | Number as at 01/01/2016 |
|--|-------------------------|-------------------------|
| N1: Permanent professors and similar positions | 56 (21.5) | 40 (15,1) |
| N2: Permanent researchers from Institutions and similar positions | 58 | 53 |
| N3: Other permanent staff (without research duties) | 93 (76.2) | 86 (66,8) |
| N4: Other professors (Emeritus Professor, on-contract Professor, etc.) | 9 (4,2) | 2 (0,6) |
| N5: Other researchers (Emeritus Research Director, Postdoctoral students, visitors, etc.) | 30 | 17 |
| N6: Other contractual staff (without research duties) | 31 | 13 |
| TOTAL N1 to N6 | 277 (220,9) | 211 (165,5) |

| Unit workforce | Number as at 30/06/2014 | Number as at 01/01/2016 |
|---|-------------------------|-------------------------|
| Doctoral students | 62 | |
| Theses defended | 90 | |
| Postdoctoral students having spent at least 12 months in the unit | 24 | |
| Number of Research Supervisor Qualifications (HDR) taken | 14 | |
| Qualified research supervisors (with an HDR) or similar positions | 77 | 60 |

2 • Overall assessment of the interdisciplinary unit

Global assessment of the unit

The Center strongly promotes translational research with a multi-scale and multi-level approach that spans from molecular/cellular research in animal models to the study of large-scale brain networks and of human behavior. The strong integration with clinical groups allows direct translation of research findings to diagnostic, therapeutic and prognostic applications in clinical settings and access to patient recruitment to research studies aimed at understanding pathophysiological mechanisms of neurological diseases. The Center is organized around 3 thematic axes with several teams contributing to more than one theme. The 3 axes are embedded in 2 main research directions: from gene to behavior, and from bench to patients. Axis 1 (Perception, Attention, Action) investigates mechanisms of olfaction, nociception, auditory processing and sensorimotor integration in humans using a wide range of experimental methods as well as animal models. Axis 2 (Memory, Emotion, Social Cognition) looks at learning, plasticity and social interactions in healthy and clinical populations. Axis 3 (Sleep, Waking, States of consciousness) studies sleep and wakefulness regulation in animal models and in humans. During the first 3 years of the Center two new axes have emerged and ultimately led to the creation of new teams for the proposed second 5 year term: Axis 4 (Genetics and Phenotypic Flexibility) that studies neurodevelopment and neuroprotection and Axis 5 (Blood-Brain Interfaces) that looks at development of the blood-brain interfaces and searches for biomarkers of neurodegenerative diseases.

Strengths and opportunities in relation to the context

One of the main strength of the Center is the close link and the collaboration with clinical units; this is a critical element for a successful translation of the research findings to clinical applications. Likewise, the ease of access to clinical populations and cohorts allows to study brain dysfunctions directly in humans and exploring new therapeutic strategies. Due to this strong historical connection to the clinical environment, the impressive distinctiveness of the Center is the genuine translational research, of which the development of biochemical PET biomarkers for neurodegenerative disease, the improvement of pain diagnosis, the discovery of a cascade of events that precede cardiac failure in SUDEP, or the improved treatment of hemi neglect are just some examples.

A second important strength is the outstanding work of the director of the center. He accomplished the formation of an impressive research center of high national and international recognition despite all political and administrative complications that one has to face to put such a center together. Without his personal dedication and enthusiasm this center would not exist in its current form.

Overall, Center researchers use a variety of sophisticated methodological approaches and analyses methods in both humans and animal studies. The available platforms and technological resources are of exceptional standard and allow multidisciplinary research at all levels. Most of the teams make significant use of these opportunities and approach their research questions on different scales and with different methodologies. Many teams study their research topic in animal models, in vitro and in vivo, and in humans and try to integrate the findings in a global understanding of brain functions. As a result, research produced by members of the Center is published in journals with a multidisciplinary audience.

With 1150 peer-reviewed articles published in the last 5 years, the Center's production is excellent in terms of quantity. Several publications have been accepted in journals with high international reputation. The citation rate is also generally excellent as seen by the high H-index of some of the team leaders.

Recruitment and training of PhD students is excellent. The neuroscience PhD program is successful and well structured and so is the organization of the Master School.

Weaknesses and threats related to the context

An obvious threat is the continuing dispersion of the Center in different parts of the city despite the planned new location having been forecasted for 2013. The campus will be delayed by more than 4 years and will still be only partly available in 2017. Despite remarkable efforts, this geographic scattering has significantly hindered the collaboration between the different teams. The geographic dispersion also hampered the Center to appear as a real unitary entity.

While the diversity of research themes and approaches is impressive, it also bears potential risks of not having sufficient resources and manpower to be internationally recognized as a Center of excellence in any specific domain. Some teams are small with only very few full-time researchers. The smaller teams may have difficulties in having a global impact and consequently struggle to be seen as attractive to high-quality international researchers. This becomes obvious when looking at the composition of the tenured researchers that are to an overwhelming majority from France.

The Center has been very successful in securing national competitive research grants, particularly with respect to the Labex, PHRC, ANR and Foundation calls. However, the number of international competitive grants is comparatively small, particularly when we look at the number of EU grants.

Concerning publications, the number of published papers that include authors from different teams is still small despite the very obvious overlap of research questions and methodologies. The growing interactions described in the project should help improve this point for the next five-year period.

Recommendations

The site visit and the discussion with the different researchers and representatives led to the following general recommendations:

1. the new buildings for the Neurocampus are absolutely mandatory for the flourishing of the Center. The phase 2 building is crucial not only to bring in the rest of the teams but also and most importantly to be able to develop new research strategies and axes and to attract new researchers to the teams;

2. the collaboration between the teams has to be strengthened by increasing the Center budget dedicated to the promotion of interactions between the teams and by encouraging PhD studies to have some training in other teams;

3. the strategy of fragmenting researchers in small teams should be reviewed. The collaboration between small teams with similar research topics should be maintained and encouraged;

4. application to international competitive grants has to be encouraged. Some resources should be made available by the Center to support the administrative burden associated to being principal applicants in large-scale grants;

5. the University should make efforts to facilitate the exchange between PhD students of University Lyon 1 and Lyon 2. It should also install specific programs to facilitate the engagement of postdocs from abroad. The limitation to 3-year contracts is a serious problem for the laboratories to form and retain technically skilled people;

6. the rules, the administrative load and the long duration of the ethical review process slows the research projects beyond what is internationally accepted. This is particularly problematic in view of the short PhD duration of 3 years. Efforts have to be undertaken to facilitate and speed up the ethical committee applications;

7. some of the tenured senior researchers should get more possibilities for undergraduate teaching.