GGB - Génétique, génomique fonctionnelle et biotechnologies

Rapport Hcéres

HCERES

High Council for the Evaluation of Research and Higher Education

Research units

HCERES report on research unit:

Génétique, Génomique fonctionnelle et Biotechnologies

GGB

Under the supervision of the following institutions and research bodies:

Université de Bretagne Occidentale - UBO

Institut National de la Santé et de la Recherche Médicale - INSERM

Établissement Français du Sang

Evaluation Campaign 2015-2016 (Group B)

HCERES

High Council for the Evaluation of Research and Higher Education

Research units

In the name of HCERES,[1]

Michel Cosnard, president

In the name of the experts committee,[2]

Michael Nothnagel, chairman of the committee

Under the decree No.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 sole result of evaluation by the expert committee, the composition of which is specified below.

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

Unit name:	Génétique, Génomique fonctionnelle et Biotechnologies
Unit acronym:	GGB
Label requested:	UMR INSERM –University of Brest
Current number:	1078
Name of Director (2015-2016):	Mr Claude FÉREC
Name of Project Leader (2017-2021):	Ms Emmanuelle GÉNIN

Expert committee members

Chair:	Mr Michael NOTHNAGEL, University of Cologne, Germany
Experts:	Ms Monique BOLOTIN-FUKUHARA, Université Paris-Sud
	Mr Ralph EPAUD, Université Paris-Est Créteil (representative of CSS Inserm)
	Mr Jamal TAZI, Université de Montpellier
	Ms Elisabeth TOURNIER-LASSERVE, Université Paris 7 (representative of the CNU)

Scientific delegate representing the HCERES:

Ms Sophie EZINE

Representatives of supervising institutions and bodies:

Mr Christian BERTHOU, Faculté de Médecine, Brest

Mr Rémi BRAJEUL, Centre Hospitalier Recherche Universitaire, Brest

Ms Marianne DESMEDT, Inserm

Mr Pascal GENTE, Université Bretagne Occidentale

Ms Marie-Josèphe LEROY-ZAMIA, Inserm

Mr Jean-Christophe PAGÈS, Établissement Français du Sang

Head of Doctoral School:

Mr Christian BROSSEAU, Doctoral School n° 373 "Santé, Information – Communications, Mathématiques, Matière – SICMA"

1 • Introduction

History and geographical location of the unit

The research unit started in 1996 with an Inserm Research Contract (CRI) awarded to Mr Claude FÉREC for developing human molecular genetics. The research was initially devoted to the study of the CFTR gene and mutations causing cystic fibrosis, a disease particularly common in Brittany. The late 90s' were a fertile time for molecular geneticists, with the discovery of genes implicated in numerous diseases. Over the years, the unit also initiated new research projects, with a particular interest in chronic pancreatitis, polycystosis and haemochromatosis. Five years later, in 2001, a joint unit, associating Inserm, the local university (UBO: "Université de Bretagne Occidentale") and the French Blood Agency (EFS: "Établissement Français du Sang"), was created.

The Inserm UMR 1078 is currently organized around five main themes: (1) "functional genetics and epidemiology", (2) "gene transfer and gene therapy", (3) "RNA splicing, lipid metabolism and apoptosis control", (4) "yeast models of human pathologies" and (5) "channelopathies and calcium signalling". In addition, the unit hosts two technical platforms, one is dedicated to protein production and purification (PURIPROB) and the other is for testing non-viral delivery systems (SynNanoVect).

At the last evaluation, it was suggested by the visiting committee that, given the diversity of themes and the limited overlap between them, the research unit should evolve towards several separated teams. The different themes have therefore continued to be developed as independent research projects with the idea that three different teams could emerge. However, to meet the challenge of personalized medicine and remain competitive, bigger research structures with complementary expertises in different fields are now encouraged. Based on this analysis and also on the good collaboration spirit shared by all the theme leaders of the unit, the different groups of the unit have, thus, decided to stay together within a single entity, with three main themes that will still be developed as independent projects but with the shared objective of a better understanding of the molecular basis of phenotypes. They have also invited a group of researchers conducting a research program on the pulmonary microbiota of cystic fibrosis patients to join the unit, in order to benefit from their expertise in this field and develop novel integrative research projects, in particular pertaining to gene-environment interactions.

Further, in the future contract, three main themes will be presented with the merging of themes (2) and (4) into a single theme and theme (5) "channelopathies and calcium signalling" that will no longer be developed. The unit will include (1) Molecular genetics and genetic epidemiology that will include most of the members of UMR 1078 involved in the previous theme 1 and the members of the LUBEM involved in the study of the pulmonary microbiota; 2) Somatic gene expression and RNA splicing that will include the members of the previous Theme 3 and a few members of Theme 1 involved in the study of the genetic and cytogenetic abnormalities in myelodysplastic and myeloproliferative syndromes; (3) Biotechnological developments and chemobiological approaches, that will merge the previous Theme 2 on gene transfer and Theme 4 on yeast-based chemobiological approaches that will constitute its two main axes.

The dispersion of the working places, which are distributed on the three floors of the Faculty of Medicine and Health Sciences of Brest and also at Brest hospital (CHRU) and EFS (Établissement Français du Sang) premises, represents one of the current weaknesses of the UMR 1078. The construction of a new building "Institut Bréstois de Recherche en Biologie en Santé" (IBRBS) that just started in 2015 will put an end to this geographical dispersion at the beginning of the future contract in 2017.

Management team

The proposed director of the unit for the next contract is Ms Emmanuelle GÉNIN with Mr Marc BLONDEL as deputy-director. Ms Emmanuelle GÉNIN will take over from Mr Claude FÉREC the current director.

HCERES nomenclature

SVE_LS1

Scientific domains

The unit has develop a biomedical research with a particular focus on genetics and personalized medicine, starting from cohorts and biological samples of patients and epidemiological studies to the identification of new causative genes and their mutations, the elucidation of the functional consequences of these mutations, including somatic mutations, as they occur in cancer, and finally the exploitation of this knowledge toward the clinics through translational studies. Further, their main scientific objectives are to understand the genetic bases of human disorders (in particular rare diseases) and to exploit this knowledge to discover new and more personalised candidate treatments. Objectives achievement will be ensured by (1) identifying genes and genetic variants within these genes that are associated with disease susceptibility, disease severity and disease progression, (2) unravelling the molecular mechanisms involved, (3) developing efficient models to screen candidate therapeutics (drugs, genes, etc.).

Unit workforce

Unit workforce	Number on 30/06/2015	Number on 01/01/2017
N1: Permanent professors and similar positions	16 (5.8)	23 (8.33)
N2: Permanent researchers from Institutions and similar positions	9	9
N3: Other permanent staff (technicians and administrative personnel)	22 (20.6)	23 (21.6)
N4: Other professors (Emeritus Professor, on-contract Professor, etc.)	1	
N5: Other researchers from Institutions (Emeritus Research Director, Postdoctoral students, visitors, etc.)	3	
N6: Other contractual staff (technicians and administrative personnel)	13	
N7: PhD students	20	
TOTAL N1 to N7	**84 (72.4)**	
Qualified research supervisors (HDR) or similar positions	17	

Unit record	From 01/01/2010 to 30/06/2015
PhD theses defended	15
Postdoctoral scientists having spent at least 12 months in the unit	9
Number of Research Supervisor Qualifications (HDR) obtained during the period	6

2 • Overall assessment of the unit

Introduction

The unit has started following the genetic mapping of the CFTR gene some 20 years ago. Since then, it has broadened its focus both from monogenic, via oligogenic, to complex and multifactorial diseases including haemochromatosis, chronic pancreatitis, congenital dislocation of the hip and others, and from mere genetic mapping to understanding the etiology of diseases and translating this knowledge into medical treatment. In particular since the last evaluation report (2011), genuine integrative genetic approaches to decipher Mendelian and complex disorders, gene regulation by genetic modifiers and environmental factors, mechanisms of alternative splicing and post-transcriptional regulation as well as translational approaches via drug identification in model organisms have been developed. For the future contract phase (2017-2021), the unit plans to strengthen this "from-bench-to-bedside" integrative research model, spanning from the identification of disease-causing (genetic) factors via understanding their physiological mechanisms to delivering promising drug candidates for future medical treatment. This is to be achieved by a single-entity, three-themes approach that additionally includes rare-variant mapping approaches, microbiota research, systems biological modelling and efficient screening models for therapeutics in the future.

Global assessment of the unit

The research program of the unit is driven by health-oriented research, involving genetic rare diseases, cancer biology and gene therapy. The quality of science is very good to excellent, with a considerable number of publications during the evaluation period, two technological platforms in place and excellent internal as well as external science communication. The unit has gathered an excellent national reputation but needs to strengthen its international visibility. The opening of Ms Emmanuelle GÉNIN as the new head of the unit provides a great opportunity, building on past achievements, to re-orient this excellent, dynamic and well progressing unit, both to broaden the data basis and the used analytical methods as well as to deepen the integrative research approach. The unit has presented a clear, comprehensive and solid strategic vision for the future contract (2017-2021).

Strengths and opportunities in the context

The unit combines very good, complementary and well-recognized expertise in molecular genetics, statistical genetics and functional genomics. It has a clear strategic vision for the future evolution of the unit. Furthermore, the unit has access to well phenotyped cohorts of patients and healthy controls, access to very good genomic platforms and good links to local clinical research. Research topics are timely and ideally placed at the junction between basic and applied research. The unit is inserted in good national and international collaborative networks. It is actively involved in the training of PhD students, in the teaching of medical students, master students in various programs as well as students in paramedical courses. The unit is very well organized and this coherence should allow efficient pursuit of the unit's program. The organization promotes efficient scientific exchanges within the unit and outside.

Weaknesses and threats in the context

The unit comprises relatively small-sized groups involved in the various themes. Given the large number of distinct projects that are to be pursued, a risk of dispersion exists. Furthermore, although many collaborations exist, both the international visibility and the international network are not yet strong enough.

Recommendations

Given the small size of the groups, the unit leader has to be careful to keep them focused and to think of projects in agreement with the size of the thematic group. A focus should be put on the integration of Theme 2 in the unit. In this regard, hiring new post-docs (international post-docs if possible) and graduate students will be critical to the future success. To this end, a strategy to obtain ANR and EC grants is important. An effort should be made to extend participation in international networks and organization of international meetings to strengthen the international visibility of the unit.