

EVALUATION REPORT OF THE UNIT

MSP - Mitochondrie, stress oxydant et protection musculaire

UNDER THE SUPERVISION OF THE
FOLLOWING ESTABLISHMENTS AND
ORGANISMS:

Université de Strasbourg

EVALUATION CAMPAIGN 2022-2023
GROUP C



In the name of the expert committee¹ :

Luc Bertrand, Chairman of the committee

For the Hcéres² :

Stéphane Le Bouler, acting president

Pursuant to Articles R. 114-15 and R. 114-10 of the French Research Code, evaluation reports drawn up by expert committees are signed by the chairmen of these committees and countersigned by the Chairman of Hcéres.

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 Luc BERTRAND, UC Louvain, Brussels, Belgium

Experts :

Mr Bruno CHENUÉL, Centre Hospitalier Universitaire de Nancy, Nancy,
representative of the CNU

Mrs Véronique PARIETTI, Université Paris Cité, representative research
support staff

Mrs Cécile VINDIS, Clinical Investigation Center 1436, INSERM, Toulouse

HCÉRES REPRESENTATIVE

Mrs Francesca PALLADINO

CHARACTERISATION OF THE UNIT

- Name : Mitochondries, stress oxydant et protection musculaire
- Acronym : MSP
- Label and number : UR 3072
- Composition of the executive team : Pr Bernard Geny

SCIENTIFIC PANELS OF THE UNIT

SVE: Sciences de la vie de la santé et de l'environnement

SVE6 Physiologie et physiopathologie humaine, vieillissement

Panel 1

SVE6 : Physiologie et physiopathologie humaine, vieillissement

Panel 2

SVE4 : Immunité, infection et immunothérapie

Panel 3

SVE7 : Prévention, diagnostic et traitement des maladies humaines

Panel 4

SVE3 : Molécules du vivant, biologie intégrative (des gènes et génomes aux systèmes), biologie cellulaire et du développement pour la science animale

THEMES OF THE UNIT

The Unit 3,072 'Mitochondries, Stress oxydant et Protection musculaire' is focused on the study of the pathophysiology of the muscle mitochondrial network and oxidative stress in the context of ischaemia-reperfusion and inflammatory myopathies, as well as during exercise. Each of these constitutes a research axis lead by one PI.

HISTORIC AND GEOGRAPHICAL LOCATION OF THE UNIT

The Unit was created in 2005 and was directed by Bertrand Geny. In 2020 members moved into the CRBS (Centre de Recherche en Biomédecine de Strasbourg), located on the campus site of the Hôpital Civil de Strasbourg.

RESEARCH ENVIRONMENT OF THE UNIT

In addition to the Unit 3,072, the CRBS is composed of nine other research units. The centre operates in a federative manner. With the support of Idex Unistra, the Unit created the CEERIPE (Centre Européend'Enseignement, de Recherche et d'Innovation en Physiologie de l'Exercice), located in another location on the same campus. The Unit has several other local collaborations, including one on surgical processes in the context of the IHU Strasbourg (Institut de Chirurgie guidée par l'Image). The Unit is also part of the Fédération de Médecine Translationnelle de Strasbourg (FMTS).

UNIT WORKFORCE: IN PHYSICAL PERSONS AT 31/12/2021

Permanent personnel in active employment	
Professors and associate professors	16
Lecturer and associate lecturer	12
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	0
Research supporting personnel (PAR)	4
Subtotal permanent personnel in active employment	32
Non-permanent teacher researchers, researchers and associates	2
Non-permanent research supporting personnel (PAR)	0
Post-docs	0
PhD Students	13
Sub-total non-permanent personnel	15
Total	47

DISTRIBUTION OF THE UNIT'S PERMANENTS BY EMPLOYER: Non-tutorship employers are grouped under the heading 'others'.

Employer	EC	C	PAR
CHU Strasbourg	19	0	0
Université de Strasbourg	8	0	4
Others	1	0	0
Total	28	0	4

UNIT BUDGET

Recurrent budget excluding wage bill allocated by parent institutions (total over 6 years)	363
Own resources obtained from regional calls for projects (total over 6 years of sums obtained from AAP idex, i-site, CPER, territorial authorities, etc.)	578
Own resources obtained from national calls for projects (total over 6 years of sums obtained on AAP ONR, PIA, ANR, FRM, INCa, etc.)	352
Own resources obtained from international call 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.)	167
Total in k€	1460

GLOBAL ASSESSMENT

The unit 3,072 'Mitochondries, Stress oxydant et Protection musculaire' from the Université de Strasbourg has conducted original research focused on muscle mitochondrial function and oxidative stress in three pathophysiological contexts, namely inflammatory myopathies (myositis), chronic ischaemia/reperfusion of skeletal muscle, and during exercise (with a focus on its beneficial effect for patients and athletes). The unit relocated to the CRBS in 2020 to join nine other research units,

Overall, the scientific production of the unit is very good and evenly distributed between the three research axes: among the 158 publications, 99 are signed by members as first or last author in specialised journals (Eur J. Vasc. Endovasc. Surg Acta Neuropathol). Publications in multidisciplinary journals remain rare.

The unit showed some very good success in obtaining funding at the national level: two ANR grants, one as carriers (280 k€ and one as partner (194 k€). Additional funding amounting to a total of 962,900 Euros over the evaluation period was obtained from local and caritative agencies (Alsace Contre le Cancer, PhD funding from l'Association Française Contre les Myopathies and la Société Française de Rhumatologie,). No PIA or European funding was obtained by the unit.

The implication in training of the unit is excellent: twelve PhD thesis was defended and thirteen others are in progress for 22 HDRS in the Unit. Overall, 62% of the publications are signed by PhD students. The overall attractiveness of the unit is excellent. Over the period 2016–2021 two university hospital assistants and four MCF were recruited, and two senior foreign professors were hosted. The unit benefits from very good to excellent national and international visibility, as depicted by the organisation of two international congresses (e.g. European Symposium on Vascular Biomaterials, Global Conference on Myositis); participation in foreign scientific committees (4 in total, e.g. Word Society for Myositis, RARENET). and research steering committees (9 in total, e.g. American Society of Rheumatology, European Society of Vascular and Endovascular Surgery); membership in national and international societies that are authorities in their field of expertise (5 in total, including a founding member of the Strength and Conditioning Society). It is noteworthy that the unit is equipped with a platform, CEERIPE (European Center for Education, Research and Innovation in Exercise Physiology), thanks to support from Idex Unistra. The policy of welcoming and recruiting researchers from outside the medical field remains to be consolidated.

Interactions of the unit with the non-academic world are excellent: partnerships with the Schiller Company (CIFRE thesis grant), the Institute of Cancerology Strasbourg Europe (ICANS; 2 PhDs financed and 5 clinical studies), collaboration with the spin-off Predimet (improvement of Telemedicine, consortium HUS and EuroMétropole). The unit is involved in three clinical trials. In addition, the CEERIPE platform is working in collaboration with Satt Conectus to develop a new type of eccentric ergocycle (backward pedalling).

The contribution of the unit to the dissemination of knowledge is excellent: members of the unit are actively involved in participatory science activities involving patients (e.g. AFM), dissemination of science (debates, conferences.). Non-academic partnerships have also led to societal and economic benefits (Telemedicine, improvement of the quality of life and survival of cancer patients...).

In conclusion, the unit UR 3,072 conducts original research that could benefit from the recruitment of permanent scientific researchers in order to develop mechanistic studies and increase visibility and publication quality. Its influence in society is excellent (industrial partnerships, participation in various scientific committees), both at the national and international level.

DETAILED EVALUATION OF THE UNIT

A – CONSIDERATION OF THE RECOMMENDATIONS IN THE PREVIOUS REPORT

— Concerning scientific production, the lack of mechanistic studies was raised by the previous committee. To address this point, the unit moved into the CRBS and equipped itself with several pieces of equipment to explore the molecular mechanisms involved in their scientific paradigms using various cellular and pre-clinical models as well as human samples. The creation of a technological platform focused on the study of mitochondrial function is currently under consideration.

Measures have been taken to carry out more mechanistic studies, but this is not yet reflected in the unit's publications.

—A lack of influence and visibility was also mentioned. To answer this, the unit joined the CRBS and now appears on its web site and social media outlets. The creation of the new technological platform, CEERIPE, allowed the recruitment of four MCUs with the goal to improve visibility in the field of exercise physiology.

—A lack of valorisation was raised. The unit, in the context of the CEERIPE, started a project valorising a new device (eccentric ergometer) with the help of the Satt Conectus.

—Concerning the unit organisation, the previous expertise mentioned the importance of a clear identification of leaders for the different axes of research. This has been done, with three different PIs each leading one of the three research axes, under the supervision of the unit director. A scientific board has been created and meets monthly.

—The previous experts highlighted the quality of formation by the unit. This has been maintained: twelve PhD theses completed, and thirteen ongoing. Seven HDRs were also completed during the last five-year period.

B – EVALUATION AREAS

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

Assessment on the unit's resources

The recent integration of the unit within the CRBS and the creation of the CEERIPE platform have greatly improved the human and scientific resources of the unit. This significant improvement in the scientific environment makes it possible to envisage an excellent future. The number and the amount of financial resources (as PI, 1 national grant ANR, 4 local grants) can be considered as very good. The absence of permanent researchers and junior scientists (absence of postdoctoral fellows) tempered the overall evaluation.

Assessment on the scientific objectives of the unit

Overall, this is considered as excellent. The scientific objectives of the unit are clearly established: it has integrated the CRBS and has set up transversal collaborations at local, national, and international levels to develop its research topics.

Assessment on the Functioning of the unit

Overall the functioning of the unit is excellent to outstanding. The unit council and management take into account well-being and parity and a safe working environment is ensured. The unit is also aware of its duties regarding environmental protection.

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

Strengths and possibilities linked to the context

The integration of the unit into the CRBS and the creation of the CEERIPE has allowed the researchers of the unit to develop their expertise in the field of exercise physiology, and to develop basic research (study of signalling pathways, development of mouse models, study of mitochondrial function).

The unit is staffed by members that have either university (PU, MCU, engineer, technician), hospital (PH), or joint hospital and university appointments (PU-PH, MCU-PH), facilitating interactions between basic and clinical research. A number of PhD students (13) also contribute to research. The increase in human resources (recruitment of 4 EC, 2 CDD PhD, 1 AHU) has been a driving force behind the evolution of the unit.

The unit has its own financial resources (mainly regional and 1 national grant ANR as PI) in addition to its recurrent allocations.

It benefits from the common services and platforms of the CRBS (photonic imaging platform), equipment of the CEERIPE, and has acquired equipment for the analysis of cellular and molecular mechanisms.

Weaknesses and risks linked to the context

The variability in the unit's annual financial resource presents a risk for the sustainability of scientific projects. The absence of permanent and junior scientists (postdoctoral fellows), and the low number of technical staff need to be taken into account if no recruitment is planned in the next few years.

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

Strengths and possibilities linked to the context

The scientific objectives of the unit take into account the scientific policy of the site and the strategic orientation plan of the regulatory authorities. The unit has set up transversal collaborations at local, national and international levels to develop its research topics. The CEERIPE platform allows the unit to benefit from innovative and cutting-edge infrastructure to develop its projects, in particular for the direct benefit of patients (use of telemedicine, hyperspectral imaging).

Weaknesses and risks linked to the context

The absence of scientists with permanent position and students (PhD) from scientific and non-medical formation could be deleterious or a brake to the development of the unit's scientific objectives.

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 council, which represents all personnel, is organised on a parity basis (6 women and 6 men). Parity is also found for the seventeen PhDs during the contract (9 women and 8 men). The unit's management alternates between male and female, and for the new contract the Unit will be led by a woman. There is a committee of referents for the 'Respect in Working Relationships' in the unit. Health and safety comply with the work legislation (health and safety officer in the unit, incident register, welcome booklet for new entrants). A particular attention is given to help staff members develop career plans (support for promotion requests). Scientific animation is ensured by weekly laboratory meetings (presentation of research work and/or bibliography). The computer system and network are secure within the CRBS. The unit is located in an environmentally responsible building and has adopted a sustainable management policy. Contingency plans in case of an emergency are updated regularly.

Weaknesses and risks linked to the context

There is no parity between men and women in the distribution of the unit's personnel: 27 men and 15 women. The latest recruitments (4 MCU) is exclusively men.

EVALUATION AREA 2: ATTRACTIVENESS

Assessment on the attractiveness of the unit

The unit benefits from significant local recognition, testifying to a strong transversal activity including numerous clinicians and PhD students trained through research. The creation of the European Center for Education, Research and Innovation in Exercise Physiology, and the unit's integration in the Strasbourg Biomedicine Research Center were decisive, making it possible to further strengthen the national attractiveness of the unit. The recruitment of young and permanent researchers would amplify the movement. International recruitment is very good to excellent with the arrival of a new MCU-PH from Italy.

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

Through its three research axes, the unit benefits from national and international visibility, particularly in Europe. Participation in international meetings is satisfactory and regular (n=37 during the last contract), with substantial activity in the organisation of major international events either in the form of congresses (European Symposium on Vascular Biomaterials (2021), Global Conference on Myositis (2019)) and participation in various scientific committees (4 in 2016–2021).

Members of the unit are largely involved in international editorial activities (7 editorial responsibilities), research steering, or international scientific committees (9 on the last contract). They are also active members in national and international societies which are authorities in their field of expertise (5 societies in total including a founding member of the Strength and Conditioning Society). Eight prizes and scientific distinctions were awarded to the team (5 international and 3 national).

The unit is very attractive for physicians already committed to, or wishing to engage in a hospital-university career. The creation of the European Centre for Education, Research and Innovation in Exercise Physiology and its certification as a platform within the CORTECS network has allowed the recruitment of four new teacher researchers from STAPS (MCU) and should strengthen this attractiveness.

Weaknesses and risks linked to the context

The international visibility is not sufficiently demonstrated through the obtention of EU grants and hosting foreign students/postdoctoral fellows.

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

Strengths and possibilities linked to the context

The great attention paid to the supervision of doctoral and postdoctoral fellows both through their material well-being (appreciable dedicated facilities and equipment) and scientific mentoring (personalised supervision), ensures significant success in training courses, allowing the respect of the rhythm of acquisitions and the proper aspirations of the student. The significant number of theses defended (12) and HDRs (7) obtained under the present contract prove the consistency of this high-quality level of support. In this context, two university hospital assistants and four MCF were recruited over the period 2016–2021. The unit welcomed two senior foreign teacher researchers in 2021, one from Canada (University of Quebec) and the other from Italy (University of Verona).

Weaknesses and risks linked to the context

The unit has yet to recruit any teacher researchers from outside the medical field

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

Over this last contract, the unit was able to obtain two grants from the National Research Agency (ANR JCJC, GC-MYOS project: 280 k€ in 2021) and is a partner in ANR Sport Haute Performance HYPOXPERF, 194 k€ (2020) for the unit.

Additional funding amounting to a total of 962, k€ over the period 2016–2021 was obtained from local and caritative agencies (5 fellowships as bourses de these de l'Association Française Contre les Myopathies, de la Société Française de rhumatologie.. ,, subvention Alsace contre le cancer).

Weaknesses and risks linked to the context

The unit has not secured competitive funding on the national and international level on a more regular basis

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

Strengths and possibilities linked to the context

The creation of CEERIPE and its certification as a platform within the CORTECS network of the University of Strasbourg are important assets. The investment in innovative equipment likely to strengthen the fields of expertise of the platform and of the unit is worth noting and should further increase its ability to generate translational collaborations (state-of-the-art imager generation and multimode license plate reader as examples).

Weaknesses and risks linked to the context

BIATSS staff members dedicated to the development of the CEERIPE platform is missing in order to envisage a greater number and more fruitful collaborations.

EVALUATION AREA 3: SCIENTIFIC PRODUCTION

Assessment on the scientific production of the unit

The overall scientific production of the unit is regular and is considered as very good and harmoniously divided between the three axes of research, but still largely due to the clinical aspects of the research. Among the 158 publications, 99 publications (62% of the total) are signed by members of the unit as first or last author in specialised journals (Eur J. Vasc. Endovasc. Surg Acta Neuropathol).

1/ *The scientific production of the unit meets quality criteria*

Strengths and possibilities linked to the context

The unit presents 158 publications for the evaluation period (not including publications related to pure hospital activity). The multidisciplinary scientific production of the unit satisfies quality criteria.

The three publications of the portfolio which reflect the quality of the scientific production of the unit correspond to the three current research axes of the unit: 1) in the field of ischaemia-reperfusion, their work showed that pharmacological inhibition of oxidative stress protects and restores the muscle activity (mitochondrial function) in a mouse model of lower limb ischaemia. (Eur J Vasc Endovasc Surg) 2) In the field of inflammatory myopathies, their work (with national collaborations) has demonstrated immunometabolic changes in patients with dermatomyositis (DM) in relation to the inflammatory status of the disease. The molecular and cellular mechanisms studied show for the first time a cytokine-dependent oxidative stress linked to mitochondrial dysfunction in muscle tissue (Acta Neuropathol). 3) in the field of physical exercise, their work studied in an original model of eccentric muscular work (downhill running) the acute response mechanisms (at the respiration, cardiovascular and neuromuscular levels) and the chronic effects of eccentric muscular work (Medicine & Science in Sports and Exercise). This work has led to the establishment of new international collaborations and the obtaining of ANR funding as co-PI (HypoxPerf). A recent clinical study (publication 2020) of the unit has identified the platelet/lymphocyte ratio as an accurate biological marker to target high-risk sarcopenic patients (this test could be easily set up in routine clinical practice).

As members of national and international scientific consortiums, unit members also appear as co-authors in high-profile journals in their specific field of expertise, Path Institute (2 original articles), European Reference Networks on inflammatory myopathies, AENEAS (American and European NETwork of Antisynthetase Syndrome) Collaborative Group, University of Utah (15 original articles since 2016), ISSEPS (Sfax) 2 original articles) and Research Center on High Level Sports Performance at the Catholic University of Murcia (4 original articles).

Weaknesses and risks linked to the context

The fundamental aspects (cellular and molecular mechanisms, cellular or mouse models) of the physio- and physiopathological processes studied in the unit remain limited despite recent efforts.

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 is proportionate to the research potential of the unit, 158 (average of 32 publications/year over 5 years) for 21 members (hospital and university), thirteen members (university) and six members (hospital) for the evaluated period, 99 publications (62%) were signed by members of the unit as first and/or last author. PhD students were co-authors in 40% of the unit's publications.

The publication policy of the unit is a balance between high-profile generalist journals and journals of the discipline that have an impact on patient care but that are less cited.

Weaknesses and risks linked to the context

The number of publications in generalist journals remains limited.

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 scientific production of the unit complies the principles of scientific integrity (application of the University of Strasbourg's Charter (Code) of Ethics). The unit, through its research axis on critical ischaemia of the lower limbs, has developed a reproducible model of critical ischaemia of the lower limbs and made it available to the research community. Its use by independent research teams (3 publications) testifies to the reproducibility and reliability of the unit's work. The scientific production of the unit complies with the rules of human ethics (ethics committee, committee for the protection of persons).

The traceability of the experiments (investigators, protocols, raw data) is recorded in laboratory notebooks, accessible to all members of the unit. The research unit tries as much as possible to follow the guidelines for open science, via publications in Gold Open Access or Green Open Access in open archives, or via professional networks.

Weaknesses and risks linked to the context

None

EVALUATION AREA 4: CONTRIBUTION OF RESEARCH ACTIVITIES TO SOCIETY

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

The contribution of the unit's research in society is considered as outstanding: the unit has developed strong partnerships with various players of the non-academic world. Interactions with the economic sector include a CIFRE thesis grant and an industrial research contract on nutrition and physical activity. Activities in the social and community sectors include clinical studies on the role of physical activity in cancer and a spin-off on telemedicine, coordination of a European network including input from patients, and organisation of conferences for the public audience. A partnership was set up with JO2024 for improving athlete training. The unit is also involved in the production of videos providing information for patients. At the international level, the unit participates in the drafting of medical recommendations.

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

Strengths and possibilities linked to the context

The unit has developed several partnerships with actors from the non-academic world: Schiller's company (CIFFRE thesis grant, electrographic monitoring); ICANS (2 PhDs, 5 clinical studies on breast cancer and physical activity, PROTECT project); Racing Mutest Académie (1 PhD, 1 Master training, role of neuromuscular tiredness in the occurrence of injuries and link with sports performance); SATT Conectus; STEPAN company (industrial partnership with a research contract, 1 PhD, nutrition and physical activity); collaboration with the spin-off Predimet (improvement of Telemedicine, consortium HUS and EuroMétropole). The scientific and technological added value of these partnerships is not only significant in the field of public health, but has also led to societal and economic spin-offs (Telemedicine, improvement of the quality of life and survival of cancer patients, sports activity and physical injury, weight loss and improvement of endurance performance).

A Physician-Professor of the unit is the principal investigator of three clinical trials for the pharmaceutical industry (ALXN1210-DM-310: 'Ravulizumab Versus Placebo in Adult Participants With Dermatomyositis'; —IM101-611: trial to evaluate the efficacy and safety of abatacept;—RECLAIM: 'A Study to Evaluate the Efficacy, Safety, and Pharmacokinetics of IgPro20 in Adults With Dermatomyositis (DM).

The research unit is also involved in participatory science activities: patient groups participate in the scientific production of the unit (elaboration of the recommendations/guidelines of the European Society of Vascular Surgery concerning the management of infections of vascular graft prostheses, 1 publication). The unit also coordinates the group (including expert patients) dedicated to myositis of the European Network ReCONNET (Rare Connectivity Tissue and Musculoskeletal Diseases Network, 1 publication).

Weaknesses and risks linked to the context

None

2/ The unit develops products for the socio-economic world.

Strengths and possibilities linked to the context

The CEERIPE platform is developing a new eccentric ergocycle (bicycle that increases muscle power with low energy expenditure, with support from the SATT for patent registration). The unit participates in the development of spin-offs (Predimed) in technological fields (telemedicine, saturemeters), and collaborates with the food industry for the development of new supplements for weight loss and improvement of endurance performance. In the field of ischaemia-reperfusion, the unit participated in the drafting of recommendations/guidelines for four scientific bodies: the European Society of Vascular Surgery and the European Society of Nuclear Medicine, the National Plan of Diagnosis and Care (PNDS) on dermatomyositis (HAS 2016), the National Plan of Diagnosis and Care (PNDS) on inclusion myositis (HAS 2022), and the MedicoSport-Healthy (support for physicians in prescribing physical activities for patients).

The unit participates in the writing of scientific watch articles through monthly newsletter of the "Filière des Maladies Auto-Immunes et Auto-Inflammatoires Rares" (FAI2R), the realisation of video for patient information, and the publication of books for the public audience.

The unit was attributed to a transversal IDEX grant on the societal consequences of fibromyalgia, and was involved in the COVID-19 pandemic through the study of the effects of COVID-19 on mitochondrial function in intensive care patients infected by the virus (12 publications).

Weaknesses and risks linked to the context

None

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

Strengths and possibilities linked to the context

Members of the unit regularly participate in conferences for the public audiences: Alsace contre le cancer Jardin des Sciences, Salon du diabète du Grand-Est, Association AFD67, Alsace cardio 2021), and talks in the context of autoimmune diseases. Members of the unit also talk regularly in the media, on the internet or on social networks, in the respect of scientific integrity and ethics: broadcast on organ transplantation (France 3 Alsace), podcasts (ischaemia-reperfusion, in the framework of the European Journal of Vascular and Endovascular Surgery Forum), newsletters/social networks for monthly scientific watch "Filière des Maladies Auto-Immunes et Auto-Inflammatoires Rares". PhD students present their research projects through interviews (Radio France Bleu Alsace in 2020, France 3 Alsace in 2021), and articles in the print media (Recherche.unistra.fr, The Conversation. PhD students created a LinkedIn account for the unit. The unit organises awareness and training actions for young people (students, college students, high school students) around the importance of physical exercise and nutrition. Since 2019, the unit participates in the "pilot secondary school" project and, within this framework, provides training on the theme of sugar in our diet, in partnership with the teaching staff. The unit welcomes trainees from secondary schools as part of a discovery course.

Weaknesses and risks linked to the context

None

C - RECOMMENDATIONS TO THE UNIT

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

The unit has shown an impressive development over the last period with its integration in the CRBS and the creation of CEERIPE in addition to the recruitment of four new MCUs. The committee now recommends progressing to the international level (promoting recruitment of foreign postdocs and increasing international collaborations).

In light of the unit's growth, basic research must also continue to expand. This could eventually lead to the development of an experimental platform open not only to CRBS teams, but also to external ones. In addition, technologies to evaluate mitochondrial functions (e.g. SeaHorse) are available within the CRBS, but are not yet used by the Unit. Technical training is required to implement these novel technologies.

Considering the development of a "mitochondrial" platform, recruitment of technical support will be essential. Similarly, the reinforcement of the unit by a BIATSS staff member dedicated to the development of the CEERIPE platform is necessary in order to envisage additional fruitful collaborations.

Recommendations regarding the Evaluation Area 2: Attractiveness

Recruitment at the local and national level benefits from strong transversal actions (platforms) and support from the University of Strasbourg. International recruitment, which is already excellent, could be further improved through the intensification of fundamental research. The reinforcement of the unit with a BIATSS staff member dedicated to the development of technical platforms is also a major point to address. The development of policies favouring junior (postdoctoral fellow) and senior researchers particularly involved in basic research needs to be considered.

Recommendations regarding Evaluation Area 3: Scientific Production

To improve visibility, team members are encouraged to publish articles with senior authorship in large-audience journals when possible. Applying for European grants and recruiting postdoctoral fellows will greatly help them to publish in top journals. Further investment in the establishment of novel basic science approaches will certainly promote such achievements.

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

Continue pursuing current policies to maintain the high-level contribution to society

CONDUCT OF THE INTERVIEWS

DATE(S)

Start: 14, october, 2022

End: 14, october, 2022

Interview conducted: online

INTERVIEW SCHEDULE

8 a.m.-8:30 a.m.:	Time for everyone to connect
8:30 a.m.	Presentation of the committee
8:40 a.m.-9:20 a.m.:	Presentation: Highlights of the Unit by the Director, Anne Lejay & Bernard Geny
9:30 a.m.-9:50 a.m.:	Topic 1 – Inflammation
9:50 a.m.-10:10 a.m.:	Topic 2 – Exercice
10:10 a.m.-10:30 a.m.:	Topic 3 – Ischaemia reperfusion
Coffee break	
10:45 a.m. – 12 p.m.:	Committee debriefing
12 p.m.-1 p.m.:	Lunch
1:15 p.m.-1:45 p.m.:	Meeting with PhDs and postdocs (closed doors)
1:45 p.m.-2:15 p.m.	Meeting with technicians and administrative staff (closed doors)
2:15 p.m.-2:45 p.m.:	Meeting with researchers (without team leaders)
Coffee break: 15 min	
3 p.m.-3:30 p.m.:	Meeting with team leaders (closed door)
3:30 p.m.-3:50 p.m.:	Meeting with the representatives of the local institutions: Universite VP recherche Remi BARILLON
3:50 p.m.-4:20 p.m.	Meeting with the Director
4:20 p.m.-4:50 p.m.:	Closed-door meeting of the HCERES committee

PARTICULAR POINT TO BE MENTIONNED

GENERAL OBSERVATIONS OF THE SUPERVISORS

Université

de Strasbourg

Monsieur Éric Saint-Aman
Directeur du Département d'évaluation de la
recherche
HCERES - Haut conseil de l'évaluation de la
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75013 PARIS

Strasbourg, le 2 octobre 2023

Objet : Rapport DER-PUR230023318 - MSP - Mitochondrie, stress oxydant et
protection musculaire

Réf. : RB/FF/ 2023- 475

Rémi Barillon

Vice-Président Recherche,
Formation doctorale et
Science ouverte

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