

REPORT ON THE RESEARCH UNIT:  
Proteomic, Inflammatory Response, Mass  
Spectrometry (PRISM)

UNDER THE SUPERVISION OF THE  
FOLLOWING INSTITUTIONS AND  
RESEARCH BODIES:

Université de Lille

Centre hospitalier régional et universitaire de  
Lille - Chru Lille

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

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**EVALUATION CAMPAIGN 2018-2019**  
GROUP E



In the name of Hcéres<sup>1</sup>:

Michel Cosnard, President

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

François Berger, Chairman 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).

This report is the sole result of the unit's 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.

Tables in this report were filled with data provided by laboratories and supervising bodies in the unit's application and in the Excel files "Données du contrat en cours" and "Données du prochain contrat".

## UNIT PRESENTATION

<b>Unit name:</b>	Proteomic, Inflammatory Response, Mass Spectrometry
<b>Unit acronym:</b>	PRISM
<b>Requested label:</b>	UMR Inserm
<b>Application type:</b>	Renewal
<b>Current number:</b>	U 1192
<b>Head of the unit (2018-2019):</b>	Mr Michel SALZET
<b>Project leader (2020-2024):</b>	Mr Michel SALZET
<b>Number of teams:</b>	1

## EXPERTS COMMITTEE MEMBERS

<b>Chair:</b>	Mr François BERGER, Université Grenoble-Alpes
<b>Experts:</b>	Mr Christophe CLEMENT, Université de Reims Champagne-Ardenne (representative of CNU) Ms Chiara GUERRERA, Inserm Paris (supporting personnel) Ms Valérie TALY, CNRS Paris (representative of Inserm CSS)

## HCÉRES REPRESENTATIVE

Mr Pierre COUBLE

## REPRESENTATIVES OF SUPERVISING INSTITUTIONS AND BODIES

Ms Marie-Josèphe LEROY-ZAMIA, Inserm  
Mr Lionel MONTAGNE, Université de Lille  
Mr Patrick VERMERCH, Université de Lille

## INTRODUCTION

### HISTORY AND GEOGRAPHICAL LOCATION OF THE UNIT

U1192 Inserm was created in 2015. It is one of the laboratories of the biology department of sciences and technology at the University of Lille (U Lille). It is located on the first floor of the SN3 building at the campus "Cité scientifique" of U Lille. Since 2015, it is also located at the Faculty of Medicine of U Lille at the hospital campus thanks to the association with D. Vinatier at the department of gynaecology, E. Blanc of the regional cancer comprehensive center of Lille (Centre Oscar Lambret) as well as association with neurooncologists of the neurosurgery department.

### MANAGEMENT TEAM

PRISM is a single-team unit with Michel Salzet as the Director and Isabelle Fournier as Deputy Director.

### HCÉRES NOMENCLATURE

SVE2\_2; ST4\_4; SVE6\_3.

### SCIENTIFIC DOMAIN

The scientific activity is organized in two axes, the first focuses on Maldi MS imaging technologies including tissue microproteomics for high throughput protein identification, on-tissue protein quantification and structure analysis and correlation between proteome and transcriptome. The second axis aims at studying the role of macrophages/microglia cells response modulation in two main clinical applications that are spinal cord injury and brain tumors.

### UNIT WORKFORCE

	Unit workforce	
	Proteomic, Inflammatory Response, Mass Spectrometry	
Active staff	Number 30/06/2018	Number 01/01/2020
Full professors and similar positions	6	6
Assistant professors and similar positions	10	7
Full time research directors (Directeurs de recherche) and similar positions	0	0
Full time research associates (Chargés de recherche) and similar positions	0	1
Other scientists ("Conservateurs, cadres scientifiques des EPIC, fondations, industries, etc.")	9	10
High school teachers	0	0
Supporting personnel (ITAs, BIATSSs and others, notably of EPICs)	5	7
<b>Permanent staff</b>	<b>30</b>	<b>31</b>

Non-permanent professors and associate professors, including emeritus	2	
Non-permanent full time scientists, including emeritus, post-docs	16	
PhD Students	13	
Non-permanent supporting personnel	3	
<b>Non-permanent staff</b>	<b>34</b>	
<b>Total</b>	<b>64</b>	

## GLOBAL ASSESSMENT OF THE UNIT

PRISM research activity focuses on the development of innovative technologies in the field of Maldi MS imaging technologies from the proteomic concept to its translation at the bedside both *ex-vivo* and *in vivo*. Research activity is organized in two axes: innovation technology axis and therapeutic innovation axis. As suggested by previous Hceres evaluation, the research unit has shown an effort to implement a more focused research. In particular the axis of the former research unit dedicated to *Hirudo officinalis* has been abandoned. The unit is recognized as EAL (European Associated Laboratory) with the department of surgery and cancer at the Imperial College London since 2017. The life of the unit is well structured. The educational activity is excellent disseminating the knowledge of the unit at the local, national and international levels. The research unit pays attention to the training of young researchers and follows closely the fate of the PhD students and the postdocs. Fundraising has been significantly increased for industry and academic grants. PRISM research achievements in Tag-Mass multiplexed tissue imaging and spidermass technologies are outstanding. An excellent industrial valorisation was carried out with the deposit and validation of several patents as well the creation of Immabiotech and Y-med start-ups. The unit also hosts O'Dreams (Oncological DRivEn Associated Mass Spectrometry), a LabCom with the company Oncovet clinical research. The level of publications was enhanced as illustrated, for example, by the outstanding publication of the Spidermass technology in Cancer Cell. Beside the innovation technology axis, the therapeutic activity axis implements the connected clinical translation and validations. The clinical developments in neuro-oncology are excellent, and well integrated within a multicentre PHRC that will perfectly support the medical validation of the innovative technologies developed by axis 1.

## DETAILED ASSESSMENT OF THE UNIT

### UNIT'S RESPONSE TO PREVIOUS RECOMMENDATIONS

Previous recommendations were addressed by increasing the recruitment of post-doctoral fellows and the increase of HDRs. Considerable efforts were made to attract scientists which could represent potential candidates for Inserm recruitment, but this remained unsuccessful. Four engineers were also integrated, and the PhD student number increased from 5 to 13. Scientific focalisation was increased by the delegation of the collaboration projects to the CLIC-imaging platform. The instrumental park was renewed with one synapt G2S and one Rapidflex. Moreover, in 2018 funds were acquired from Plan Cancer to get a Xevo QTOF instrument with DESI Imaging and REIMS ion source. The work on *Hirudo officinalis* has been arrested. A significant effort was made to publish more in generalist journals increasing the impact of publications, this effort should be continued.

### CRITERION 1: QUALITY OF SCIENTIFIC OUTPUTS AND ACTIVITIES

#### A – Scientific outputs and activities, academic collaborations, reputation and appeal

Scientific outputs and activities, academic collaborations, reputation and appeal From 01/01/2013 to 30/06/2018	Proteomic, Inflammatory Response, Mass Spectrometry
<b>Articles</b>	
Scientific articles	81
Scientific articles with last authorship	61
Review articles	18
Other articles (professional journals, etc.)	3
Clinical articles	95
<b>Books</b>	
Scientific book edition	0
Book chapters	6
<b>Meetings</b>	
Meeting abstracts	66
Meetings and congress organisation	11
<b>Electronic tools and products</b>	
Software	1
Databases	1
Tools for decision making	1
Cohorts ( <i>Biology only</i> )	7
<b>Instruments and methodology</b>	
Prototypes	2
Platforms and observatories	2
<b>Editorial activities</b>	
Participation to journal editorial boards (books, collections)	yes

<b>Peer reviewing activities</b>	
Reviewing of journal articles	yes
Grant evaluation (public or charities)	yes
Participation to lab site visit committees (Hcéres, etc.)	yes
Participation to institutional committees and juries (CNRS, Inserm, etc.)	yes
<b>Academic research grants</b>	
European (ERC, H2020, etc.) and international (NSF, JSPS, NIH, World Bank, FAO, etc.) grants	5
National public grants (ANR, PHRC, FUI, INCA, etc.)	9
Local grants (collectivités territoriales)	7
PIA (Labex, Equipex, etc.) grants	7
Grants from foundations and charities (ARC, FMR, FRM, etc.)	3
<b>Visiting senior scientists and post-docs</b>	
Post-docs	7
Visiting senior scientists	3
<b>Scientific recognition</b>	
Prizes	14
Distinctions	3
IUF members	1
Chair of learned and scientific societies	oui
Invitations to meetings and symposia (out of France)	49
Members' long-term visits abroad	1

## Strengths

High international acknowledgments in the field of proteomic and mass spectrometry imaging supported by the mapping of the international group leaders worldwide published in 2017 by the American society for mass spectrometry. Four cover journals and 50 conference invitations including keynote plenary lectures were recorded, as well as 1 *Cancer Cell* publication for spidermass technology that was also awarded by several innovation technology prizes. Moreover, the deputy director has applied for an ERC advanced funding where she passed the first round attesting of her high international recognition. Strong fundraising capacities were demonstrated at the national (5x ANR, 2x INCa, LNCC, Cancéropole) and international (FEDER, NIH, US Fullbright grant) levels.

The unit has been recognized in 2017 as an EAL (European Associated Laboratory) with the department of surgery and cancer of Imperial College London. The unit also hosts O'Dreams, a LabCom with the company OCR (Oncovet clinical research).

From the last five years, 80 clinical papers and 42 publications (for a team of 50 scientists) have been published in top journals such as *Lancet*, *Cancer Cell* or *Molecular Cell Proteomics* (for the clinical aspects) with team members signing in leading positions. High attractiveness of the unit for clinicians (including veterinary ones via the O'dreams team) with a good renewal rate for the persons that left the unit.

A significant number of prizes (14) were obtained both by permanent and non-permanent scientists including young researchers.

## Weaknesses

Some researchers of the lab have a low publication activity, however this is also explained by a drastic reorientation of several scientists in the lab since the new contract. It is however important to mention that a clear and focused strategy to improve this aspect was presented. Moreover, this low publication activity is also linked to the fact that a large part of the professors and assistant professors are performing a significant activity of teaching (>40h in average above the number of hours due to the university). As discussed with the representatives of the university, both the Director and the Deputy Director will be exonerated from teaching during the next contract.

### Assessment of scientific outputs, reputation and appeal

In summary, this criteria is judged outstanding (axis 1) to excellent (axis 2). The novelty, international competitiveness of the MALDI-MS technology research implemented by PRISM as well as its translation is outstanding as illustrated by the paradigmatic example of spidermass technology.

## B – Interactions with the non-academic world, impacts on economy, society, culture or health

Interactions with the non-academic world, impacts on economy, society, culture or health From 01/01/2013 to 30/06/2018	
<b>Socio-economic interactions / Patents</b>	
Invention disclosures	6
Filed patents	1
Accepted patents	1
Licensed patents	1
<b>Socio-economic interactions</b>	
Industrial and R&D contracts	16
Cifre fellowships	1
Creation of labs with private-public partnerships	1
Networks and mixed units	7
Start-ups	2
Clinical trials	3
<b>Expertise</b>	
Consulting	no
Participation in expert committees (ANSES, etc.)	no
Legal expertise	no
Expert and standardization reports	no
<b>Public outreach</b>	
Radio broadcasts, TV shows, magazines	0
Journal articles, interviews, book edition, videos, etc.	2
Other popularisation outputs	2



Debates on science and society	1
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## Strengths

The creation of the IMABIOTECH start-up (with now 19 people) devoted to MassSpec imaging is an outstanding achievement and also an exponentially growing success after its creation in 2009. The new platform Y-MED based on spidermass technology was created in 2018 illustrating perfectly the remarkable continuum between technology innovation and industry implemented by the PRISM unit. These industrial collaborations provide a significant funding to PRISM. The creation of these new tools will allow new advances in deciphering of biological mechanisms, in the topic of the PRISM lab but also on many other research topics related to biology. The clinical trial activity implemented to validate the technology development of the lab is excellent. Strong fundraising capacities were demonstrated at the industrial level (SATT nord de France, OCR company, Advion, Thermo Scientific, Waters...) level.

## Weaknesses

Since 2013, one patent has been filled and licensed, 6 inventions disclosures have been made. This level of patenting is good but not outstanding especially regarding the several industrial projects and collaborations. However, several invention declarations were made recently and should lead to new patents in the very near future.

### Assessment of the interactions with the non-academic world

The interactions of PRISM with the non-academic world are rated outstanding. Even if the patenting could be further improved, this outstanding level is illustrated by the developed industrial collaborations and partnerships as well as the creation of platforms, joint teams and start-ups.

## C – Involvement in training through research

Involvement in training through research From 01/01/2013 to 30/06/2018	
<b>Educational outputs</b>	
Books	0
E-learning, MOOCs, multimedia lessons, etc.	1
Mean number of publications per student ( <i>Biology &amp; Science and technology only</i> )	7
<b>Training</b>	
Habilitated (HDR) scientists	6
HDR obtained during the period	1
PhD students	19
Defended PhDs	7
Mean PhD duration	36
Internships (BTS, M1, M2)	60
<b>Education</b>	
Courses with international label (ERASMUS, etc.)	2

## Strengths

PRISM research is closely linked to teaching activity disseminating its knowledge at the university level. A master of proteomic is a perfect example of this training integrating more than 350 students to date with a 91% rate of insertion. A mass Spectrometry DU and a University Immunology DU will be implemented in 2019. The participation to 2 international schools and masters demonstrates an international recognition in this field.

A mean of 7 publications per PhD student is mentioned regarding the 7 PhDs who graduated, which is a significant achievement. All of them signed at least one first author paper. It is also mentioned that all PhD students who defended their thesis found a job either in the industry or in the academia (such as MCF, IR, CEO or postdoctoral researcher) within a year after graduation. This point is rather exceptional and should be further emphasized.

Furthermore, 4 postdocs stayed in the unit and published 20, 10, 7 and 3 papers with 8, 2, 3 and 2 first author ones, respectively.

## Weaknesses

The number of postdocs could be increased.

### Assessment of the involvement in training through research

PRISM involvement in training through research is excellent to outstanding as illustrated by the quality of teaching activity and management of PhD students and postdocs.

## CRITERION 2: UNIT ORGANISATION AND LIFE

<b>Unit organisation and life</b> <b>From 01/01/2013 to 30/06/2018</b>	
Women/men ratio in the unit	50%
Women/men ratio among unit scientists	33%
Women/men ratio among unit PhD students	62%
Women/men ratio among team leaders, unit head and deputy heads	50%

## Strengths

The unit management and life is classically organized with a laboratory council, general assembly and scientific council. A high level scientific advisory board has been formed that reported in December 2017. The ratio between women and men in the various aspects of the unit organisation is globally equilibrated. The unit head pays attention to the needs of researchers, as well as to the well-being of the supporting personal. Interaction with the different members of the unit clearly demonstrated an outstanding unit's life, atmosphere and organization.

## Weaknesses

The team highlights as a weakness the obsolescence of the research and office premises, which should both be threat for the quality of research and for the attractiveness of the unit.

Moreover, the limited number of permanent research engineers for running and maintaining the lab equipment could also be detrimental to their research. Similarly, a strong support will be paramount to maintain the technology excellence of the proteomic platform.

The effort made to hire people on permanent research positions such as Inserm researchers and/or ATIP or ERC was not successful to date.

### Assessment of the unit's life and organisation

The committee was strongly impressed by the outstanding life's unit management and organization as expressed by the members of the unit during the visit.

## CRITERION 3: SCIENTIFIC STRATEGY AND PROJECTS

### Strengths

The innovation technology activity research of PRISM in the field of mass spectrometric imaging and proteomics is highly innovative providing several international breakthroughs in this field. Their development in the field of micro-proteomic and the new Tag-Mass concept provide unique opportunities to identify and multiplex low concentrated proteins in situ. This is a real paradigmatic shift in the field of MS imaging. The development of innovative technology for in vivo interventional imaging is outstanding. An original concept was developed, translated and validated with both high-level publications and high-level valorisation. The continuum between technology innovation development and its translation into clinical trial into the therapeutic innovation axis in neuro-oncology is also excellent. Rigorous multicentre prospective trials were implemented and they will support and validate the medico-economic interest of these technologies to optimize patient stratification and to find new therapeutic targets.

### Weaknesses

The scientific activity of PRISM is supported by less than 10 ETP. Many clinical programs are developed in different axes that dilute the translation efficacy of PRISM.

### Assessment of the scientific strategy and projects

The project is outstanding, integrating an enhanced focalisation that was already initiated during the last 5 years.

## RECOMMENDATIONS TO THE UNIT

### **A – Recommendations on scientific production and activities (criterion 1)**

The unit should continue its successful strategy in the field of proteomic and mass spectrometry imaging technology focusing on the more successful developments such as spidermass technology. Translational activity and clinical research should focus on the validation of the innovative technologies developed by axis 1 as well as on more focused clinical topics, such as neuro-oncology, that are excellent research area of the Lille biomedical research environment.

### **B – Recommendations on the unit's organisation and life (criterion 2)**

The excellent management of the unit should be reinforced. The on-going reorientation of the research efforts of some researchers should enhance the efficacy of the research. A strong effort should be implemented for the recruitment of full-time researchers and/or ATIP or ERC positions to reinforce the number of full-time researchers.

### **C – Recommendations on scientific strategy and projects (criterion 3)**

The research strategy already implemented by PRISM unit should continue the development of innovative technologies in proteomic in connection with an excellent valorisation and translational activity. Further focusing the work in the unit should be a priority to improve the global scientific strategy. Higher priority should be given to clinical programs in direct line with the innovation technology research activities as illustrated by the neuro-oncology project in order to enhance the global feasibility and competitiveness of the unit.

PRISM translational research project should enhance the collaboration with bioclinical excellence groups such as neuro-oncologists or ovarian cancer clinical researchers. The development of the transversal focusing on in situ immunoproteomic should be also supported, integrating the specific knowledge of PRISM researcher and bioclinical needs in the field of immunotherapy. It should be more successful than a global multi-level omics strategy not guided by specific biological hypothesis.

## CONDUCT OF THE VISIT

### DATE

**Start:** 7 January 2019 at 08:30

**End:** 7 January 2019 at 18:00

### VISIT SITE

**Institution:** Université de Lille

**Address:** Bâtiment de Biologie, rue Paul Langevin, Bâtiment SN3 1er étage, Villeneuve d'Ascq

### Specific premises visited

The laboratory and the platforms

## CONDUCT OR PROGRAM OF THE VISIT

Sunday January 6<sup>th</sup>, 2019

20:00 Dinner with all the expert committee members and the Scientific Officer (SO)

Monday January 7<sup>th</sup>, 2019

08:15 - 08:30 Welcome to the expert committee

08:30 - 09:00 Preliminary meeting of the expert committee (closed hearing)

Attending: expert committee, SO

09:00 - 09:15 Presentation of the Hceres evaluation - Pierre Couble, SO

09:15 - 10:00 Presentation of the research unit by Michel Salzet (including 15 min questions)

Attending: expert committee, SO, representatives of institutions and all unit members

10:00 - 10:50 Presentation of Axis 1 by L. Fournier and M. Wisztorski

10:40 - 10:50 Break

10:50 - 11:40 Presentation of Axis 2 by M. Salzet, M. Duhamel and D. Hajjaji

11:40 - 12:00 Visit of the laboratory

12:00 - 13:00 Lunch

13:00 - 14:00 Discussion around posters

14:00 - 14:30 Discussion with the representatives of Inserm and University of Lille

Attending: expert committee, representatives of Institutions, SO

14:30 - 16:00 Meeting of 30 minutes with, respectively:

1: the researchers and professors except the unit director

2: the technical and administrative staff

3: the PhD and post-docs

Attending: personnel, expert committee, SO

16:00 - 16:30 Meeting of the expert committee with the head of the unit

Attending: expert committee, SO

16:30 - 18:00 Deliberation of the expert committee (closed hearing)

Attending: expert committee, SO

18:00 End of the visit. Thanks and leave of the expert committee

## **SUPERVISING BODIES' GENERAL COMMENTS**

Affaire suivie par  
Stella BOUAMRIRENE  
+33 (0)3 62 26 80 82

Villeneuve d'Ascq, le 25 février 2019

**HCERES**  
**2 rue Albert Einstein**  
**75013 PARIS**

Objet : Courrier d'observation de portée générale Université Lille **DER-PUR200017167**

Madame, Monsieur,

L'université de Lille tient tout d'abord à remercier le comité de visite HCERES pour l'attention qu'il a portée au travail mené par l'unité de recherche **PROTEOMIQUE, REPONSE INFLAMMATOIRE, SPECTROMETRIE DE MASSE (U 1192)** et pour la qualité de l'évaluation qu'il a produite.

La visite sur site a été l'occasion, pour les membres du laboratoire et pour l'université, d'approfondir certaines questions et de répondre aux interrogations des experts, dans un esprit constructif dont il faut se féliciter.

Les recommandations émises dans le rapport d'évaluation seront précieuses pour orienter la politique de recherche de l'établissement pour le prochain contrat.

Le laboratoire reste mobilisé sur cette question et, avec le soutien de l'université de Lille, poursuivra ses efforts en vue d'une intégration plus poussée des personnels contractuels dans le laboratoire

Je vous prie d'agréer, Madame, Monsieur, mes sincères salutations.

Le Président,

Jean-Christophe CAMART



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