

FINAL RESUME ON THE RESEARCH UNIT
RMeS - Regenerative Medicine and Skeleton

UNDER THE SUPERVISION OF THE
FOLLOWING INSTITUTIONS AND RESEARCH
BODIES:

Université de Nantes

Institut national de la santé et de la recherche
médicale - INSERM

ONIRIS - École nationale vétérinaire, agroalimentaire et
de l'alimentation, Nantes Atlantique

EVALUATION CAMPAIGN 2020-2021
GROUP B



In the name of Hcéres¹:

Mr Thierry Coulhon, President

In the name of the experts committee²:

Mr Jan Tuckermann, Chairman of the
committee

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

¹ The president of Hcéres "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 experts committee". (Article 11, paragraph 2).

Tables in this report were filled with certified data submitted by the supervising body on behalf of the unit.

UNIT PRESENTATION

Unit name:

Regenerative Medicine and Skeleton

Unit acronym:

RMeS

Current label and N°:

UMR 1229

ID RNSR:

201722762X

Application type:

Renewal

Head of the unit (2020-2021):

Mr Jérôme Guicheux

Project leader (2021-2025):

Mr Jérôme Guicheux

Number of teams and/or themes:

2

EXPERTS COMMITTEE MEMBERS

Chair:

Mr Jan Tuckermann, University of Ulm, Germany

Experts:

Ms Karine Anselme, CNRS, Mulhouse (representative of INSERM CSS)

Ms Delphine Farlay, INSERM, Lyon (supporting personnel)

Mr Elias Fattal, Université Paris-Saclay, Châtenay-Malabry

Mr Youssef Haikel, Université de Strasbourg (representative of CNU)

Mr Rik Lories, KU Leuven, Belgium

Mr Arnaud Scherberich, University of Basel, Switzerland

HCÉRES REPRESENTATIVE

Mr Jean-Marc Lobaccaro

REPRESENTATIVES OF SUPERVISING INSTITUTIONS AND BODIES

Mr Jean-Marie Bach, ONIRIS Nantes

Mr Laurent Beck, École Doctorale Biologie Santé, Nantes

Mr Bertrand Cariou, Faculté de Médecine de Nantes

Mr Frédéric Delaleu, INSERM

Mr Olivier Grasset, Université de Nantes

Mr Milan Lazarevic, CHU de Nantes

Mr Franck Lethimonnier, ITMO

Ms Alexa Rouez, DRIED (Direction de la Recherche, de l'Innovation et des Études Doctorales), Angers

Ms Anne Royer, CHU de Nantes

Mr Sébastien Youinou, Université de Nantes

INTRODUCTION

HISTORY AND GEOGRAPHICAL LOCATION OF THE UNIT

The unit RMeS laboratory (Regenerative Medicine and Skeleton Research laboratory) finds its origin in the INSERM unit U225 created in 1983 and further renewed regularly to end in 2006 in the creation of LIOAD "Center for Osteoarticular and Dental Tissue Engineering" in the School of Dental Surgery at University of Nantes. This unit has a longstanding reputation in the University of Nantes in the domain of tissue engineering and more especially in calcium phosphate ceramics for bone substitution, and was successively led by Mr B. Kerebel, Mr G. Daculsi and Mr P. Weiss.

The LIOAD laboratory composed of forty-nine people in 2006 was organized in a single research team sharing its activities between three research themes working in tight collaboration. In the further years, the staff increased to about eighty-five people, including permanent and temporary people, as well as PhD students and postdoctoral fellows and extended its activity to hydrogels for tissue engineering and developed additional topics due to the arrival of new researchers. To reflect this orientation, the structure was dubbed RMeS in 2017, and was organized into two teams entitled STEP ("Skeletal Tissue Engineering and Physiopathology") and REGOS ("Regenerative Medicine of Bone Tissues").

The RMeS unit was located within the School of Dental Surgery of the University of Nantes, spreaded on about 1700 m². This includes offices as well as four technical platforms composed of cell and tissue culture, molecular biology and physico-chemistry as well as imaging instruments.

It was headed by Mr J. Guicheux (DR Inserm) assisted by Ms C. Le Visage (DR Inserm) and Ms V. Geoffroy (DR Inserm) as deputy-directors. The direction team was assisted by a steering committee, including representatives of research themes. The unit will welcome the former GEROM UPRES EA 4658 University/Hospital of Angers in the REGOS team.

RESEARCH ECOSYSTEM

The unit is affiliated to Inserm, University of Nantes and the National Veterinary School of Nantes (ONIRIS). More specifically, several members of the unit are involved in the CRIP at ONIRIS ("preclinical investigation and research center"), while most of the university/hospital researchers and clinicians of the unit belong to the University Hospital of Nantes (NUH). More precisely, they belong to the departments of rheumatology, orthopedics, neurosurgery, maxillo-facial surgery, ear, nose and throat (ENT) surgery, physical and rehabilitation medicine, odontology and pharmacy of the NUH. The unit members are strongly involved in the management bodies of the University of Nantes, University Hospital of Nantes, ONIRIS etc.

The unit is also member of the François Bonamy Federative Research Institute, which gathers eighteen technological platforms (PF), six INSERM research units, one INRAE research unit, one CNRS research unit and two INSERM-CNRS research units. The unit is more specifically collaborating with some of them such as animal facilities (UTE-IRSUN), the MicroPicell PF (confocal microscopy, BRET, FRAP, FLIM, slide scanner), the Cytocell PF (FACS, cell sorting), the iPS PF (human and animal iPS), the protein PF (Biacore), and the GenoBird platform for genomics.

Members of the unit are also participating to the BIOREGATE research, formation and innovation regional cluster dedicated to regenerative medicine of multiple organs.

The unit has strong interactions with local private companies and has contributed to the creation of several start-ups. For research transfer, the unit beneficiates from SATT Ouest Valorisation.

At the national level, beside the participation of its members in national scientific societies in biomaterials, tissue engineering and regenerative medicine, the unit is participating to national research networks such as the ROAD Arthritis Foundation network or the NetWOArk, a national INSERM Research Network dedicated to peripheral and spine osteoarthritis.

The researchers and professors of the unit are affiliated to the doctoral school of biology and health (ED-BS) of the University of Nantes. The INSERM researchers of the unit are affiliated to the INSERM Specialized Scientific Committee CSS 6: Public Health and Health Technology and the two CNRS researchers are affiliated to the CNRS section 22. Professors and Assistant-professors are affiliated both to CNU sections in health disciplines (Medicine sections 42, 49, 50, 55 and Odontology sections 57, 58), pharmaceutical disciplines (80, 85) and scientific disciplines (65, 66). Of note, some RMeS members have been or are currently members of CNU sections.

HCÉRES NOMENCLATURE AND THEMATICS OF THE UNIT

SVE5 Physiologie, Physiopathologie, Cardiologie, Pharmacologie, Endocrinologie, Cancer, Technologies Médicales

UNIT WORKFORCE

Active staff	Number 06/01/2020	Number 01/01/2022
Full professors and similar positions	16	21
Assistant professors and similar positions	13	15
Full time research directors (Directeurs de recherche) and similar positions	5	5
Full time research associates (Chargés de recherche) and similar positions	3	3
Other scientists ("Conservateurs, cadres scientifiques des EPIC, fondations, industries, etc.")	0	0
High school teachers	0	0
Supporting personnel (ITAs, BIATSSs and others, notably of EPICs)	21	24
Permanent staff	58	68
Non-permanent professors and associate professors, including emeritus	1	
Non-permanent full time scientists, including emeritus, post-docs (except PhD students)	7	
PhD Students	16	
Non-permanent supporting personnel	8	
Non-permanent staff	32	
Total	90	68

GLOBAL ASSESSMENT OF THE UNIT

The RMeS unit under the supervision of Nantes University and INSERM, a two-team unit (STEP and REGOS), is working in the field of the regenerative medicine of the skeleton, from the conception of biomaterials, specifically in hydrogels and calcium phosphate ceramics for skeletal tissues substitution, up to the physiopathology of skeletal tissues including bone, teeth, cartilage and intervertebral disc.

The unit has a good to very good publication record (161 research publications signed by RMeS members over the period, 61 % signed by RMeS members as first or last author, corresponding roughly to 2,6 first authorships for 37 permanent scientists over the period) mostly in journals of specialties. The unit has to improve the number of articles in high profile journal for the general scientific audience. Even though few projects in epigenetics are managed for the complex biology of bone regeneration, implementing major system biological approaches could provide also major advances in general cell biology and cellular cross-talk and would allow to target those types of journals.

The European visibility of the unit is evidenced by i) the organization of several international conferences (HYPOXIA 2015, Biohydrogels 2015, Basic Research on Bone and Cartilage Biology (2015, 2017, 2019), BIOREGATE Forum (2016, 2018), ROAD summer and winter school 2016 and 2018) and ii) its participation in several European projects. International recognition could be reached by taking the lead of international projects more and attracting more foreign postdoctoral fellows.

Funding is very good to excellent and is continuously rising (3.3. M€ 2019) and includes three European grants (two H2020 and one ERA-NET, as partners), eleven ANR grants, fourteen regional grants, one FUI grant.

The valorization is outstanding as illustrated by the seventeen patents filed and nine with licensing agreements and three founded companies. One joint lab (LabCom GELMECS) funded by ANR was created in 2020 with HTL company. Both teams are involved in this joint lab. However, involvement in clinical trials should be improved in particular for the REGOS team.

The unit has very good presence in the national media (TV and press) and thus disseminates its results successfully to the public.

The commitment of RMeS members in training through research is very good as illustrated by the teaching and coordination in various Master programs at the University of Nantes (at Master 1 and Master 2 levels) as well as in other French Master programs on one hand and Master (28) and PhD (21 defended, 16 ongoing) students' training over the period with a mean duration of four years, all PhD students having defended their doctoral dissertation with several articles, usually as first authors.

The unit scientific strategy for the next period is considered as very good to excellent as exemplified by the reorganization of the teams in order to decrease the thematic diversity, and by the integration of new members from another laboratory, bringing new competences. The RMeS unit has to rapidly initiate new clinical trials based on biomaterials and strategies developed, given the high number of clinicians in the laboratory and numerous pre-clinical validations.

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