

FINAL RESUME ON THE RESEARCH UNIT  
MINT - Translational Micro and Nano medicines

UNDER THE SUPERVISION OF THE  
FOLLOWING INSTITUTIONS AND RESEARCH  
BODIES:

Université d'Angers

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

Centre National de la Recherche Scientifique - CNRS

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**EVALUATION CAMPAIGN 2020-2022**  
GROUP B

Report published on July, 19 2021



In the name of Hcéres<sup>1</sup>:

Mr Thierry Coulhon, President

In the name of the experts committee<sup>2</sup>:

Ms Nathalie Mignet Zoppi, Chairwoman of the committee

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

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

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

## UNIT PRESENTATION

<b>Unit name:</b>	Translational Micro and Nano medicines
<b>Unit acronym:</b>	MINT
<b>Current label and N:</b>	UMR
<b>ID RNSR:</b>	201722390T
<b>Application type:</b>	Renewal
<b>Head of the unit (2020-2021):</b>	Mr Patrick Saulnier
<b>Project leader (2021-2025):</b>	Mr Patrick Saulnier
<b>Number of teams:</b>	1

## EXPERTS COMMITTEE MEMBERS

<b>Chair:</b>	Ms Nathalie Mignet Zoppi, CNRS, Paris
<b>Experts :</b>	Mr Alain Durand, Université Lorraine, Nancy (representative of CoNRS) Ms Julie Mouglin, CNRS, Paris (supporting personnel) Mr Olivier Piot, Université de Reims Champagne-Ardenne, Reims (representative of CNU) Ms Valérie Taly, Université Paris Descartes (representative of INSERM CSS) Ms Nathalie Wauthoz, Université Libre de Bruxelles, Belgique

## HCÉRES REPRESENTATIVE

Mr Jean Edouard Gairin

## REPRESENTATIVES OF SUPERVISING INSTITUTIONS AND BODIES

Mr Laurent Bouteiller, INC CNRS  
Mr Loïc Carballido, CHU Angers (partenaire)  
Mr Alexandre Legris, INC CNRS  
Ms Marie-Joséphine Leroy-Zamia, Inserm  
Mr Philippe Simoneau, Université d'Angers

## INTRODUCTION

### HISTORY AND GEOGRAPHICAL LOCATION OF THE UNIT

The MINT unit is located within the Angers Hospital campus. It was created in 1990 by Mr Jean-Pierre Benoit. In 2017, Mr Patrick Saulnier took the lead. The MINT unit initially recognized by the Angers University, in 2001 by INSERM, and finally in 2017 by the CNRS. This was the opportunity to focus the activities around formulation and characterization of nano and micro-objects. The reorganization of the unit in 2017 led to the departure of seven teachers-researchers and one INSERM researcher, and the arrival of a research team composed of four teachers-researchers and one INSERM researcher.

### RESEARCH ECOSYSTEM

The MINT unit is recognized by three research structures: Angers University, CNRS, INSERM. Resources are managed by the university.

The actual director of MINT unit is in charge of the Biostatistics and methodology department of the CHU, which is a strategic partner of the UMR.

The MINT unit is part of the Health Pole of the University, and is located in the 'Institut Biologie Santé', which gathers almost all common facilities. Within these facilities, one member of MINT is managing the Imaging and Multimodal Research platform.

The MINT unit is also a member of the Health-SFR ICAT 4208, called cellular interactions and therapeutic applications. The head of the unit is member of the SFR board and one MINT member is an elected representative.

The MINT unit will joint in 2021 the interregional platform SYNANOVECT, currently involving four laboratories composed of chemists and biologists from the Universities of Brest and Rennes. The microfluidic processes will be transposed from the laboratory to this interregional platform.

The MINT unit also closely collaborates with two start-ups, Carlina technologies initially founded by MINT unit, and Gliocure originating from researchers now affiliated to the UMR, respectively.

### HCÉRES NOMENCLATURE AND THEMATICS OF THE UNIT

SVE5, ST5, ST4

The MINT unit designs nano- and micro-objects for drug delivery, characterizes their physico-chemical properties and their interaction with the biological environment.

### MANAGEMENT TEAM

Mr Patrick Saulnier is the current and next director of the unit. Ms Catherine Passirani is the current deputy head. Mr Laurent Lemaire will be the deputy head for the next contract.

### UNIT WORKFORCE

MINT		
	Active staff	Number 06/01/2020
		Number 01/01/2022
	Full professors and similar positions	9
	Assistant professors and similar positions	12
	Full time research directors (Directeurs de recherche) and similar positions	1
	Full time research associates (Chargés de recherche) and similar positions	1
	Other scientists ("Conservateurs, cadres scientifiques des EPIC, fondations, industries, etc.")	0
	High school teachers	0
	Supporting personnel (ITAs, BIATSSs and others, notably of EPICs)	8

<b>Permanent staff</b>	<b>31</b>	<b>32</b>
Non-permanent professors and associate professors, including emeritus	2	
Non-permanent full time scientists, including emeritus, post-docs (except PhD students)	1	
PhD Students	15	
Non-permanent supporting personnel	2	
<b>Non-permanent staff</b>	<b>20</b>	
<b>Total</b>	<b>51</b>	<b>32</b>

## GLOBAL ASSESSMENT OF THE UNIT

The MINT unit has a strong expertise in the formulation of lipid nanocapsules and microspheres. It is a multidisciplinary group focused on pharmaceutical development and innovative tools for the conception, characterization, production of drug delivery systems, and their interaction with the targeted biological environment. MINT unit shows a high robustness (health-SFR technological core facilities, European grants, critical mass) and a strong interdisciplinary research.

The quality of the research in the MINT unit and scientific production (130 research papers, of which 65 % with members as first and/or last authors in journals like *Journal of Controlled Release*, *International Journal of Pharmaceutics*, *Biomaterials*, *Journal of Physical Chemistry Letters*, *PLOS One* or *Scientific Reports* and 47 clinical articles in *Leukemia*, *Journal of hepatology*) is overall very good with some disparities between the axes (Axis 1 excellent, Axis 2 very good).

MINT has got a very good number of regional, national (2 ANR as coordinator) and European (3 EuroNanoMed as coordinator and 2 FP7 program as partner) grants obtained during the period. The excellent visibility, recognition and attractiveness of the unit at the national level, should be further enhanced at the international level in particular by increasing the international academic collaborations.

The strong interaction with the socio-economic environment is illustrated by five patents during the period, collaborative contracts with start-ups emanating from the unit and other private companies (Feroscan, Eydo pharma, Addenium, Greenimpulse) including four CIFRE funding. The MINT unit should take advantage of its capacity to interact with private companies to raise the level of funding issued from these interactions.

Training through research has been excellent during the period with a substantial number of students in collaborative projects and international students, reflecting the appeal of the unit. The MINT unit members have been highly involved into student training through European programs for Master and doctorate students (Nanomed, Nanofar) with an excellent professional integration of the students.

The governance and the life of the unit are very well organized. Despite the strong restructuration with the departure of thirteen permanent staff and the arrival of nine permanent staff, the director managed to maintain the scientific topics concentrating on more fundamental research and researcher expertise. Increasing the number of meetings at the unit level would further reinforce the number and the quality of the shared projects.

In the next contract, the MINT unit will remain as a single team with two main focus which are the development of novel drug delivery systems and their evaluation towards the living. This focalization aims at positioning the unit members as experts in this field, favoring the socio-economic interactions with pharmaceutical companies and foster future collaborations. Higher implications of biologists to elaborate models able to determine nanoparticles integrity, toxicity and glioblastoma stem cells targeting should provide new knowledge and advances in the field.

The very good project in both axes, would deserve a reduced number of sub-projects with the best potential in terms of innovation or clinical translation, consistently with skills and number of permanent people and this could be achieved by focusing on main common objectives for the unit as regard to the international competition.

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