

EVALUATION REPORT OF THE UNIT

LP2M - Laboratoire de Physico-chimie médecine
moléculaire

UNDER THE SUPERVISION OF THE
FOLLOWING ESTABLISHMENTS AND
ORGANISMS:

Université Côte d'Azur - UCA,
Centre national de la recherche scientifique -
CNRS

EVALUATION CAMPAIGN 2022-2023
GROUP C



In the name of the expert committee¹ :

Alain Lacampagne, Chairman of the committee

For the Hcéres² :

Thierry Coulhon, President

Under the decree n° 2021-1536 of 29th November 2021:

¹ The evaluation reports "are signed by the chairperson of the expert committee". (Article 11, paragraph 2);

² The president of the Hcéres "countersigns the evaluation reports established by the expert committee and signed by their chairperson." (Article 8, paragraph 5).

This report is the result of the unit's evaluation by the expert committee, the composition of which is specified below. The appreciations it contains are the expression of the independent and collegial deliberation of this committee. The numbers in this report are the certified exact data extracted from the deposited files by the supervising body on behalf of the unit.

MEMBERS OF THE EXPERT COMMITTEE

Chairperson:

Mr Alain Lacampagne Université de Montpellier

Experts:

Ms Francoise Bleicher Université Claude Bernard Lyon 1 (CNU representative)

Mr Nicolas Bourmeyster Université de Poitiers (CNRS representative)

Mr Alain Lacampagne Université de Montpellier

Ms Paula Longhi Queen Mary University of London Royaume-Uni

Ms Irma Machuca-Gayet Centre national de la recherche scientifique – CNRS, Lyon

Mr Benoit Pourcet Université de Lille

Mr Emmanuel Clave, Université Paris-Cité, (PAR)

HCÉRES REPRESENTATIVE

Mr Kamel Benlagha

CHARACTERISATION OF THE UNIT

- Name: LABORATOIRE DE PHYSIOMÉDECINE MOLÉCULAIRE
- Acronym: LP2M
- Label and number: UMR7370
- Number of teams: 3
- Composition of the executive team: Laurent Counillon

SCIENTIFIC PANELS OF THE UNIT

SVE Sciences du vivant et environnement

SVE6 Physiologie et physiopathologie humaine, vieillissement

SVE4: Immunity, Infection and Immunotherapy

SVE3: Living Molecules, Integrative Biology (From Genes and Genomes to Systems), Cell and Development Biology for Animal Science

SVE7: Prevention, Diagnosis and Treatment of Human Diseases

THEMES OF THE UNIT

The unit is developing an interactive research program focusing on mineralization, imembrane transport, metabolism and pH regulation, as well as immune and inflammatory responses. Its objective is to integrate these different elements at the molecular and cellular level in order to better understand different physiological functions and pathophysiological situations. At the beginning of the present contract, the unit was divided into two teams according to the coherence of thematic orientations (i.e. Pathophysiology of ion transport (team 1) and Osteoimmunology, niches and inflammation (team 2). To these, an ATIP-Avenir team (innovative molecular and cellular therapies in nephrology and transplantation) will join at the end of the contract, emphasising its attractiveness.

HISTORIC AND GEOGRAPHICAL LOCATION OF THE UNIT

The Molecular PhysioMedicine Laboratory (LP2M) was initially created in 2012 by the merger of four teams working on the pathophysiology of ion channels and transporters, with a team dedicated to the connection between inflammation and bone niches. It was renewed in 2014 (Dir. Jacques Barhanin) and moved from the Faculty of Science to the campus of the Faculty of Medicine (Pasteur) in order not only to gain space but also to promote the emergence of translational research projects with clinicians. This relocation also made it possible to bring the units closer to different methodological platforms as well as to obtain space, allowing the integration of an ATIP/Avenir team (arrival in 2021) and the integration of two other new teams. At the start of the next five-year contract, Laurent Counillon, current director of the unit is a candidate for his own succession for the next contract.

RESEARCH ENVIRONMENT OF THE UNIT

The UMR shares the mix between the CNRS (National Center for Scientific Research) and Université Côte d'Azur (UCA) recently awarded by the IDEX Label. It is attached to the LIFE and Health Science Graduate School (directed by Laurent Counillon). The UMR is located on the Pasteur campus, near the CHU Pasteur and the Antoine Lacassagne Cancer Center (CAL). The Unit contributes to university management through the doctoral school, the University Orientation Council, the Academic Council of the University, the Scientific Committee of the Faculty of Medicine and clinical research at the CHU (Laurent Counillon is a member of the CRBSP of the CHU) and has significantly increased its interaction with the hospital to further develop translational research. The Unit is an active member of the Ion Channels Science and Therapeutics LabEx (ICST) as well as the OncoAge University-Hospital Federation. The unit is also a member of the ROPSE International Associated Laboratory (LIA) that aims to structure collaborations between the Scientific Center of Monaco (CSM) and Université Côte d'Azur UCA.

The Unit members are participating in the steering committees of several technological platforms and facilities (Genomics, Imaging PICMI, Animal Facility, local Ethic committee for animal experimentation CIEPAL-Azur)

UNIT WORKFORCE: in physical persons at 31/12/2021

Permanent personnel in active employment	
Professors and associate professors	4
Lecturer and associate lecturer	1
Senior scientist (Directeur de recherche, DR) and associate	6
Scientist (Chargé de recherche, CR) and associate	4
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	3
Subtotal permanent personnel in active employment	18
Non-permanent teacher researchers, researchers and associates	4
Non-permanent research supporting personnel (PAR)	1
Post-docs	3
PhD Students	9
Subtotal non-permanent personnel	17
Total	35

DISTRIBUTION OF THE UNIT'S PERMANENTS BY EMPLOYER: NON-TUTORSHIP EMPLOYERS ARE GROUPED UNDER THE HEADING 'OTHERS'.

Employer	EC	C	PAR
CNRS	0	7	4
Université Côte d'Azur	2	0	1
CHU Nice	3	0	0
Inserm	0	3	0
Total	5	10	5

UNIT BUDGET

Recurrent budget excluding wage bill allocated by parent institutions (total over 6 years)	741
Own resources obtained from regional calls for projects (total over 6 years of sums obtained from AAP idex, i-site, CPER, territorial authorities, etc.)	181
Own resources obtained from national calls for projects (total over 6 years of sums obtained on AAP ONR, PIA, ANR, FRM, INCa, etc.)	2,176
Own resources obtained from international calls for projects (total over 6 years of sums obtained)	0
Own resources issued from the valorisation, transfer and industrial collaboration (total over 6 years of sums obtained through contracts, patents, service activities, services, etc.).	715
Total in K euros	3,813

GLOBAL ASSESSMENT

The unit (3 teams, 35 members) has developed a unique identity by combining expertise in ion transport/ionic channel and immunology. During the present contract, a rebalance of the research forces has been operated by splitting the former team 1 into the current teams 1 and 2. This action has consequently stimulated inter team interactions, refocused the scientific orientations and improved the overall visibility.

The unit has an excellent record in raising funds especially with seven national competitive grants such as ANR (4 as leaders and 3 as partners, 2M€), local grants from the university and Labex (Labex ICST : Ion channels science and therapeutics.), two PHRC (national and regional), CHU Nice funding, as well as fifteen charity funds (854 k€, 3Label team FRM 2013-2016, association française contre les myopathies (AFM), Association Francois Aupetit (afa), Arthritis Foundation,...). However, no international grants, no EU network is reported. Thanks to its optimal size and excellent financial resources (3,800 k€), the unit has an excellent functioning. In addition, the unit has a remarkable policy of pooling financial resources to guarantee the best compliance of common installations and to maintain the best level of equipment at the service of the projects of the different teams. An excellent management fosters strong interaction between all lab members, allowing the share of resources and equipment and decision-making. As a result, the unit has succeeded in developing an excellent strategy to improve the quality and quantity of scientific production with 106 articles including 88 original publications (as PI) and eighteen reviews (Metabolism, Cell Death & Disease, Elife, Frontiers in Pharmacology, ...), which represents a very good progression compared to the previous mandate. Fifty percent of the publications are signed as FLC (PDC), 23% result from inter team collaborations and 54% are signed as the first author by PhD students and Postdoctoral fellows.

In addition, the unit has demonstrated an excellent capacity for attractiveness with the hosting of the ATIP/Avenir team, the arrival of a new team (immuno-metabolism), the interaction with local and national clinicians and a worldwide network of collaborators. The unit has also shown a very good attractiveness with sixteen PhD students and seven postdocs (3 foreign postdocs). Members are very regularly invited to give conferences in France and abroad (118 conferences over the period, including 36% international invitations).

During the contract, the unit has developed an excellent capacity to translate basic science into clinic (monitoring plasmatic pyrophosphate in renal transplants, ...) and made links with non-academic society with four patents, two CIFRE grants, 640 k€ industrial contract (Pronutri, BioCodex, BPI-France,...) and the creation of a start-up. There is, however, a lack in terms of communication geared towards the general public and the dissemination of knowledge to a wide audience.

However, the committee noticed weaknesses regarding the recruitment process 1) of permanent technical support allowing perpetuating the know-how and original skills of the teams and 2) talented young scientist to anticipate the recruitment of permanent researcher positions (CNRS, University). Finally, the unit is facing a lab space issue due to its excellent attractiveness, which is still local.

DETAILED EVALUATION OF THE UNIT

A – CONSIDERATION OF THE RECOMMENDATIONS IN THE PREVIOUS REPORT

In accordance with the recommendations made during the previous evaluation, the members of the unit made a point of honour to continue to develop a role in educational innovation, in particular with the direction of the LIFE Graduate School, and continue the evaluation of national and international educational programs and institutions and teach in international schools. The unit had two new HDR defences, bringing the number of HDR holders to fifteen for seventeen statutory researchers at the end of the contract. The initial Team 1, resulting from the merger of two previous teams turned out to be too large to be coherent and manageable. The unit therefore took the initiative to split it into two thematically coherent entities, one targeting aspects of 'transport and metabolism' and the second of 'Ion channels and biomineralization'. This thus made it possible to rebalance the sizes of all teams.

In addition, the unit has set up incentive measures via pooled financing of equipment or master stipends paid for projects shared between two teams. This has allowed the emergence of new inter-team collaboration. These actions translate concretely into inter-team publications (2 publications between teams 2 and 3, 1 between teams 2 and 4, 1 between teams 3 and 4 and 1 between teams 1 and 4). This is also materialised by a success in getting/requesting joint grants (1 ANR submitted between teams 1 and 3 and funds obtained from the French Transplantation Association between teams 1 and 4 and a request for a grant from the Biomedicine Agency between the teams 3 and 4).

The unit has recruited an ATIP/AVENIR team working on innovative immunological approaches in kidney transplantation. This team is led by an MD-PhD clinician with expertise in both immunology and renal physiology, two areas of expertise in perfect harmony with the teams already formed. Remarkably, the arrival of this team will be followed by the arrival of a new group on immuno-metabolism in January 2022. These restructurings and integration of new teams have therefore *de facto* conditioned the composition of the unit's management committee with a rebalancing of all the teams.

Regarding the last recommendation, teams have applied for European/international funding unfortunately without success. Team 1 applied for a Franco-Danish (DFF) project in 2016; team 2 applied once in 2017 and twice in 2020 (ITN-H2020; EJP-RD with teams in the Netherlands, Italy, Austria, Spain, Germany). Team 3 has applied three times for an ITN-H2020 (IMMUNOCLAST) COST action (SKIMNET) Team 3 participates in the COST action GEMSTONE and has applied for an ERA-NET TRANSCAN (IMMOSCAN) coordinated by H. Taipalenmaki (Germany, under final evaluation). Nevertheless, a member of team 2 is co-founder of the European COST action 'EurosoftCalc.net' (2015–2021). Here too, the reorganisation of the unit in 2023 should make it possible to increase the possibilities of international funding. Notably, the two new teams plan to compete for the ERC Young Researcher and Synergy grants in 2022.

B – EVALUATION AREAS

EVALUATION AREA 1: PROFILE, RESOURCES AND ORGANISATION OF THE UNIT

Assessment on the unit's resources

The unit has an excellent record in raising funds (80% of the total budget, 3072k€) especially with national competitive grants such as ANR (4 as leader and 3 as partners), local grants from the university and Labex, as well as fourteen charity funds (FRM, AFM, ...). The unit has demonstrated an excellent ability to attract new high-level teams (1 ATIP/Avenir team), and a new team (immuno-metabolism, team 3) and to join forces with an American team from the University of Washington in St Louis, USA, confirming the international recognition of the LP2M. The unit benefits from access to nine cutting-edge technological platforms on the site, financed by the IDEX. The unit has an insufficient number of permanent technical support.

Assessment on the scientific objectives of the unit

The unit has an excellent scientific strategy by redistributing scientists to rebalance the teams recognised in the topic and expertise. This allowed a better visibility for local, national and international collaborations.

Assessment on the functioning of the unit

Thanks to its optimal size and excellent financial resources, the unit has an excellent functioning. In addition, the unit has a remarkable policy of pooling financial resources to guarantee the best compliance of common installations and to maintain the best level of equipment at the service of the projects of the different teams.

1/ The unit has resources that are suited to its activity profile and research environment.

Strengths and possibilities linked to the context

The activity profile of the unit responds to all the facets expected with regard to the missions of a research unit with a dominance of the research activity over the other facets such as innovation and dissemination. In addition, the unit has developed a relevant inter-team collaboration strategy which should soon bear fruit and bring greater international visibility to the unit. The unit has an excellent financing capacity with more than 80% of the budget obtained through calls for projects (i.e. 3072k€: ANR with 4 projects carried out as PI and three as partners for an amount of around 2 million euros. Added to this is 854 k€ obtained on fifteen contracts as PI with foundations or charities (FRM, AFM,...)

In addition, the unit has a remarkable policy of pooling financial resources to guarantee the best compliance of common installations and to maintain the best level of equipment at the service of the projects of the different teams. The unit also benefits from access to nine cutting-edge technological platforms on the site, financed by the IDEX (imaging, genomics, proteomics, lipidomics, electron microscopy, cytometry, animal facility, histology and computing centre). The committee acknowledge the excellent managerial work of the direction committee, whose strategic orientation has made it possible over the years to consolidate the unit and guarantee its security for the future. The unit has demonstrated an excellent ability to attract new high-level teams (1 ATIP/Avenir team), and a new team (immuno-metabolism, team 3) and to join forces with an American team from the University of Washington (Washington, USA).

Weaknesses and risks linked to the context

Despite the efforts made by the members of the unit, little or no large-scale international funding was obtained during the period, but this is largely compensated by obtaining national funding. Nevertheless, the direction committee is very sensitive to this subject and the arrival of new teams could potentiate the unit's ability to obtain this kind of international financing for competitors.

A point of vigilance concerns, as for many laboratories in France, the age pyramid with an aging of the population which is difficult to compensate for by recruitment; but this point of weakness is taken into account by the attractiveness of new, younger research teams.

2/ The unit has set itself scientific objectives, including the forward-looking aspect of its policy.

Strengths and possibilities linked to the context

The lab members have a well-established recognition at the national and international level in their respective fields. The unit was able to reorganise itself in a relevant way during the contract to better distribute the forces present on the different teams with at least three full-time researchers per team. The unit now brings together a complete scope of strong expertise in biophysics, biochemistry, metabolism, immunology, inflammation, pathological situations and various clinical aspects of nephrology, vascular medicine, transplantation, and calcification. This is complemented by state-of-the-art expertise in the processing of large multidimensional datasets, in particular thanks to the collaboration and future integration of a future group and through several IDEX tools such as the House of Simulation and Modelling (MSI). The direction committee develops an interesting scientific strategy based on the freedom given to researchers to develop new ideas and new projects without self-censorship but validated collegially during laboratory meetings by only retaining projects with high potential of funding and of publications or with added values with the socioeconomic sector. As a result of this strategy, the unit has obtained two CIFRE PhD contracts during the period. The unit has also strengthened its interaction with the hospital to address health societal challenges that in turn feed the fundamental research of the unit.

Weaknesses and risks linked to the context

No weakness to note for this item

3/ The functioning of the unit complies with the regulations on human resources management, safety, the environment and the protection of scientific assets.

Strengths and possibilities linked to the context

The unit follows the European Code of Conduct for the Recruitment of Researchers adopted by the CNRS and Université Côte d'Azur to guarantee open and transparent recruitment procedures without discrimination, with the main recruitment criteria being skills and individual expertise, as well as enthusiasm for research to ensure uniformly high selection standards. All researchers are strongly encouraged to publish and apply for a grant, regardless of gender. The unit is extremely invested in staff working conditions as well as health and safety issues. The unit offers health and safety training for new members of the unit, regular presentations at lab meetings. A budget line is specifically allocated to health and safety issues in the laboratory. Computer security is perfectly implemented. Finally, the unit has developed a responsible policy in terms of sustainable development with regard to the use of consumables, waste management and transport management.

Weaknesses and risks linked to the context

If the distribution between men and women seems rather well balanced within the laboratory (53% Males vs 47% Females), this balance, however, raises questions when it is evaluated category by category where imbalances appear in particular in the body of the researchers (76.5% Males vs 23.5% Females). This unfortunately results in only one woman leading a team.

EVALUATION AREA 2: ATTRACTIVENESS

Assessment on the attractiveness of the unit

The unit demonstrates an excellent capacity for attractiveness with the hosting of the ATIP/Avenir team, the arrival of a new team (2022, immuno-metabolism), a worldwide network of collaborators (Germany, Quebec, UK), leader of a COST program, hosting foreign students and successfully obtaining funding.

1/ The unit has an attractive scientific reputation and contributes to the construction of the European research area.

Strengths and possibilities linked to the context

The unit demonstrates a remarkable capacity for attractiveness with the possibility of labelling an international collaboration with an American team from the University of Washington (Washington, USA). Members are very regularly invited to give conferences in France and abroad (118 conferences over the period, including 36% international invitations). They have organised congresses (4th congress of the French Society of Physiology and Integrative Biology), international course (Immunology Morocco, digital masterclasses (ECTS-Gemstone digital master class, 2021 and 2020; from bone to ocean and space, the untold story of mineralisation, 2021).

The unit members have editorial recognition: editor for the International Journal of Molecular Sciences (Molecular Endocrinology and Metabolism Section, MDPI), associate editors for Frontiers in Pharmacology of Ion Channels and Channelopathies, Frontiers in Chemistry, Frontiers in Immunology, as well as for Cells. Unit members participate in the boards of international and national patient databases; evaluation committees or scientific boards for international associations (American Society for Bone and Mineralised research, FECTS, WF/Austrian Science Fund) organisations or national (VLM, AFM, Foundation Arthritis). They are on the board of several learned societies (European Calcified Tissue Society, American Society of Nephrology, European Association for Study of Diabetes (EASD), Society for Redox Biology and Medicine (SFRBM).

The Unit's members have won different prizes such as six Université Côte d'Azur Medals for Scientific Excellence, FRM Victor and Erminia Mescle Prize; Diabetes Award of the French National Academy of Medicine, Three PEDR (from INSERM and CNU respectively).

The unit has hosted three internationally renowned researchers for short stay (i.e. 1–2 months, Stine Pedersen, Tamas Aranyl, Ramon Lattore) from Denmark, Hungary and Chile and welcomed seven postdocs over the period among including three from foreign countries. All the teams have developed an important network of local, national and international collaborations among which we can note collaborations with the University of Heidelberg (Germany), the University of Valencia, Spain

The unit is evaluating the possibility of pooling funds to hire a scientific writer who could help in the preparation of applications for European and international contracts. To date, some members of the unit are responsible for large European networks such as COST European action project 'EurosoftCalc.net': European COST action GEMSTONE, European network EuraNet, IMMOSCAN

Weaknesses and risks linked to the context

No weakness to note for this item

2/ The unit is attractive for the quality of its staff hosting policy.

Strengths and possibilities linked to the context

All students in the unit benefit from the required equipment and funding. Nine students defended their PhD during the contract, seven in progress and two HDR were also defended. The total number of HDR is fourteen for nineteen researchers. The unit has trained three doctoral students funded by the STIC labex, four funded by own resources (ANR, AFM), two under CIFRE contract, and two under ministerial contract. The unit welcomed seven postdocs and to compensate for the lack of permanent ITA, the unit was able to recruit six people on fixed-term contracts. The unit has implemented a strategy aiming at attracting strong young colleagues who can create their own groups and benefit in particular from the unit's state-of-the-art technological environment. This strategy has been successful with the recruitment of an ATIP-AVENIR team in 2021 and two groups (including 1 international) in 2022. The unit fits perfectly into the open science strategy of Université Côte d'Azur and CNRS with all its publications on the HAL open platform as requested by these supervisory authorities.

Weaknesses and risks linked to the context

The unit was unable to attract and recruit young researchers into permanent positions during the period of interest. This problem is accentuated by more and more doctoral students that do not want to continue in the academic sector after their thesis which complicates the prospect of recruitment.

3/ The unit is attractive because of the recognition gained through its success in competitive calls for projects.

Strengths and possibilities linked to the context

The Unit has been very involved, in particular through its director, in setting up the IDEX Université Côte d'Azur, through the management of two of its academies of excellence, through the creation of the Doctoral School of Sciences of LIFE and HEALTH of Université Côte d'Azur and by belonging to the Steering Committee of the University, and by participating in the drafting of the successful calls for tenders of the PIA: SFRI, the Institute of Artificial Intelligence 3IA and evaluation for the IDEX. Two senior members of the Unit are respectively members of the Pedagogical and Scientific Committee of the LIFE doctoral school and of the University Academic Council. The Unit is also a member of the Labex Canaux Ioniques Science et Thérapeutique and has used its funds for three doctoral students, to rejuvenate the Patch Clamp equipment and to purchase common equipment.

The unit has demonstrated a very good capacity for financing by the ANR with four projects carried out as PI and three as partners for an amount of around 2 million euros. Added to this is 854 k€ obtained on fifteen contracts as PI with foundations or charities (FRM, AFM, VLM, ASSOCIATION François AUPETIT, ..).

Weaknesses and risks linked to the context

Despite numerous attempts, the unit has been unsuccessful in obtaining European and international funding.

4/ The unit is attractive for the quality of its major equipment and technological skills.

Strengths and possibilities linked to the context

The unit has state-of-the-art equipment acquired with its own funds, to which is added access to the high-level platforms and equipment of the Pasteur Campus and other university sites: genomics, confocal imaging and light sheets, histology, pet facilities, etc. On the Pasteur site, all the facilities including the animal facility are moving in April-May 2022 to a completely renovated three-floors building with a large space dedicated to platforms and animal facilities. For several years, the unit has developed a policy of financing new state-of-the-art technological equipment and renewing essential equipment.

Weaknesses and risks linked to the context

Due to a lack of technical personnel in sufficient numbers, the unit does not host any platform strictly speaking open to the community but allows access to its equipment to people outside the laboratory if requested.

EVALUATION AREA 3: SCIENTIFIC PRODUCTION

Assessment on the scientific production of the unit

The unit has an excellent scientific production (106 articles including 88 original publications and 18 reviews) with an excellent visibility (Physiological Reviews, International Journal of Molecular Sciences, Frontiers in Pharmacology, Cell Death & Disease) which represents a very good progression compared to the previous mandate, 50% signed as FLC (PDC). However, best publications come from collaborative work (J. Exp. Med., Nat. Comm...)

1/ The scientific production of the team meets quality criteria.

Strengths and possibilities linked to the context

During the period evaluated, the unit produced 106 publications, including 88 original publications and eighteen reviews, which represents a very good progression compared to the previous mandate during which the production was 79 articles. A quarter of these articles are published in speciality journals with good visibility in the respective field. Among the publications, 50% are signed as FLC (PDC) (Physiological Reviews, International Journal of Molecular Sciences, Frontiers in Pharmacology, Cell Death & Disease. 50 % of the publications result from collaborative work with in some case high-level impact (J. Exp. Med., Nat. Comm., Theranostics, Cancer Res., Trends Endocrinol., Cell Rep., Elife, JCI insights). 23% of the publications result from inter team collaborations and 54% are signed as the first author by a PhD student. The integration of clinicians within the unit has made it possible to open up scientific production to clinical journals with greater visibility (JACC, J. Am. Soc ; Nephrol., Hypertension...).

Weaknesses and risks linked to the context

A significant proportion of the best articles come from collaborative work.

2/ Scientific production is proportionate to the research potential of the unit and shared out between its personnel.

Strengths and possibilities linked to the context

The scientific production as FLC (PDC) is perfectly balanced between the teams with for team 1, nineteen articles and six reviews; for team 2, 32 and five and for team 3, sixteen articles and six reviews. Note the inter-team publications: team 2 has two articles with team 3 and one with team 4. Team 1 has one review with

team 4; Team 3 has a post with Team 4. 23% of the publications result from inter team collaborations and 54% are signed as the first author by PhD students and Postdoctoral fellows. The productivity of the unit as a whole has not overtly suffered from the COVID period.

Weaknesses and risks linked to the context

No weakness to note for this item

3/ The scientific production of the unit complies with the principles of research integrity, ethics and open science.

Strengths and possibilities linked to the context

The unit has implemented a clear policy to ensure scientific integrity (application of CNRS/University rules regarding the integrity of laboratory notebooks, data, etc.; regular scientific meetings at team level and the units at which the raw data is presented.). The unit favours publications in well-identified journals to avoid predatory journals, the same goes for the choice of conferences in which members of the unit participate. All ethical rules are scrupulously followed in terms of animal and human experimentation. (Protocols approved by the CPP (Personal Protection Committee) and the institutional ethics committee of the CHU). All articles in the unit appear in the open-source HAL article. In addition, the unit has a funding policy for open access to publications. Publication of the raw data in complementary media or as accessible electronic data is strongly encouraged. Each member of the team has access to a secure backup unit which goes through a server common to the unit on which are also saved a set of documents relating to the function of the unit.

Weaknesses and risks linked to the context

Training sessions on ethics and scientific integrity are too rare on the site. The members of the unit would appreciate that these trainings be organised by the supervisory bodies more formalised and more frequent.

EVALUATION AREA 4: CONTRIBUTION OF RESEARCH ACTIVITIES TO SOCIETY

Assessment on the inclusion of the unit's research in society

The unit has an excellent link with non-academic society with four patents, two CIFRE grants, 640 k€ industrial contracts (Pronutri, BioCodex, BPI-France) and the creation of a start-up. There is, however, a lack in terms of communication geared towards the general public and the dissemination of knowledge to a wide audience. Public outreach has to be developed.

1/ The unit stands out by the quality of its non-academic interactions.

Strengths and possibilities linked to the context

The unit carried out a technological transfer through several collaborations with private laboratories (Pronutri and Biocodex), and by obtaining two CIFRE grants over the mandate. Overall, the unit succeeded in raising 640 k€ on industrial contracts.

Weaknesses and risks linked to the context

This criterion may be further taken into account in the future.

2/ The unit develops products for the socioeconomic world.

Strengths and possibilities linked to the context

An important part of the activity of team 1 was dedicated to the development of new molecules to respond to health issues. This has led to three patent applications and the creation of a start-up is in progress dedicated to developing products against chemotherapy-induced neuropathy.

Weaknesses and risks linked to the context

N/A

3/ The unit shares its knowledge with the general public and takes part in debates in society.

Strengths and possibilities linked to the context

The unit members regularly take part in scientific outreach activities, according to their scientific skills. They are present in the media, on the internet or on social media, in compliance with research integrity and ethical requirements. All details are given team by team below.

Weaknesses and risks linked to the context

The laboratory concedes a lack of investment in terms of communication geared towards the general public and the dissemination of knowledge to a wide audience. Despite the motivation, the time spent on other tasks (writing articles and applying for grants in particular) leaves little time to devote to this activity.

C – RECOMMENDATIONS TO THE UNIT

Recommendations regarding the Evaluation Area 1: Profile, Resources and Organisation of the Unit

The unit should reinforce the process of recruiting permanent technical support to perpetuate the know-how and original skills of the teams. The unit should urgently solve lab space issues especially in terms of office space to facilitate the work of PhD students and postdocs and to increase the hosting of Master students. The unit should continue to apply for international funds.

Recommendations regarding the Evaluation Area 2: Attractiveness

The unit should reinforce its strategy to attract talented young scientists to anticipate the recruitment of permanent positions (CNRS, University).

Recommendations regarding Evaluation Area 3: Scientific Production

The unit should sustain the strategy already initiated to improve the quality and quantity of scientific production.

Recommendations regarding Evaluation Area 4: Contribution of Research Activities to Society

The unit should continue to translate basic science into clinic and increase its visibility by better disseminating its results. Aware of this weakness, the unit has already implemented various solutions to achieve this, in particular via social networks.

RESPONSES TO SUPERVISING BODIES CONCERNS (IF ANY)

N/A

TEAM-BY-TEAM ASSESSMENT

Team 1: Transport and Metabolism
 Name of the supervisor: Mr. Laurent Counillon

THEMES OF THE TEAM

The aim of Team 1 is to study redox regulation through H⁺ ion transport and control of oxidative stress in human pathologies. They also aim to uncover new molecules emerging from fundamental research, allowing industrial collaborations and start-up creation.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Previous recommendations that applied to team 1 were

- To develop national and international teaching and increase the number of HDR. This was partially addressed since two team members obtained their HDR, but the number of students formed was not very high (4 in the period) and no postdocs were recruited.
- To develop synergy between transport and osteoimmunology. An effort is made in that sense, however most of the intra-unit collaborations continued with team 2 (former team1).
- To seek EU/international funding. Although the team obtains many national funding that allowed development of research, EU and international funds were not addressed.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	1
Lecturer and associate lecturer	1
Senior scientist (Directeur de recherche, DR) and associate	1
Scientist (Chargé de recherche, CR) and associate	2
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	1
Subtotal permanent personnel in active employment	6
Non-permanent teacher researchers, researchers and associates	2
Non-permanent research supporting personnel (PAR)	1
Post-docs	0
PhD Students	3
Subtotal non-permanent personnel	6
Total	12

EVALUATION

Overall assessment of the team

The quality of the scientific production ranges from very good to excellent, this is attested by the invitation to publish a Physiological review. The team has a very good production with an excellent visibility in their field with a total of 41 publications in generalist and speciality prestigious journals (i.e. JAmSocNeph, Am J. Pathol,...); 34 original articles, fourteen as PI (Scientific Reports, Cell Death and Differentiation .). The team has a good attractiveness for PhD students, nevertheless the absence of a postdoc should be pointed. The capacity of the team to obtain research funding for the period is very good with four national grants, as coordinator (e.g. 1 ANR and 3 IDEX grants). The valorisation of the team is excellent with two patents and one start-up creation.

Strengths and possibilities linked to the context

Team 1 emerged from the separation of a previous team corresponding to actual teams 1 and 2. The organisation relies on the research conducted by three full-time researchers (Inserm and CNRS), with the help of an emeritus professor and an assistant professor. The team leader is also director of the unit and its administrative and educational functions preclude its possibilities of developing a personal project, although he participates in different research axes.

The main research theme is redox regulation through H⁺ ion transport and control of oxidative stress in human pathologies. Three main axes are developed, mainly by the full-time researchers:

- i. Study of hypusination pathways in ischaemia/reperfusion;
- ii. Exploration of the role of NHE and its regulation in human pathologies;
- iii. Pathophysiology of adipose tissue and role in obesity and diabetes. During the mandate, significant contributions were made concerning
 - a. Hypusination and I/R (J Am Soc Nephrol. Am J Transplant. Cell Death Dis. 2021).
 - b. Oxidative stress and neuropathic pain: identification of new molecules leading to patent deposit and start-up creation.

The team obtained five national grants, including four as coordinator (e.g. 1 ANR Iso2Met and 3 IDEX grants) and one as partners (ANR KIRI). They also obtained two contracts as PI from foundations and charities (1 FRM, 1 SRLF) for a total of more than 300 k€. Collaboration with the industry (Pronutri) led to different funding (IDEX, CIFRE thesis...) for more than 300 k€. Satt Sud-Est contributed to the development of a patent in 2016 for 23 k€.

The team has published a total of 41 articles during the current mandate, including seven reviews and sixteen scientific articles as PI such as J Am Soc Nephrol., J Endocrinol., Cell Death Dis., Int J Mol Sci. or Cell Biosci.

The team demonstrates the capacity to attract young French researchers. Specifically, they have trained four PhD students (including a CIFRE Thesis and two medical students from the CHU).

The team is well recognised at the national and international level as evidenced by their many invitations to the congress of the domain metabolism and oxidative stress in France and abroad (16 invitations, 2018 International Diabetes Symposium, 25th Anniversary EFSD and Lilly Joint Venture, ...).

The link with the non-academic sector is attested by three patent deposits (1 leading to the creation of a start-up).

Weaknesses and risks linked to the context

Most of the international visibility of the team relies on three members, one being emeritus. This could represent a weakness for the future. The retirement of a senior scientist during the next contract will weaken the team's research capacity. Also, no international grant application was made, suggesting a lack of international collaborations (excluding the one in Denmark with Petersen group). The team did not develop postdoc positions, and had few PhD students, half of them being medical students whose hospital functions delay the advancement of research. The intra-unit collaborations are limited to team 2,

RECOMMENDATIONS TO THE TEAM

- The team should propose a more focused scientific strategy in coherence with the rest of the unit.
- The team is encouraged to apply to European grants and to competitive national grants as a coordinator.
- The team should improve their interactions with the other teams in the unit and find new international collaborators in order to obtain international grants.
- The number of PhD students should be increased, and postdoc positions should be proposed.
- They should identify talented young researchers for future recruitment (CNRS and or UCA).

Team 2: Ion Channels and Biomineralization
 Name of the supervisor: Mr. Saïd Bendahhou

THEMES OF THE TEAM

Team 2 explores the role of ion channels and transporters in the mineralisation process. Projects are particularly focused on cellular events controlling ion transport regulation in the context of inflammation, excitable (cardiac and skeletal muscle) and non-excitable (bone) tissues. Team 2 is also particularly involved in translational projects aiming to improve the current diagnosis of human diseases including chronic kidney and liver diseases as well as acquired pro-calcifying conditions.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The team has addressed most of the recommendations of the previous report. In 2016, the team was organized in one large team (grouping 4 previous groups) but was then divided into two groups leading to the individualisation of Team 2 'Ion channels and Biomineralization', thus reducing the number of projects and strengthening the coherency within the team.

Following the recommendation of the previous report, team 2 has reinforced the translational project. They have increased their publication rate with a total of 43 articles and five reviews over the last six years.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	2
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	3
Scientist (Chargé de recherche, CR) and associate	1
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	2
Subtotal permanent personnel in active employment	8
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	0
Post-docs	2
PhD Students	4
Subtotal non-permanent personnel	6
Total	14

EVALUATION

Overall assessment of the team

The scientific production of the team is very good to excellent with a total of 43 original publications (Front Pharmacol, Cell Tissue Res, JBMR, ...). Collaboration papers allowed the team to publish in some prestigious journals (Cell, Nature Commun, J. Am Soc Nephrol). The attractiveness of the team is considered as very good to excellent with the recruitment of two postdocs and seven PhD students. Its ability to raise funds is good with one ANR as PI, two AFM and one VLM. However, no international grants were obtained. The valorisation is outstanding with two patents (undergoing a process to industrial transfer), a major transfer to clinic (2 PHRC, 3 cohorts) and two industrial contracts.

Strengths and possibilities linked to the context

The team organised itself around three interconnected axes dealing with ion transport and mineralisation. Each axis is led by a coordinator. All team members contribute actively to the three axes. These three axes are

1. Ion Channels in excitable and non-excitable tissue
2. Transporters and calcification
3. and anion channels and inflammation.

Based on their expertise on ion channels and transporters in the mineralisation process, the main research program of the team is the study of the functional consequence of potassium channels Kir2.1 mutations in human diseases, the role of chloride channel in crystal-driven diseases, the function of channels in renal physiology and translational study using innovative PPI dosage strategies. For that purpose, they combine *in vitro* experiments and preclinical studies with translational approaches using gold standard technologies and tools (electrophysiology, human skin biopsy-derived iPSCs). The main contribution on this thematic was that Kir2.1 channels are involved in the excitation-contraction coupling processes in muscles (Cell Tissue Res, 2018), whereas Kir2.1 channels control endochondral and intramembranous ossification signalling pathways in bone (JBMR, 2018). The presence of physicians as team members also allowed the development of translational aspects (PPI and vascular calcifications, patent for PPI quantification in body fluids). The team obtained two ANR (1 as PI) and grants from associations as PI (AFM label 2014-2019, 2020-2024, Vaincre la mucoviscidose), CHU (for 3 cohorts) and private funds (SATT, CIFRE Grant 2021–2023). During the evaluated period, the team has published a total of 43 articles and five reviews (3 as PI): five original articles based on Team 2 topics as PI (Front Pharmacol, Cell Tissue Res, JBMR, Cell Death Dis, Front Cell Dev Biol), 30 collaborative papers (mainly involving one member of the team 2) with two last author positions and nine clinical reports (7 as PI).

The team was able to attract French and one foreign young researcher (Tunisia). Specifically, they have trained five PhD students (2 being supported by Labex ICST, 2 MD students from Nice Hospital, and one was supported by a CIFRE grants) and hosted one postdoctoral researcher (partially supported by Pronutri and LFB Biomedicament).

The team is well recognised at the national and international level as evidenced by their commitment to scientific committee of patient associations (PXE international and PXE France, association Vaincre la mucoviscidose, AFM-Telethon, Society of Nephrology, FEPS).

Members have given sixteen lectures and seventeen oral presentations. Invitations to international meetings in France and worldwide (USA, Mexico, Hungaria). As meeting organisation activities, Team 2 has organised a patient association day meeting and a digital summer school in July 2021. One senior scientist of the team was the President of the French Society of Physiology (2013–2019). Two Members of the team 2 also act as experts to the national committee 24 of CNRS.

The link with the non-academic sector is attested by three patents filled and five clinical trials (Pipal, Pyrocal, Pyro-TH, Ki-Pyrinia, Prophecy) linked to their research. Of note, the national PHRC study PROPHECY is led by a physician of Team2. Team 2 has also set up two partnerships with private companies (Pronutrin, LFB Biomedicaments).

Weaknesses and risks linked to the context

As highlighted in the publication section above, the ratio between collaborative article and team 2-driven publications is imbalanced (14/43).

RECOMMENDATIONS TO THE TEAM

Team 2 is mainly composed by confirmed experimented researchers and should renew its staff with talented young researchers for future recruitment (CNRS and or UCA).

Team 2 should also consider welcoming long-term trainees (Master 2 students...).

We acknowledge the effort of team 2 to expand its collaborative network, but from the publication list, it seems that it has overwhelmed the main activity of Team 2, therefore team 2 should prioritise on their own projects.

Team 3: Osteoimmunology, Niches and Inflammation

Name of the supervisor: Mrs. Claudine Blin

THEMES OF THE TEAM

Team 3 develops research in the field of osteoimmunology, which is basically the study of the reciprocal relationship between immune and bone cells. Team 3 deciphers the innate immune function of osteoclasts as monocytic cells specialised in bone resorption. They also aim at identifying the interaction between monocytic and lymphoid cells with bone cells in the gut-bone axis, both projects are explored in healthy and pathological models.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Previous recommendations highlighted the outstanding research program of Team 3 and recommended the need to improve inter-team collaborations and to improve visibility by expanding international collaborations. This has been perfectly achieved attested by the publication of sixteen high quality original articles and six reviews; the award of competitive funding and the establishment of new external collaborations. Team 3 shares two publications with team 2 (Stem Cell and Dev 2016 and JBMR 2018) and started a project with team 3 on NHE1 function in OCL differentiation and fusion. Despite no increase in postdoc or institutional researcher number, Team 3 has established national (4) and international (2) networks, reflecting its international recognition in the field which is remarkable. They did not address the point of strong interaction with the industry. The representation of Team 3 in the unit governance has been improved, as two senior researchers from Team 3 are now part of the management committee.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	1
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	2
Scientist (Chargé de recherche, CR) and associate	1
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	0
Subtotal permanent personnel in active employment	4
Non-permanent teacher researchers, researchers and associates	2
Non-permanent research supporting personnel (PAR)	0
Post-docs	1
PhD Students	2
Subtotal non-permanent personnel	5
Total	9

EVALUATION

Overall assessment of the team

The team has a very good production with an excellent visibility in their field with a total of 24 publications in generalist and speciality journals including seventeen original articles, seven as PI (JBMR, Front Immunol, Elife) and six reviews, four as PI (Gut microbiome.). The team has an excellent attractiveness with five PhD students and five postdocs. The ability of the team to raise funds is excellent exemplified by the obtention of 4ANR as PI and FRM label team and partner of an EU network. The team has a very good valorisation with two industrial contracts (Biocodex) and one ongoing clinical research project (TNFi in Crohn's disease).

Strengths and possibilities linked to the context

From 2016 to 2022 Team 3 is organised around the themes of the three institutional researchers and managed by the team leader. A clinician (odontology) was present over a year during the mandate. Their research axes are complementary and synergistic which make it extremely productive evidenced by the co-authorship and sustained publication activity. The research program of the team lies in the study of osteoclast (OCL) plasticity, identifying distinct OCL subsets derived from preferential differentiation pathways and how the innate lymphoid cells impact on these pathways. They were the first to characterise OCL as an immune cell beyond its capacity of resorbing bone. They also address the contribution of the OCLs as true innate immune cell to induce immunogenic responses. Team 3 contributes to demonstrating:

- i. The existence of two functionally distinct OCL subsets and identifying OCL as an innate immune cell (JBMR 2016, Elife 2020);
- ii. OCL capacity to activate T cells and to induce inflammation or immunosuppression depending on their cell origin (JBMR 2016, Elife 2020);
- iii. Providing evidence of specific OCL subsets in inflammatory colitis (Front Immunol 2019 and BioRxiv 2020).

Altogether, members have published a total of 24 publications over the six-year period in generalist and speciality prestigious journals including sixteen original articles, seven as PI (JBMR, Front Immunol, Biorxiv, Elife) or first authors (ChemMed Chem) and six reviews, four as PI (Gut microbiome).

Team3 has obtained competitive research funding for the period: five national grants, including four ANR as coordinators; from charities: équipe labellisée from FRM (2013-2016), François Aupetit association, Arthritis recherche et développement and 1 as partners (ANR OSTEOVALYMPH (2017–2022), one FRM PhD fellowship for a total amount of 975K€ HT.

The team visibility is reflected by the high number of invited lectures (23) given by Team 3 tenured researchers (International Conference on Osteoimmunology, Immuno-Morocco, Università degli Studi di Firenze) and 22 selected oral PhD student or postdoc presentations in scientific meetings (ECTS, ASBMR, EWRR, JFBTM). Tenured researchers have active involvement in scientific committees: presidency of SFBTM and board members or chair of several national structures (i.e. Foundation Arthritis), local (Université Cote D'azur) and European (ECTS board and committees). Team 3 members have been awarded during this period with the bonus of excellence Inserm twice and PhD students with ASBMR, ECTS awards. During the period Team 3 has trained five postdoc fellows and five PhDs of which four have defended and been associated at least to one publication. Members of Team 3 have acted as an expert in assessment panels of INSERM, CNRS, and HCERES. Thanks to their expertise in osteoimmunology and to their original approach of phenotyping osteoclasts subsets, Team 3 has developed a strong collaborative network at the national level (4 ANRs: ANTIPODE, ORIOS, DIVOS OSTEOVALYMPH) and international level Team 3 obtained a European network contract (Euranet: Immunoscanner 2022) with other partners in France, Germany, Italy and Denmark.

The link with the non-academic sector has been developed through industrial partnership with the Biocodex Laboratory first contract 2016/2017 (99K€1-year postdoc salary), followed by a two-year contract of 100K€01/012018 to 31/12/2019. As for public outreach, team leader has been in charge of the ECTS PhD training course 2018, 2019, 2020 and 2021. This course is open to PhD students but also to academic and non-academic young researchers. A tenured team member has organised the 2nd North African (IUIS-FAIS -2021) course in immunology welcoming both academic and non-academic young researchers.

Weaknesses and risks linked to the context

Team 3 has not succeeded in recruiting tenured young researchers in the mandate.

RECOMMENDATIONS TO THE TEAM

Team 3 should materialise their already engaged in numerous collaborations and ANR partnerships by publications.

To stabilise and reinforce the new axes that are to be developed, Team 3 has to put a special effort in attracting full-time young investigators for long-term position or at least three-year tenure tracks.

The Team should continue to pursue international collaborative funds to consolidate their world-class reputation and expanded collaborative networks. In addition, they should take advantage of their newly generated models and build on the industrial partnership with Biocodex and new industries as well as support for filling patent applications.

CONDUCT OF THE INTERVIEWS

Date(s)

Start: 09 janvier 2023 à 8 h 30

End : 10 janvier 2023 à 13 h

Interview conducted: online

INTERVIEW SCHEDULE

8:30 a.m. Presentation of the committee
 8:45 a.m.-9:25 a.m. Highlights of the Unit by the Director Laurent Counillon

9:25 a.m.-10 a.m. Team1: Transport and Metabolism: Laurent Counillon

Coffee break: 10 mn

10:15 a.m.-10:50 a.m. Team2: Ion Channels and Mineralisation: Saïd Bendahhou

10:50 a.m.-11:25 a.m. Team 3: Osteoimmunology Niches and Inflammation: Claudine Blin

11:25 a.m.-1 p.m. Committee debriefing (closed doors)

13H00-14H00 LUNCH

2 p.m.-2:40 p.m. Meeting with technicians and administrative staff (closed doors)

2:40 p.m.-3:10 p.m. Meeting with PhDs and postdocs (closed doors)

3:10 p.m.-3:20 p.m. Coffee break: 10 mn

3:20 p.m.-4:20 p.m. Meeting with researchers not team leaders (closed doors)

4:20 p.m.-5:30 p.m.. Committee debriefing (closed doors)

Day 2

9 a.m. – 9:30 a.m. Meeting with the representatives of the local institutions (closed doors)
 9H00-9H15: CNRS delegate: Yvan De Launoit CNRS DAS for the LP2M and Clara Herer (head of CNRS delegation Côte d'Azur) will also participate in the zoom

9:15 a.m.-9:30 a.m.: Université de cote d'azur delegate : Noël Dimarq (Vice President for Research)

Coffee break: 15 mn

9:45 a.m.-10:15 a.m. Closed-door meeting of the committee

10:15 a.m.-10:45 a.m. Meeting with the Directors (Laurent Counillon)

10:45 a.m.-12 p.m. Committee meeting

PARTICULAR POINT TO BE MENTIONED

No Particular point to be mentioned

GENERAL OBSERVATIONS OF THE SUPERVISORS

**Direction de la
Recherche, de la
Valorisation et de
l'Innovation**



Mme Johanna ZERMATI
Directrice

 drvi-recherche@univ-
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Nice, le 12 juin 2023

à l'attention du Haut Conseil à
l'Evaluation de la Recherche
et de l'Enseignement Supérieur

Affaire suivie par :
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Gestionnaire

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Objet : Observations de portée générale

**Unité : DER-PUR230023281 - LP2M - Laboratoire de Physico-chimie
médecine moléculaire.**

The LP2M thanks the HCERES committee for the thorough evaluation of the Unit. We agree on the assessment given in the HCERES report. We are grateful for the positive points that have been raised and will take the very constructive recommendations into account.

Signature

Tampon

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Laurent COUNILLON, Directeur

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Direction de la
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Valorisation et de
l'Innovation



Mme Johanna ZERMATI
Directrice

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Nice, le 25 juillet 2023

à l'attention du Haut Conseil à
l'Evaluation de la Recherche
et de l'Enseignement Supérieur

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Objet : Observations de portée générale

Veuillez trouver ci-après les observations de portée générale d'Université Côte d'Azur concernant l'unité **DER-PUR230023281 - LP2M - Laboratoire de Physico-chimie médecine moléculaire**.

Université Côte d'Azur would like to thank the entire HCERES Committee for the consistent and quality work in analyzing and evaluating the activities of the LP2M research unit. The Committee's assessments and recommendations on the various areas of assessment are very useful for positioning the unit's activities and providing elements on which to rely to consolidate the unit's forward-looking vision.

The University has no comments to make on the Committee's report.



Pour le Président d'Université Côte d'Azur
et par délégation,
Le Vice-Président Recherche et Innovation

Nicolas DIMARCO

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