

EVALUATION REPORT OF THE UNIT
NPS – Neurosciences Paris Seine

UNDER THE SUPERVISION OF THE
FOLLOWING ESTABLISHMENTS AND
ORGANISMS:

Sorbonne Université,
Institut national de la santé et de la recherche
médicale – Inserm,
Centre national de la recherche scientifique –
CNRS

EVALUATION CAMPAIGN 2023-2024
GROUP D

Rapport publié le 07/06/2024



In the name of the expert committee¹ :

Ms Ellouise Anderson Leadbeater, Chairwoman 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.

To make the document easier to read, the names used in this report to designate functions, professions or responsibilities (expert, researcher, teacher-researcher, professor, lecturer, engineer, technician, director, doctoral student, etc.) are used in a generic sense and have a neutral value.

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:

Ms Ellouise Anderson Leadbeater, Royal Holloway University of London, Royaume-Uni

Experts:

Ms Nora Arous, Inserm - Institut national de la santé et de la recherche médicale - INSERM, Bordeaux

Mr Olivier Bertrand, Université Claude Bernard Lyon 1 - UCBL, Lyon

Mr Philippe De Deurwaerdere, Communauté d'universités et d'Établissements d'Aquitaine - CUEA, Bordeaux

Mr Luc Dupuis, Université de Strasbourg, Strasbourg

Mr Jean-François Gherzi-Egea, Institut national de la santé et de la recherche médicale - INSERM, Lyon

Mr Etienne Guillaud, Centre national de la recherche scientifique - CNRS, Bordeaux

Mr Jacques Noel, Université Côte d'Azur - UCA, Nice

Ms Fabienne Pituello-Berniere, Centre national de la recherche scientifique - CNRS, Toulouse

Ms Muriel Thoby Brisson, Institut national de la santé et de la recherche médicale - INSERM, Bordeaux

Ms Elisa Zanier, Mario Negri Institute for Pharmacological Research, Milan, Italy

HCÉRES REPRESENTATIVE

Mr Giovanni Stevanin

REPRESENTATIVES OF SUPERVISING INSTITUTIONS AND BODIES

Mr Philippe Agard, Faculté des Sciences et Ingénierie, Sorbonne université

Mr Bernard Poulain, Centre national de la recherche scientifique – CNRS

Mme Marjolaine Robillard, CNRS - Centre national de la recherche scientifique

Mr Etienne Hirsch, Inserm - Institut national de la santé et de la recherche médicale

CHARACTERISATION OF THE UNIT

- Name: Neurosciences Paris Seine
- Acronym: NPS
- Label and number: UMR 8246 CNRS U1130 INSERM Sorbonne Université
- Composition of the executive team:

SCIENTIFIC PANELS OF THE UNIT

SVE Sciences du vivant et environnement
SVE5 Neurosciences et troubles du système nerveux

THEMES OF THE UNIT

The objective of the Neurosciences Paris Seine (NPS) unit is to explore the mechanisms that allow neural circuits to adapt to internal and external challenges, in both healthy and pathological brains. The unit follows an integrative approach that incorporates multiple species at multiple levels, from transcriptomic to organismal. Over the course of the contract, the NPS has been composed of 13–16 teams, broadly addressing the dynamics underlying neural development and regeneration, behaviour, psychiatric or neurological disorders, and responses to social and other environmental challenges. Many teams cover more than one of the topics on this list. The key characterising feature of NPS is the bridging of truly fundamental research (typically non-clinical or preclinical approaches) and translational activity.

HISTORIC AND GEOGRAPHICAL LOCATION OF THE UNIT

The NPS research unit is an integral part of the Institute of Biology Paris Seine (IBPS), situated within the Cassan building on the Pierre and Marie Curie campus of the Sorbonne University (SU) in central Paris. It has existed for approximately a decade, having been established in 2014 through the amalgamation of three previously independent research entities:

- 1) the CNRS/UPMC 'Neurobiology of Adaptive Processes' unit – NPA;
- 2) the Inserm/CNRS/UPMC 'Physiopathology of Central Nervous System Diseases' lab – PMSNC;
- 3) and a research unit affiliated with the University Paris Descartes (Centre for Psychiatry and Neuroscience, CPN, Sainte-Anne Hospital).

The initial contract was renewed in 2019 with the same director for both mandates. Positioned at the heart of Parisian neurosciences, the NPS has capitalised on its central location and leverages collaborations with other neuroscience units that lie in close geographic proximity (Institut du Fer à Moulin — IFM & Paris Brain Institute — ICM), alongside units in other disciplines within IBPS and further afield nationally and internationally.

RESEARCH ENVIRONMENT OF THE UNIT

NPS is one of five units that sit within the IBPS, a federative structure dedicated to biology research at the Pierre and Marie Curie campus within Sorbonne Université (SU). The expertise of the other constitutive units traverses the border between biology and physics, including computational, quantitative and developmental biology among others, and the IBPS supports seven technology platforms, employing over 500 staff.

NPS actively contributes to the development and maintenance of shared facilities, such as RongIBPS and IBPS Imaging, and plays a vital role in the IBPS Summer Schools. Moreover, the unit is affiliated with the UFR de Biologie and contributes to research and teaching in the field of biology and life sciences at SU. NPS has actively participated in various structures initiated by the Programme d'Investissements d'avenir (PIA), including Labex Biopsy, IdEx program I-Bio Sorbonne University, and FHU Nor-Sud.

Additionally, members of the unit have been instrumental in establishing and managing DIM C-BRAINS, an initiative by the Région Île-de-France aimed at structuring and unifying research and innovation in the domains of neuroscience and cognition. At both the national and European levels, NPS members are engaged in numerous research federations, including GIS Réseau de phénotypage du petit animal, GIS Autism, GDR Mémoire, GDR Neuralnet, Société des Neurosciences Françaises, European Molecular Cellular Cognition Society, Federation of European Neuroscience Societies, and the European Huntington Disease Network. Furthermore, NPS collaborates closely with several hospitals in and around Paris, such as CHU Pitié Salpêtrière, Sainte Anne, Saint Antoine, Fernand Widal, Créteil, as well as institutions in Tours, Nice, New York, and Rio among others.

To enhance the socio-economic impact of their research, NPS members receive support from Société d'Accélération et de Transfert Technologique Lutec and Inserm Transfer. This enables them to translate their scientific advancements into practical applications and innovations that can benefit society and the economy.

UNIT WORKFORCE: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	7
Maîtres de conférences et assimilés	13
Directeurs de recherche et assimilés	17
Chargés de recherche et assimilés	15
Personnels d'appui à la recherche	22
Sous-total personnels permanents en activité	74
Enseignants-chercheurs et chercheurs non permanents et assimilés	1
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	41
Sous-total personnels non permanents en activité	42
Total personnels	116

DISTRIBUTION OF THE UNIT'S PERMANENTS BY EMPLOYER: in physical persons at 31/12/2022. Non-tutorship employers are grouped under the heading 'autres'.

Nom de l'employeur	EC	C	PAR
CNRS	0	19	10
SORBONNE UNIVERSITÉ	19	0	6
Inserm	0	13	6
AUTRES	1	0	0
Total personnels	20	32	22

GLOBAL ASSESSMENT

NPS teams consistently produce high-quality research in the field of fundamental neuroscience, positioning the unit as a crucial centre for neuroscience research both nationally and internationally. Over the last contract period, the unit's profile on the international stage has continued to follow an upward trajectory. NPS members have actively engaged in and initiated numerous international initiatives, including the organisation of meetings and conferences such as FENS 2022. External competitively sourced research funding has grown and now represents an impressive portfolio of grants from national (5 to 7 ANR per year for a total of 28 contracts with eight as coordinator, 3 FRM teams, 3 INCA contracts with one as leader) and sometimes international funders (1 H2020, 3 NIH contracts as partner) for a total amount surpassing 16M€. This excellent to outstanding funding capacity, together with unit promotion policies (flyers on international conferences) and national/international recognition (L'Oréal, FRM and Inserm prizes, 5 PhD prizes, 130 invitations in prestigious conferences such as Gordon) underlie excellent international attractiveness, which is evident in the number of international researchers at many levels; 1/5 of the PI, half of the 96 PhD and 68% of postdocs (15/22) are from abroad.

The teams have strengthened connections with the commercial sector (Jansen, Sanofi, etc.), making notable strides in leveraging their technical innovations. The Unit benefits from excellent shared services both in-house and as a constitutive unit of the IBPS. The Unit maintains an excellent level of scientific productivity with >60 original publications yearly (50% with lead/senior authors from the unit), including several in highly recognised journals such as Nature Communication, eLife; PNAS or Biol Psychiatry, with strong consistency across teams. The multidisciplinary nature of the unit's expertise, encompassing diverse topics, fosters collaborative research within the unit with more than ten papers yearly co-authored by two or more teams. Additionally, NPS teams have forged robust interdisciplinary collaborations with other groups in Paris and worldwide (e.g. Europe, Turkey, Israel, UK, Brazil, US), and are involved in key important networks within both local (Labex BioPsy) and international (Autism sequencing consortium and Huntington's disease system biology consortium initiative) visibility.

A notable strength lies in the translational aspect of the scientific projects, with many teams establishing strong research transfer including multiple patent submissions (n=15) and initiation of start-ups (n=3). While the teams employ a wide array of cutting-edge techniques (e.g.: fibre photometry) and introduce technological innovations through excellent core facilities and technical platforms (e.g.: optogenetics), there are identified weaknesses. Functioning of core administrative support services is sometimes poor, to the extent that this hinders the smooth progress of research. Awareness of and confidence in formalised processes for PhD student support could be improved. Notably, the absence of NPS team participation in European research consortia or ERC grants remains a significant gap.

There has been limited recruitment of new teams at junior level, but this reflects significant planning effort that precedes a restructuring in the next contract and associated senior recruitment.

DETAILED EVALUATION OF THE UNIT

A – CONSIDERATION OF THE RECOMMENDATIONS IN THE PREVIOUS REPORT

Firstly, the previous committee recognised the scientific production of the unit as excellent but recommended that some teams should prioritise targeting the highest-tier journals in order to be competitive for international funding. In the current period, several teams have successfully done so, taking lead roles for primary research publications in (e.g.) Nature, Science, Nature Communications, Science Advances, and co-authorship positions in many more.

A second recommendation was to improve communication through (a) scientific retreats (b) increased frequency of meetings and (c) provision of communal space. In the current contract, these provisions exist, although it is not clear that their frequency/provision has increased.

It was recommended that support for Early Career Researchers (ECRs) to attend conferences should be more homogeneous. It is clear that attendance has taken place, but this criterion is impossible to assess due to the onset of the COVID-19 pandemic mid-mandate, which precluded many opportunities.

Nomination of a deputy director was recommended, and this will be implemented for the final year of the contract (2024).

The previous committee urged consolidation of the scientific coherence of some teams. For the majority of teams presented at this review, coherent aims were clear. In addition, there has been very significant effort to re-evaluate the structure and objectives of all teams during the current mandate, with vision towards the future. Further development of cutting-edge technologies was recommended and has been impressively implemented (e.g. Fiber photometry).

Recruitment of fully independent junior groups with sufficient funds was recommended. Recruitment has been relatively low during the period, but given the imminent integration of several new teams from other institutes, focus has shifted from recruitment of new junior teams to accommodation of incoming established teams. This has been a major preoccupation but also presents an exciting opportunity given the high scientific value of the arriving teams.

B – EVALUATION AREAS

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

Assessment on the scientific objectives of the unit

The assessment on the scientific objectives of the unit is excellent to outstanding. NPS follows a research program that seeks to bridge cutting-edge fundamental neuroscience and translational activity to address societal challenges. This is achieved through a multi-level, multi-species approach that centres around the dynamic responses of the brain to external and internal perturbation.

Assessment on the unit's resources

Resources of NPS are excellent. NPS is a relatively large unit composed of 74 permanent staff (ratio PI/technical assistance: ~0.4). The unit benefits from excellent financial resources (~3M€ yearly) secured through competitive national (5–7 ANR per year) or international (NIH, H2020) academic grants, charities (e.g. Ligue Nationale contre le cancer, AFM), public-private initiatives (e.g. MELKIN pharmaceuticals, Sanofi) and local strategic initiatives (e.g. SATT, conseil régional IDF, IDEX), in addition to core funding. Within IBPS, it both benefits from and adds to an excellent to outstanding set of research platforms, and it is a major contributor to teaching at SU, ensuring efficient recruitment of students.

Assessment on the functioning of the unit

The functioning of the NPS unit is excellent. The general governance of NPS is well organised, featuring clearly defined responsibilities across various governance bodies. The leadership is well integrated into the IBPS. The team and laboratory councils foster ongoing communication and function on a democratic basis. NPS has assembled multiple initiatives to effectively oversee internal policies, covering both scientific and operational aspects. On a day-to-day basis, aspects of administrative support require attention as they are failing to achieve their intended purpose efficiently.

1/ The unit has set itself relevant scientific objectives.

Strengths and possibilities linked to the context

NPS has been following an interdisciplinary program that covers multiple levels of neurobiological analysis, from genes to behaviour. They seek to explore neural dynamics in the context of internal and external change at the fundamental level, but have also identified translational questions that have applications in psychiatric and neurological diseases. This strategy has four axes: neural development and regeneration, behaviour, psychiatric or neurological disorders, and responses to social/other environmental challenges. The organisation of the unit has allowed for collaboration between teams, producing synergy of approach. For example, more than 60 publications were co-authored by researchers from more than one NPS team, including high-tier publications (e.g. Brain, eLife, Nature Communications and Current Biology).

As a research entity, the unit is an important contributor to key networks at local and national level. For example, locally, it has been a driving force behind the C-BRAINS DIM, which supports access to advanced technologies for training of a new generation of researchers across a research community. Strong interactions with colleagues at IFM have led to a decision to merge into a unique Neuroscience Research Centre in the next contract (NEURO-SU), a process ongoing. Internationally, NPS members are involved in consortia that address societal problems (e.g. the Autism Sequencing Consortium, Huntingdon's Disease Systems Biology Consortium Initiative).

Weaknesses and risks linked to the context

While internal collaboration within NPS is robust, the architectural design of the building poses challenges for informal scientific exchange that could facilitate more collaborative work, owing to limited social spaces and teams segregated across various floors. In the current mandate period, the strategic recruitment of young teams that could enhance NPS's core expertise has been constrained by the upcoming planned merge, while at the more senior level, a new and highly successful team has been recruited, with a remit that could remain tangential to the NPS's core expertise if active efforts to ensure integration are not carefully planned. It will be essential to promote initiatives for improved communication and networking opportunities, especially among early-career scientists.

2/ The unit has resources that are suited to its activity profile and research environment and mobilises them

Strengths and possibilities linked to the context

NPS has been successful in obtaining funding that provides resources to support its activity (about 16 M€ over the period), including support from LABEX Bio Psy and DIM (5% of unit income), and project-specific funding from

ANR (28 contracts with 8 as leader) other national bodies (37% of income). It also has a strong profile in terms of private support (~15% of unit income such as ARC or Lejeune foundations) and in public-private R&D (SATT Lutec, Melkin, Argobio SAS etc). Over the course of the contract, approximately 12% of the unit's income was realised through valorisation. This record implies impressive fundraising. The unit contributes to innovative research-based teaching, which represents ~20% of its activity. Many teams include SU associate or full professors (7), facilitating the recruitment of students in the teams (around 100 PhD students trained). Other key aspects of activity include research administration (8%), which derives from key roles fulfilled by its staff on direction committees (e.g. IBPS), funding committees (e.g. Horizon 2020/Europe), editorial duties and advisory boards. Dissemination activities include schools outreach, media delivery and patient association responsibilities. This comprises 5% of activity.

The unit is well supported in terms of facilities. For example, combined with the IBPS-level breeding facility, the behavioural core presents a state-of-art forum, while Fiber photometry and Optogenetic platforms are also available within the unit and made available at the wider IBPS level.

Finally, with 74 permanent staff (including 32 full researchers, 20 researchers with clinical or university duties and 22 technical staff), the unit was able to host 96 PhD students during the period.

Weaknesses and risks linked to the context

The current administrative support for basic research processes, and particularly ordering and contracts (but also IT) is dysfunctional and is hindering the implementation of research. This is especially problematic for the junior researchers who have limited ability to chase timely solutions. To optimise this support, NPS, together with the other Units of IBPS have started to implement a centralised and shared administrative staff.

The unit has already begun to change significantly in team structure and will do so dramatically in the next contract, such that a major expansion in terms of space is critical. This has been planned for at the level of SU, with a proposed date for finalisation. There is concern that the building work required may be disruptive for the behavioural experiments that constitute some of the unit's core research.

For a unit composed of >50 full-time researchers, the training of only 10–15 master students yearly seems insufficient.

3/ The unit's practices comply with the rules and directives laid down by its supervisory bodies in terms of human resources management, safety, environment, ethical protocols and protection of data and scientific heritage.

Strengths and possibilities linked to the context

NPS has in place structures that ensure compliance with human resources, safety, and the production of scientific assets, and in some aspects, these are particularly forward-looking. Career development of NPS staff is considered at the level of the direction board, which also serves to build cases for obtaining externally allocated positions (e.g. SU professorships). Specific training is provided for promotion, and in preparation for external competitions.

Gender is balanced at almost all levels except for fixed-term researchers and PhD students, where there is a female majority (approx. 3:1). The unit has taken measures to improve access for researchers with specific access needs (e.g. support for living costs for students from LMI countries).

The protection of scientific assets is well-considered, including emergency ringfenced budget provision. Rooms containing sensitive equipment restrict access to authorised users. Newcomers attend a dedicated IBPS induction session, and a regular data club considers safety, security and lab rules, in addition to scientific presentation. Automated temperature alarms are in place to protect samples and data.

Networks are in place to welcome newcomers (e.g. an annual lunch), while early career researchers can take part in the IBPS docs and post-docs association. Professional training is supported for staff with contracts longer than eighteen months, and career support is also provided by an internal funding application review process.

Weaknesses and risks linked to the context

Although gender balance within the unit is strong at most levels, there are no specific actions taken to address those issues that may face women in science, technology, engineering & mathematics (STEM) disciplines, who interact in research worlds outside the unit as well as within. Evidence of commitment to environmental policies

is also lacking, with implementation at IBPS level but limited evidence of basic features (recycling bins, air travel policy) featuring within NPS day-to-day processes. Pastoral support for PhD students is limited, with no universal awareness of formal procedures to seek advice in the event of conflict with supervisors, or (where awareness does exist) confidence in the independence of allocated pastoral support.

EVALUATION AREA 2: ATTRACTIVENESS

Assessment on the attractiveness of the unit

NPS provides an excellent to outstanding environment for collaborative fundamental research with applications towards societal challenges. The robust research infrastructure and platforms render this a highly attractive research unit. As a result, the unit has had considerable success in attracting international researchers at many levels, and at the senior level, these researchers are engaged in international research networks, events and administrative roles that attest to a highly competitive standing at both national and international levels.

- 1/ The unit has an attractive scientific reputation and is part of the European research area.*
- 2/ The unit is attractive because for the quality of its staff support policy.*
- 3/ The unit is attractive through its success in competitive calls for projects.*
- 4/ The unit is attractive for the quality of its major equipment and technical skills.*

Strengths and possibilities linked to the context for the four references above

The attractiveness of the unit is following a strong upward trajectory. Research funding includes a significant proportion at international level (€1.7 million at European level, €1.8 from outside Europe; 22 international grants in total). At national level, the unit's members have secured 27 ANR grants as either coordinator (n=9) or partner (18), illustrating the collaborative nature of much of their work.

There is strong evidence of success in attracting highly mobile researchers: more than half of the postdoctoral (fixed-term) researchers employed during the contract are international (68 v 32%), while the same is true for approximately one fifth of researchers with permanent positions. At PhD level, approximately half of students come from outside France (51.5 v 48.5%). In terms of scientific reputation, the high international standing of the unit is evidenced by the invited roles that its members take on within editorial boards at 9 field-specific journals (Molecular Autism, Front Endocrinol, Front Mol Neurosci, Front Neurosci, etc.), and through invited participation on evaluation juries for European funding schemes that have included COST actions and H2020 programs, among others.

Multiple senior members of the unit hold positions within research steering bodies such as the Board of the French Neuroscience Society (5); CNU 69 (president 1; member 4); CNRS 25 (president 1; member 3); Inserm CSS4 (2); CNRS (INSB, chargée de mission), Scientific Council of CoNRS and INSB; E-Brains; C-Brains; CNESER; National League against Cancer; FRM. Some individuals within the unit hold research steering positions at international level (e.g. UNESCO international bioethics committee). Additionally, prizes have been won at all levels from PhD to team leader; e.g. Prix de thèses (5); L'Oréal-Unesco; FRM; Inserm. Members of the unit maintain a high profile through the initiation of scientific activities, such as the organisation of international meetings and training opportunities e.g. ARRIGE; FENS 2022; EMBO School 2019; CNRS school (1); INSERM workshops (2); IBPS summer schools (3); Annual NPS-IFM international symposium (2). They also participate in meetings organised by others, either by invitation or through successful abstract submission (130 platform presentations), including at prestigious events such as Gordon Research Conferences. All PhD students attended international conferences at least once, and postdocs attend annually. Again, at the international level, early-career members of the institute participate in collaborative networks such as the European Innovative Training Network (E1), ERAAMUA, CAPES-COFECUB collaboration with Brazil (E1, E4), the international program of iBio SU and the young training investigator program of FENS.

The unit has at its disposal cutting-edge platforms of IBPS for animal facilities (CEFI), cell imaging (electronic microscopy, biphoton and confocal imaging), proteomic and bioinformatics. Of particular note, major expansion of the behavioural core facility for rodent and zebrafish models has enabled manipulation (via optogenetics) or recording neural activity (large-scale electrophysiology, fibre photometry) in freely moving

animals that are engaged in behavioural tasks. In parallel, the unit has led specific aspects of *in vivo* bioluminescence. These developments have been made possible in part through the development of a highly successful resource sharing program and strategy, but also through a successful funding application (FRM, 200k€) and by the attraction and recruitment of a new CNRS engineer who brought equipment. The unit makes clear efforts to directly raise its profile, promoting the lab through a promotional video, stand and flyers at international conferences (e.g. American Society for Neuroscience).

Weaknesses and risks linked to the context for the four references above

Despite multiple applications from well-qualified researchers, the unit has not yet attracted European Research Council Funding, with the exception of remaining funds ported by incoming research groups from other institutes. Success with the Marie-Curie Fellowship program has also been limited (a single one obtained in 2016 but used during the evaluated period). Both of these funding sources are key indicators of prestige that could significantly enhance the attractiveness of the unit.

EVALUATION AREA 3: SCIENTIFIC PRODUCTION

Assessment on the scientific production of the unit

The scientific production of the NPS is excellent, and the quality of many outputs is outstanding. The Unit has published nearly 400 scientific articles in the period, and has led ~50% of these. When including co-authorships, the proportion of articles in generalist highly reputed journals (e.g. Nature Communications, eLife, Nature, Science Advances, PNAS) is very strong, constituting approximately one third of publications. Involvement of PhD students in publication is strong, with ~50% of publications having a PhD student lead.

- 1/ *The scientific production of the unit meets quality criteria.*
- 2/ *The unit's scientific production is proportionate to its research potential and properly shared out between its personnel.*
- 3/ *The scientific production of the unit complies with the principles of research integrity, ethics and open science. It complies with the directives applicable in this field.*

Strengths and possibilities linked to the context for the three references above

Over the course of the contract under evaluation, the unit has published nearly 400 original articles, and almost half of these involve lead/senior/corresponding author positions. Considering all outputs (including those in co-authorship positions), the quality of publications is high, with approximately one third of publications being accepted by either generalist top-level journals (e.g. 3 articles in Nature, 17 in Nature Communications, 6 in PNAS, 11 in eLife, 5 in Current Biology) or journals with a very strong profile within their field (e.g. Nature Neuroscience, Biological Psychiatry).

While the contribution varies between teams, every single team has contributed important papers to the unit's research output portfolio in at least a co-authorship position. This level of production, across so many teams, is excellent. The majority (approximately two thirds) of the unit's publications fall within the neuroscience or general neurology fields, but many have very strong translational potential. Most publications are provided in open-access forms, in line with the recommendations of the CNRS and INSERM affiliations of the unit.

The unit also ensures that high standards of research integrity are maintained, through specific training sessions for new starters and annual seminars on the topic for all staff, alongside early uptake of electronic lab books, and mandatory presentation of initial results at lab meetings. In terms of ethics and responsible research, the unit's director is the chairperson of INSERM's ethics committee and contributed to the development of LORIER (Organisation for Ethical and Responsible research by INSERM). Scientific production is shared out between the unit's members. Approximately 50% of publications have a PhD student as first author, although this varies between teams. All graduating PhD students publish at least one paper, with a range of 1–7 and a median of 3.

Weaknesses and risks linked to the context for the three references above

For some teams, the publication record is heavily dominated by co-authorships rather than lead positions, including the most significant papers upon which the portfolio depends.

EVALUATION AREA 4: CONTRIBUTION OF RESEARCH ACTIVITIES TO SOCIETY

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

The inclusion of the unit's research in society is excellent to outstanding. NPS has created an excellent infrastructure to promote research transfer and business development, achieved through collaborations with the pharmaceuticals (Janssen, Sanofi among others), the advancement of internal start-ups (n=3) and patent submissions (n=15). The unit has additionally demonstrated diverse activity in organising and formalising the dissemination of its accumulated knowledge to the general public (events such as Semaine du Cerveau, Cerveau en Seine but also interviews in journals or seminars in patient associations), and is outstanding in this regard.

- 1/ The unit stands out for the quality and the amount of its interactions with the non-academic world.*
- 2/ The unit develops products for the cultural, economic and social world.*
- 3/ The unit shares its knowledge with the general public and takes part in debates in society.*

Strengths and possibilities linked to the context for the three references above

Over the contract period, the unit has actively promoted links to society along several dimensions, and stands out in terms of the quality and quantity of these links, particularly given the non-clinical focus of majority of the unit's research. The efforts made to strengthen links with pharmacology partners and biotech are clear. For example, with respect to economic actors and partnerships, the unit has been particularly strong in filing patents (15; plus one invention disclosure).

The majority of these have been licensed and are being used by established companies, clinics, or four new start-ups led by the unit's own researchers. In one case, this has also led to a successful phase 2 clinical trial. These embody the translational nature of the research being carried out in the unit (for example, by targeting cancer treatment or addiction therapy), which is also recognised in award of a prize for innovation and valorisation to two of the unit's members (Lutech Research Trophy). This strong technology transfer record received financial support from the CNRS PRIME 80 program, and enterprise (e.g. French companies against cancer – GEFLUC-) and (to a much more limited degree) PhD training (CIFRE)'. Interactions with economic actors also included testing new drugs for big pharma (e.g. Jansen) or small biotechs (e.g. Brain Vectis and Aelis Farma) as either contracts or collaborations.

The unit's director is a member of a national task force that oversees responsible innovation in neurotechnology for health, and has been a member of the international Bioethics committee for UNESCO, reporting on issues surrounding neurotechnology. Other members of the unit also have high-level roles in nationally and internationally important initiatives, such as co-chairing an NIH ClinGen panel, which seeks to assess the validity of gene-disease relationships. The unit is proactive in sharing knowledge with the general public, from groups with specific relevant interests to educational work. For example, several teams have contributed to patient associations (e.g. autism, Huntington, cancer, Phelan-McDermid syndrome), either through formal roles (e.g. SAB) or presenting to meetings. One member of the unit received an award for her outstanding commitment to a patient association at international level.

Notably, the Unit is a major contributor to Brain Awareness Week, through a coordination role at national level. Educational contribution (in this context, not including university-level teaching) is strong, with a large number of students from local schools welcomed to the unit via the IBPS (around 30 per year), and regular participation in events designed to facilitate interactions with schools (Declics, Semaine du Cerveau, Cerveau en Seine). The unit's contribution includes a pedagogic tool for primary and secondary schools that has seen uptake in twenty classrooms across Paris and has received external funding. There is a clear pipeline for the dissemination of research findings through production of press releases for important publications, and these are picked up by national media (for example, Le Monde, La Croix) and occasionally international outlets (e.g. Japanese/USA). Their outreach portfolio is extraordinarily diverse, and includes collaborations with artists (e.g. organisation of meeting to brainstorm between scientists and artists), discussion within artistic forums (e.g. with movie-goers, following projection of relevant films e.g. 'Welcome to Gattaca'), and contribution to radio and TV shows by 6 researchers (e.g. 'the danger of addiction to screens'). The unit director also produced a popular science book combining scientific and artistic approaches to emotion.

Weaknesses and risks linked to the context for the three references above

Although links to society are very well developed, the focus is not entirely uniform across teams and some express limited interest in research transfer.

ANALYSIS OF THE UNIT'S TRAJECTORY

The future Neuro-SU Unit will consist of ~150 people organised in fifteen teams stemming from:

- a) Neuroscience Paris Seine Unit (11 teams of NPS reorganised in 8 future teams, 4 of which being the continuation of past teams, with new team co-leaders in some cases),
- b) the Biology of Adaptation and Ageing Unit (1 new team from B2A unit), both being part of the Institute of Biology Paris-Seine (IBPS),
- c) the Institut du Fer à Moulin (4 teams from IFM, 1 of which being an ATIP-AVENIR team),
- d) the Institute of Psychiatry and Neuroscience of Paris (1 team from IPNP)
- e) and finally the Centre de Recherche sur la Cognition Animale (a fraction of 1 team of CRCA, Toulouse, the leader having an ERC advanced grant).

Among the fifteen future teams of variable size, ten will have two team leaders. In several cases, the merging of teams is linked to the future retirement of current team leaders. Three teams of NPS will not be part of the Neuro-SU project and have left, or are leaving soon, for other institutes in Paris.

The future director of Neuro-SU will be the current deputy-director of NPS, and her deputy director will be the current director of the IFM which is an excellent way to facilitate the smooth integration of the largest components of the future unit. The governing bodies of Neuro-SU will be CNRS, Inserm and Sorbonne University. In 2025, all the Neuro-SU teams will be located in the Cassan building of the Pierre and Marie Curie SU campus where the IBPS Units are already implanted. The teams from CRCA and IPNP have already joined the NPS premises in the Cassan building.

The new consortium forming the future Neuro-SU Unit is extremely relevant and coherent with respect to the proposed scientific project, which covers several aspects of systems neuroscience, from fundamental to translational research. Altogether, they are interested in the emergence of brain architecture during development, in the formation and function of circuits and neuronal identity, as well as in the brain's ability to adapt and ensure resilience against stress and disease, and to instruct individual behaviours underlying cognition. This is investigated at multiple scales (from gene to neural network dynamics and behaviour) and in multiple species (insect, fish, rodent, human) in healthy and pathological brains (through collaborations with clinical teams in psychiatry and neurology departments). This merger of teams will be mutually beneficial since it will capitalise on the expertise developed over the years at NPS and IFM, as well as additional approaches coming from the teams coming from B2A, IPNP and CRCA.

This will form a critical mass of complementary expertise in systems neuroscience with multidisciplinary approaches. It will also lead to a comprehensive set of cutting-edge technical platforms (e.g. behavioural electrophysiology in rodents with semi-naturalistic automated environments, L2 culture lab, cell and tissue microscopy imaging, cell engineering, and recently, fibre photometry), some of them already operational in the Cassan building, others coming with the move of IFM teams. Neuro-SU clearly has the objective to rationalise and strengthen their shared technical platforms, either by making accessible across teams or sometimes at the IBPS level, some equipment, methods and human resources developed in a given team. In addition, competences in computational neuroscience are developing rapidly in certain teams, sometimes in collaboration with other units of IBPS.

Overall, the scientific positioning of the future Unit in the Paris neuroscience landscape clearly rests on basic and preclinical biomedical research investigated at multiple levels. The know-how developed by the teams allows them to address current health issues: the understanding of social and mood disorders (stress, anxiety, depression), addiction, the evaluation of learning and memory abilities and disabilities including sleep disorders, neurovascular coupling and metabolism as well as structural and functional development impairment that can lead to intellectual and motor disability, epilepsy and autism spectrum disorder (ASD).

In the continuation of their strong upward trajectory in terms of success to competitive funding, most of the future Neuro-SU teams have already secured grants for their research in the coming years. However, there is still room for progress in European or international grant applications. Several recent funding opportunities are extremely relevant for the unit: C-Brains (DIM regional program for PhD fellowship and platforms, e.g. naturalistic behaviour, organoids, AI), i-Bio program for interdisciplinarity (SU). The PEPR PROPSY should certainly be an additional funding opportunity for the translational projects of the unit related to psychiatric diseases.

Over the last contract period, the unit has clearly demonstrated its capacity to promote links to society, in terms of both technology transfer to the private sector and dissemination of scientific knowledge to the general public. Based on this extremely active and successful past experience, the unit has planned to further reinforce their actions to link science to society. This will concern technology transfer to the economic world (3 maturation projects funded by SATT Lutech and some projects benefiting from the creation of start-ups by Neuro-SU members), as well as bidirectional efforts to ensure reciprocal trust between science and society. Namely, in addition to communication with the general public and patient associations, scientific diffusion will be expanded with actions towards middle and high school students. Participative research is also encouraged.

With regards to climate change issues, Neuro-SU, jointly with IBPS, has started to implement a Green Committee to take measures to minimise the environmental impact of their research activities. Another strength of the Unit is its close link with training at the Bachelor or Master levels, involving teacher researchers, researchers and engineers. This activity will be pursued in the future.

The management and operational organisation of Neuro-SU is already well defined. Although on two different sites today, a number of collaborations between the IFM and NPS teams have already been developed over the last contractual period (supported by Labex BioPsy, for example), contributing to the scientific coherence of the merged Units.

This future research environment will certainly strengthen the attractiveness of the unit and should allow increasing the recruitment on permanent positions of young talented researchers who should be supported in applying for ERC or ATIP-AVENIR applications.

However, a highly critical issue is the schedule of the regrouping of the IFM teams on the IBPS site. The identification of space allocated to IFM teams and platforms has already been worked out. The renovation timeline is urgently needed for an optimal organisation of the move and of the future Unit functioning. Possible delays in the renovation of the Cassan Building would have a deleterious impact on the dynamics and the success of the fusion as well as on the scientific production and attractiveness. All efforts should be made to be ready with sufficient space in 2025, ideally at the very beginning of the new mandate.

RECOMMENDATIONS TO THE UNIT

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

Aspects of administrative support (e.g. procurement, contracts) require attention as they are failing to achieve their intended purpose. The planned centralisation of administrative support services provides an opportunity for improvement.

Success with securing European grants could be improved through an internal review panel led specifically by the members of the new unit who have had such success in the past.

Clear designation of spaces for IFM teams for 2025, in terms of both overall space (devoted rooms) and laboratory infrastructure (e.g. water supply, laboratory benches, etc.) is required.

Clarity and transparency regarding integration of IFM platforms and permanent support staff optimisation will be important to maintain the goodwill of these staff.

Reinforce collaborative projects between teams of the future Neuro-SU, to ensure that the future unit reaches its integrative potential quickly, including prioritising shared social space in the refurbishment.

It is imperative that PhD students have independent pastoral support, and also that they know who to approach in the event of event of other concerns such as bullying or harassment. Thus, a review of postgraduate community strategy is recommended, including consideration of the appointment of a trained safeguarding lead to address these concerns.

We recommend a unit-level review of environmental policies, including consideration of necessary travel and implementation of basic essentials such as recycling bins in social areas.

Recommendations regarding the Evaluation Area 2: Attractiveness

In the next contract, it will be imperative to increase recruitment of young researchers through INSERM and CNRS. A dedicated plan of action is required.

ERC or ATIP-AVENIR applicants who are not already based at the unit could be attracted through a specific call for applications, whereby potential candidates are interviewed by the unit and if successful, supported through the application process.

Recommendations regarding Evaluation Area 3: Scientific Production

We recommend the implementation of formal annual feedback to team leaders on their outputs, from the directorship, specifically in order to increase the number of articles in lead/senior/corresponding author positions within the team. These meetings could also be used to reinforce the targeting of high-profile journals for publication and to identify and encourage applications for ERC calls.

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

The experts suggest to further improve the current strong record of disseminating research findings to the public, and raising awareness.

Consider allocating formal advisory support for identifying possible technology transfer and for accompanying initial contacts with institutional valorisation structures, to support (a) teams that see less potential for transfer of their work (b) new recruits in the next contract.

TEAM-BY-TEAM OR THEME ASSESSMENT

Team 1: Neurobiology of psychiatric disorders
 Name of the supervisor: Catalina Betancur & Sophie Gautron (future: Catalina Betancur & Vincent Vialou)

THEMES OF THE TEAM

The team addresses the neurobiological basis of psychiatric disorders: autism, depression, and addiction and develops therapeutic strategies. The core research focuses on preclinical investigations in animal models of the diseases, and is associated with genetic data in humans in a translational approach. They use multidisciplinary and integrative approaches, including genetics, neural activity and connectivity, and plasticity. The studies on autism spectrum disorders include genetics, animal models, and neurobiology. The studies on depression focus on organic cation transporters and the development of agents targeting these transporters. The studies on stress and addiction unravelled the existence of the astrocytic hevin protein in the nucleus accumbens in cocaine's rewarding properties.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous report identified three weaknesses:

The moderate diversity of the journals targeted for publishing does not exist anymore in the assessed contract. The internal organisation and life of the team is clearer. Of note, the start of this team in 2018 corresponded to the grouping of two teams with distinct topics. The team progressively erased the disparity in combining the technical strengths of the two past groups.

Thus, the third identified weakness corresponding to the poor connection between topics no longer exists. The combination of the current topics is a strength in view of possible comorbidity between psychiatric disorders.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	3
Personnels d'appui à la recherche	2
Sous-total personnels permanents en activité	6
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	1
Sous-total personnels non permanents en activité	1
Total personnels	7

EVALUATION

Overall assessment of the team

The team is excellent. This evaluation combines the scientific topics, the scientific dissemination (22 research articles, including journals among the most cited ones) and recognition (editorial board, invitations), the ability to get external funding (more than 1.5M euros as PI or partners), the constant inclusion of new cutting-edge approaches, and the societal interaction. There are still possibilities to implement the actions of the team, notably towards teaching and PhD students training.

Strengths and possibilities linked to the context

The first strength is the topic, which is federative and important for society. The team is investigating the neurobiology of autism spectrum disorder (ASD), depression, and drug addiction. It has identified novel causative genes, novel causative mechanisms such as the glycinergic signalling, and pinpointed the endocannabinoid system as a therapeutic target in ASD.

The team has excellent visibility in these fields, as shown by their participation in EC H2020 or NIH grants. The level of publication is excellent. The team published 22 articles, some of them in established leading journals (Cell, Science, Nature Medicine, Nature Genetics). The lead position is rarely occupied by the team in those journals but the team has published as lead in excellent journals as well (Molecular Psychiatry, Biological Psychiatry, Acta Neuropathologica Communications) or in specialised, well-recognised journals (Molecular Autism, Journal of Neurochemistry), including with their PhD students in 1/3. The team continues to be funded by different agencies/associations. They succeeded in obtaining grants (more than 1.5M euros of own income during the period) as PI (Spanish Phelan-McDermid Syndrome Association, Aelis Pharma, ANR) or partners (NIH, EC Horizon 2020).

Among those incomes, there is also the support from the SATT as PI (Lutech, SU) for the development of organic cation transporters (OCTs) agents. The team has a high level of collaboration at international level. One evident marker is common publications with other groups in several top journals, and grants, notably as partner of EU (H2020) or NIH grants.

They have also established collaborations with private companies (Aelis Pharma), and occasionally French partners from distinct labs (Toulouse, for instance). They have a good ability to attract PhD students (7 during the period), and to attract visiting students from abroad for short or midterm internships (1 from Spain, and 3 from Brazil). The team has an excellent record of activity abroad in participating in meetings or being invited to conferences (Gordon Research Conference, MRC Centre for Neurodevelopmental Disorders Inaugural Symposium, Meeting American Academy of Child and Adolescent Psychiatry, NeuroFrance), or for lab seminars abroad (Harvard Medical School, Icahn School of Medicine at Mount Sinai, Brazil and Spain). The team participates in various consortia or foundations (Phelan-McDermid syndrome, Autism Sequencing Consortium, Clinical Genome Resource, European Training Network). One member of the team has editorial responsibilities (Molecular Autism), and PIs participate in the peer-review process for several journals (Neuron, Nature Medicine, Nature Reviews Neurology, Molecular Psychiatry, Biological Psychiatry Neuropsychopharmacology).

Finally, the team has strong societal interactions such as communication with patients' associations, the release of patents (OCTs compounds, Phelan-McDermid syndrome), and communication to the general public (Apprentis sorciers, Brain awareness) and within the funding bodies (CNRS, Inserm).

Weaknesses and risks linked to the context

One concern is the low level of publication involving the PhD students. A minority of articles (7 out of the 22) have been published with PhD students and not necessarily as first authors. Another marker of this concern is the low participation of some PhD students in meetings (except for 2 of the PhD students part of EU-funded training network) or poster presentations (5 posters only). It is likely linked to the context of the pandemic, but we have to raise this point, and despite these circumstances, all PhD students presented their work in at least one meeting (international in 4 cases). The participation in local teaching seems low (one PI is director of a M2 module) and since the lab interacts with IBPS at different levels, the team could easily be more involved.

Analysis of the team's trajectory

One co-PI is retiring, implying a new tandem for leading the team that will continue its involvement in autism and psychiatric disorders, from the identification of the molecular causes in large consortia to the exploration of astrocyte roles in neuronal plasticity in drug addiction and explorations of glycinergic signalling and endocannabinoid systems in autism models. In particular, they recently showed that *Gira2*-deficient mice exhibit a deficit in novel object recognition and they plan to explore by electrophysiology this model to understand the role of *Gira2* in the pathophysiology of ASD. They will also generalise the finding of a CB1 receptor inhibitor in shank3 ASD mouse model. Finally, the role of hevin (secreted by astrocytes) in mood regulation and addiction will be explored in vivo to determine how it modified plasticity of glutamatergic synapses and how this relates to mood. These projects continuations are logical and were well perceived by the panel of experts.

The team has already obtained two grants (NIH, as partner, and ANR as coordinator) covering the 2024–2027 period (>500K€). The team will have two researchers and two technical staff as a minimal setting.

RECOMMENDATIONS TO THE TEAM

The team needs to pursue the combination of technical approaches across the different topics.

The team could pay more attention to the scientific dissemination of PhD students: articles, posters in meetings, conferences. Moreover, the team is attracting PhD students but needs to hire new ones.

The team could be more integrated in some teaching units in the University. The recognition is high and it could be shared with students of the university.

The team is capable of developing multiple collaborations. However, the interaction of the team with the other teams of the whole institute could be expanded. Presently, a very few collaborations have been developed.

Team 2: Neuronal Signalling & adaptive behaviour
 Name of the supervisor: Jocelyne Caboche & Peter Vanhoutte (new: Peter Vanhoutte)

THEMES OF THE TEAM

Team 2 aims to study the cellular/molecular events shaping neuronal and behavioural adaptations encountered in preclinical models of addiction, depression and Huntington disease (HD).

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The team was considered excellent and no major weakness were identified.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maîtres de conférences et assimilés	1
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	2
Sous-total personnels permanents en activité	6
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	6
Sous-total personnels non permanents en activité	6
Total personnels	12

EVALUATION

Overall assessment of the team

Overall, the committee found Team 2 as excellent to outstanding. The scientific production is excellent given its relatively small size (4 PI and 2 permanent technical staff). It generated 28 peer-reviewed articles out of which eleven were signed by the team members as first, last or corresponding author in renown journals such as Mol Psy and Brain. As its main achievements, Team 2 developed an ImageJ plugin, founded MELKin Pharmaceuticals, and is at the origin of a clinical trial in HD patients targeting cholesterol metabolism. Team 2 raised 2.2 MEuros illustrating the excellent success/dynamism of the team. All the permanent members were promoted over the period concerned.

Strengths and possibilities linked to the context

The team focuses on pathologies such as addiction (cocaine, opiates), depression and HD, pathologies linked to the basal ganglia. Their strategy is to identify neural desadaptations associated to these pathologies and to develop molecular strategies to counteract them. This strategy has proved very successful: the research is excellent with unique experimental approaches with outstanding translational potential. They showed that:

- 1) psychostimulants increase D1R&D2R interaction with NMDAR in medium-sized spiny neurons (MSN) of the nucleus accumbens, and disruption of these interactions alters the development and maintenance of cocaine-induced adaptations,
- 2) Npas4, an important regulator of DR1-MSN spine density, regulates the strength of cocaine-induced locomotor sensitisation,
- 3) overexpression of miR-1 (targeting Fob & Npas4) in D1-SPNs has complex effects on cocaine seeking,

- 4) restoring CYP46A1 expression prevents neuronal dysfunctions and alleviates motor behaviour in HD preclinical model.

The team is composed of 4 PIs with identified research themes, and identified responsibilities. Each PI applies to selective calls to be able to structure his/her projects, and they all develop a rich network of national and international collaborations with academics (MIT, Heidelberg, McGill, etc.), clinicians (Widal and Saint-Antoine Hospitals in Paris) and biotech companies (BrainVectis, Melkin). Implication in the dissemination of knowledge and partnership with international community is also excellent, particularly through TV and radio shows and press articles, ensuring an excellent attractiveness. During the contract 2017–2022, the team raised 2.2 MEuros, which was rated as excellent by the committee. All PIs have their own grants ensuring autonomy. They include competitive national fundings (5 ANR with 2 as coordinator) and eleven other grants from academic institutions (Labex, Aviesan) or private (AFM, FRM) foundations (8 as coordinator) but also from the private sector (Argobio). The production was excellent with 28 peer-reviewed articles out of which eleven signed by the team members as first, last or corresponding author (Mol Psychiatry. 2022, Sci Adv. 2021, EMBO Rep. 2021, Biol Psychiatry. 2020, Brain. 2019, Neuropharmacology. 2019, Biochimie 2019, Brain Struct Funct. 2018, Eur J Neurosci. 2017, Biol Psychiatry. 2017, Methods. 2017) and two reviews (Front Synaptic Neurosci. 2021, Med Sci 2022). Finally, Team 2 has outstanding activity in translational research and valorisation.

The team leaders are co-founders, shareholders, and members of the scientific board of the Melkin pharmaceutical company. Melkin's R&D activities originate from the valorisation of three patents on which they are co-inventors. The last two patents filled in 2020 are the result of Melkin's R&D activities. The company's mission is to develop patented molecules in the field of psychiatric diseases and oncology. The PI are also involved in teachings (Bachelor to master degrees, including with administrative duties at the university) and in interactions with the society (press release, brain awareness week, etc.)

Weaknesses and risks linked to the context

The committee noted the absence of international grants led by the team, and only one postdoc was trained in the previous contract.

Analysis of the team's trajectory

The team's project is an extension of its previous activity and the committee found it logical, even if they found it very ambitious for a relatively small team involving researchers implicated in teachings and one emeritus researcher. The team will be composed of two permanent researchers, two researchers with teaching duties, three PhD students and three non-permanent engineers. Grants recently obtained will probably allow the hiring of technicians, PhD students and Postdocs to reinforce the team. Among these grants are one from Institut de Recherche en Santé Publique (IReSP) – Aviesan as coordinator, one from ANR as partner and a Prematuration program CNRS as coordinator, for a total amount of >400K€ secured up to 2026. Priority should be given to reinforce the team in human resources.

RECOMMENDATIONS TO THE TEAM

The team has strong ability to obtain grants, to regularly publish in highly visible journals, and to develop transfer activities. However the committee feel that the workforce (new early-career PI and Post-docs from abroad) needs to be increased as one member is now emeritus, one has a very important faculty responsibility (head of the UFR of Life Science at SU) and one is an Associate Professor with numerous university responsibilities (from the Bachelor to the Master degree). Another recommendation is to obtain more EU/international grants.

Team 5: Neuropharmacology of VGLUTs (new: Glutamate cotransmission and Psychiatry)

Name of the supervisor: Stéphanie Daumas and Nicolas Pietrancosta

THEMES OF THE TEAM

The team is focusing on understanding glutamatergic co-transmission. To this aim, the team uses multiple approaches, from ligand development and pharmaco-chemistry to systems neuroscience. They focused on VGLUT3-dependent glutamate co-transmission in the regulation of activity of specific networks and their behavioural consequences. Their activity in the previous term included the discovery and validation of highly sensitive VGLUT sensitive ligands, the description of several novel relationships between cholinergic and glutamatergic systems, and translational research towards psychiatric diseases (e.g. addiction, eating disorders) or neurodegenerative diseases (Alzheimer's disease).

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Overall, the previous report acknowledged the excellence of the production and of the project of the VGLUT Team. There was a major recommendation due to the transitioning period of leadership with two emerging group leaders who, at the time of the previous report, lacked senior author publications and independent function. It was thus recommended that the project leadership and management should be thoroughly discussed between the two early career group leaders. A second major recommendation was also that the projects should be refocused.

These two recommendations have been fully followed by the group. It is noticeable that both group leaders have now published as senior authors in the term. They also obtained both joint and independent competitive funding, and one has been promoted as full professor, which fully validates the leadership choices made in the previous term. Their leadership is now clear with a project focused on striatal cholinergic interneurons and their role in compulsive behaviours.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	3
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	6
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	3
Sous-total personnels non permanents en activité	3
Total personnels	9

EVALUATION

Overall assessment of the team

The VGLUT Team is an excellent team that studies the role of glutamatergic co-transmission in the CNS through various approaches. The team published 52 articles, with one third as leading authors, including in well-known journals such as JCI or Mol Psychiatry. The scientific publication level is excellent. The funding level is very good, with excellent funding from the SATT, but with no major national or European funding. The attractiveness for students of the team is also excellent, as well as international visibility and involvement in teaching and scientific evaluation.

Strengths and possibilities linked to the context

The strengths of the VGLUT Team include an excellent to outstanding capacity to patent and translate findings. This is exemplified by the five patents, three being licensed. In addition, the team has an excellent national and international visibility (PIs are members of national academic institutions such as CNU and Inserm CCS4 and have a large number of collaborations in Paris with 15 teams and in Europe or Canada with 5 teams). The scientific production was judged excellent with 1/3 or the production originating from the team. They published 52 articles in international journals, twenty of which were as first or last author. In highly renowned journals such as Science rep, Journal of neuroscience, Nature communication or PNAS,

They reported a VGLUT3 ligand in vivo, proved the existence of two types of synaptic vesicles with glutamate or acetylcholine in bilingual synapses and the function of VGLUT3 in regulation of stress and sleep.

Some work was done thanks to a large network of twenty collaborators in France (IPNP, IJM, AHP) but also abroad (Budapest, Barcelona, Toronto Prague).

They attracted fourteen grants (12 as coordinator), mainly from foundations (FRC) or local academic initiatives (SATT, IBPS) for a total amount >800K€.

The expert panel appreciated that the team was well managed, with two early-career team leaders with complementary expertise, one mainly on pharmaco-chemistry, the other more on systems neuroscience. In addition, the panel felt that the team involvement in academic life (e.g. teaching, evaluation by funding bodies) was excellent to outstanding, particularly because of important teaching responsibilities at the bachelor or master levels.

Weaknesses and risks linked to the context

There are no major weaknesses identified. However, the experts noted a lack of ANR or European Funding with a relatively low amount of funds during the last contract (around 1M€). Of note the team has a lot of local collaborations that may hamper their own projects.

Analysis of the team's trajectory

The project of the VGLUT Team is clearly focused on the role of striatal cholinergic interneurons in psychiatric disorders, through the angle of glutamatergic/cholinergic co-transmission. The aim is to provide possible therapeutic strategies, as well as tools and biomarkers.

The project is focusing on three complementary aims. First, the team will characterise how previously identified rare variants of VGLUT3 participate in compulsive behaviours and various neurological phenotypes. This is doable as the team has already developed a KI model for one variant. In a second aim, more pharmacological, the team will seek to characterise novel molecules based on donepezil, that will be compared to donepezil in models of compulsive behaviours. Last the team will focus on molecular mechanisms underlying Ach/Glu co-transmission through various state-of-the-art approaches.

The project of the team appears well focused and integrated, and takes advantage of all in-house expertise as well as of strong collaborations already documented. Of note, the team got a recent ANR obtained in 2023 (300K€ as coordinator) and additional funding from FRC SAATT IRESP and Prematuration CNRS amount a total of close to 900K€ up to 2027 ensuring the team is at ease to perform its project in good conditions.

RECOMMENDATIONS TO THE TEAM

The team is excellent overall, and needs to improve its success in competitive national/European funding agencies as two of the major axes are dependent upon pending funding, although ANR and FRC grants (as coordinators) were recently obtained to cover up to 2027 (380K€).

Team 12: Cerebellum, Navigation and Memory

Name of the supervisor: Laure Rondi-Reig (future : Rondi-Reig and Paradis)

THEMES OF THE TEAM

The aim of the team is to unravel how self-motion information is taken into account for space coding and navigation by investigating in rodents and humans the link between cerebellum and the hippocampal circuit in the formation of spatial representation and memory. The team deciphered the role of the cerebellum in spatial cognition and the functional role of delta/theta oscillations in the cerebello-hippocampal network dynamics. The team's contribution is in basic neuroscience, with multidisciplinary and multi-scale approaches, as well as translational approaches for clinical applications in patients.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The main recommendations are listed below with the considerations taken by the team.

'The ambition of the team to publish in journals with high impact factors is highly respectable but this has the drawback to increase publication time and to reduce the number of publications. This is particularly critical for early career scientists': Even though targeting high-impact journals in the field of behavioural electrophysiology is by nature time consuming, many PhD students and post-doc of the team are first or co-first authors of articles in very good to excellent journals (Nature Comm, Elife J Neuroscie etc).

'The team should extend its network to international groups in order to apply to European grants': The international visibility of the team has clearly improved (organisation of international meetings such as EMBO, iNAV, FENS; 20 invitations to conferences as chair or presenter). This should now facilitate successful applications to EU grants.

'The team leader should encourage teaching researcher to obtain an HDR': one researcher and one assistant professor have obtained their HDR during the current contract.

'The team has supervised excellent postdocs and should encourage one of them to apply for a permanent position': the team has recruited an INSERM researcher in 2019 and a former postdoc as a Sorbonne University research engineer.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	1
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	2
Personnels d'appui à la recherche	3
Sous-total personnels permanents en activité	7
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	1
Doctorants	4
Sous-total personnels non permanents en activité	5
Total personnels	12

EVALUATION

Overall assessment of the team

Team 12 is known for its pioneer role in demonstrating the impact of the cerebellum in spatial cognition and memory. Scientific production is outstanding: eighteen articles (13 as lead), mostly in high-profile journals (Nature Com, eLife, TINS). Their attractiveness is outstanding: recruitment of one INSERM researcher and one permanent research engineer. Competitive fundraising is also outstanding with 2.1 M€ obtained on eleven grants, including from ANR, all the PIs being grant leaders. Their links to society include important technology innovation and transfer (licensing, SATT innovation prize) and active outreach.

Strengths and possibilities linked to the context

The team is internationally recognised for its pioneering and influential work on the role of the cerebellum in spatial cognition and memory, for studying oscillatory dynamics in cerebello-hippocampal networks, investigated by behavioural electrophysiology in rodents and humans, and for translational research with clinical objectives. Regarding permanent staff, it is currently composed of three researchers, one assistant professor and three engineers (1 INSERM researcher recruited in 2018, 1 SU engineer in 2023).

It gathers multidisciplinary expertise: animal and human electrophysiology/behaviour, signal analysis and computational modelling. The level of publication is outstanding with eighteen articles, mostly in high impact journals (TINS, Current Biol, Nature Comm, Scientific Rep, eLife, Biol Psychiatry, J Neurosci). The team members are leader authors of thirteen articles, 50% being co-authored by two PIs and 50% having PhD students/postdocs as first author. Visibility of the team is clearly outstanding. Team members have been invited to fifteen oral presentations at international (10) and national conferences. They have collaborations mainly in France (Paris, Saclay) but also with US and Canada. The head of the team is frequently invited as chair/speaker at international meetings (Gordon Research Conf, FENS) and has greatly contributed to federate the scientific communities on navigation/cerebellum research by co-founding the international Interdisciplinary Navigation Symposium series and the French Cerebellum Club. PIs of the team have trained seven PhD students (1 from abroad) and three postdocs with two thesis and two HDR defended in the period. The team has an outstanding track record in raising funds: 2.1 M€ in eleven grants (including 5 ANR, 1 FRM Team), the 4 PIs being coordinators of 8/11 grants (1.4 M€). The team has developed cutting-edge expertise in behavioural electrophysiology, memory assessment in navigation paradigms, virtual environment, signal processing and software development. It is strongly engaged in technology transfer with the academic, medical and private sectors: design of the Starmaze paradigm to identify navigation strategies in mice, APP software filed, licensed to two companies; behavioural and computer tools to establish a reference database of healthy spatial cognition in mice (Sanofi collab.) and in humans (1st Prize of SATT Lutec); clinical collaborative research in autism (Labex funds) and epilepsy. The team members are actively involved in various committees: Steering Committees (GDR Mémoire, French Neuroscience Society, regional DIM C-Brains, Labex BioPsy), Academic Boards (Biology Department and Scientific Council at SU, CNU). They are deeply engaged in science popularisation (Cité des Sciences, Science TV shows, Fêtes de la Science). The activities with society can then be rated as outstanding. Team members also put their expertise at the service of the IBPS: an engineer trained in the team is now the operational director of the Behavioural Core Facility.

Weaknesses and risks linked to the context

As already identified by the team, time to publication is long, particularly for the PhD students. This is due to the combination of behavioural experiments in mice with sophisticated analyses which are time consuming, and the choice of targeting high impact journals. This scientific strategy produced remarkable breakthroughs, but nevertheless the time for production of first-author paper by young PhDs still remains a matter of concern.

Analysis of the team's trajectory

The team will continue to develop a translational approach from mice to humans using navigation as a paradigm to study learning and memory. They have very clear hypothesis on the role of the cerebellum in disentangling self-motion from environment-related information, allowing identification of its contribution to the place and sequence coding which shapes brain cognitive maps and supports spatial cognition. The project is well structured and capitalises on their well-established expertise in complementary approaches.

It is organised along three coherent lines:

- (1) In mice, they will further characterise the anatomo-functional organisation of cerebellum-hippocampus circuits (tracing, immunochemical methods; optogenetics coupled with in-vivo electrophysiology and navigation behaviour).

- (2) In humans, taking advantage of their ongoing clinical collaborations, they will study spatial cognition in various patient populations: how could the behavioural navigation repertoire be distorted? What are the preserved strategies? How can the switch of strategy be controlled? They hypothesised a role for the striatum and the hippocampus nodes in triggering these switches.

This will be addressed in implanted epileptic patients (macro- and micro-electrode recordings in the hippocampus), and in dystonic patients with deep brain electrodes in the globus pallidus. Their approaches will combine fine grain electrophysiology, well-controlled behavioural measures and oculometry in humans.

They will continue to establish a reference behavioural database for learning and memory performance in humans to identify possible cognitive profiles in the general population. Ultimately, this has a clear perspective for precision and personalised medicine with the aim to elaborate possible remediation procedures through navigation training or cerebellar stimulation.

The proposed project is very convincing with sound rationale. All sub-projects are already funded (including collaborations with clinical teams) with two contracts running until 2025 and three new ones until 2028 (833 k€). There is a strong coherence and synergy between the sub-projects, explored at multiple scales in mice and human, with potential clinical outcome and technology transfer. The methodological approaches are well mastered by team members with complementary expertise. This complementarity is particularly clear and relevant between the two future co-leaders of the team. Tight interactions already exist, including with the recruited researcher, assessed by joint publications. All sub-projects can be undertaken in parallel and should be highly productive.

RECOMMENDATIONS TO THE TEAM

The team is outstanding overall. Capitalising on its international visibility in the field of spatial navigation and cognition, they could improve competitive European/international funding allowing attraction of new talented young researchers.

New Team 6: Insect Cognitive Neuroethology

Name of the supervisor: Martin Giurfa

THEMES OF THE TEAM

The team's work centres around the investigation of learning processes in various insect models, particularly *Apis*. Their approach integrates neuroscience with behaviour, and they have a long history of establishing unique behavioural or invasive protocols, most recently including virtual reality scenarios that allow for invasive recordings in active bees.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Previous recommendations were to maintain a high level of scientific production and continue current project trajectories. These have been implemented, particularly through recent publications in high-level journals (Cell rep 2020, Science 2022, Comm Biol 2022 and iScience 2022).

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	0
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	2
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	3
Doctorants	2
Sous-total personnels non permanents en activité	5
Total personnels	7

EVALUATION

Overall assessment of the team

Not applicable since the team was in the Centre de Recherche sur la Cognition Animale (CRCA) in Toulouse but the reputation and excellence of the team is evident through the ERC grant recently obtained by the PI.

Strengths and possibilities linked to the context

Not applicable

Weaknesses and risks linked to the context

Not applicable

Analysis of the team's trajectory

The team joins the Neuro-SU unit from CRCA Toulouse, and currently includes two permanent researchers (1 SU professor, and one CNRS IR). Three postdoctoral researchers and two PhD students accompanied the move, of

which one of each will continue into the next contract. The team brings an ERC Advanced Grant funded project. The team's previous work has involved a combination of behavioural and invasive techniques to characterise aspects of insect learning, using the honeybee. They are particularly well known for their work involving novel behavioural paradigms, and for their application of electrophysiology and calcium imaging in this non-typical model. For the coming period, the team's work will follow three complementary directions. Firstly, they will capitalise upon a protocol that they have developed to study the neural basis of visual learning, which uses tethered bees. Visual learning is well understood at the behavioural level, and this protocol offers the opportunity to map this perspective to neural architecture, towards a whole-brain model of cognitive function in a miniature nervous system. At the same time, they plan to pursue similar research into olfactory cognition – a more traditional paradigm that offers the opportunity for work on gene expression, neuropharmacology and established protocols for exploring complex learning. Finally, they will continue work that focuses on taste processing and its role in appetitive decision-making.

Overall, this original and outstanding project promises to provide a holistic perspective on the neuroethology of cognition in bees – a taxonomic group that complement *Drosophila* as a model for insect learning because the ecological relevance of behaviour is well understood. The team have pioneered this work, and remain one of very few research groups to link neuroscience and ecology in this way. In this respect the project is likely to prove very rewarding. Elements of it are risky in terms of outputs, given that work demonstrating that electrophysiological recordings can be taken from tethered bees within the visual learning apparatus that has been developed here is yet to be published. Yet this risk is to be expected given that the project is ERC-funded, and the alternative research axes do not depend on the success of the visual paradigm. The ERC funding will run into the first year of the coming contract.

RECOMMENDATIONS TO THE TEAM

Since the team has recently moved to the Neuro-SU unit from Toulouse, they are reduced in number and recruitment will be imperative. Securing an additional permanent researcher must be an absolute priority in this regard. This is all the more critical given that the team leader will direct the IBPS and therefore will have very significant limitations on the available time for research.

Funding into the next contract is currently limited, with expiry of the current ERC funding in 2025. Sourcing of financial support to allow continuity will be important. If new permanent researchers are recruited as recommended, it will be imperative for the development of the team that they apply for such support in a leadership role.

The team's research extends the portfolio of the Neuro-SU unit, bringing new perspectives that are complementary but with this extension comes a risk of isolation. We suggest that the team should make strong efforts to ensure that their research becomes integrated into the portfolio of Neuro-SU by reinforcing existing nascent collaborations and developing new ones at the unit level.

New Team 8: Brain compensation dynamics in neurodegenerative diseases

Name of the supervisor: Christian NERI & Emmanuel BROUILLET

THEMES OF THE TEAM

The BRAIN-C team is working on resilience mechanisms in neurodegenerative diseases, in particular Huntington's disease. They are approaching this complex question by combining multi-omic approaches with different models, from iPSC to mouse models, with the aim of boosting resilience pathways in order to prevent neuronal death.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Not applicable as the team was evaluated in its original unit (B2A).

WORKFORCE OF THE TEAM: in physical persons at 1/1/2025

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maîtres de conférences et assimilés	1
Directeurs de recherche et assimilés	3
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	0
Sous-total personnels permanents en activité	5
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	2
Post-doctorants	2
Doctorants	0
Sous-total personnels non permanents en activité	4
Total personnels	9

EVALUATION

Overall assessment of the team

Not applicable since the team is coming from the unit Adaptation biologique et vieillissement (B2A), also at Sorbonne université.

Strengths and possibilities linked to the context

Not applicable

Weaknesses and risks linked to the context

Not applicable

Analysis of the team's trajectory

This team joins NEURO-SU and is composed of five permanent researchers (3DR, 1 PUPH and 1 MCU) as well as technical support (in short-term contracts) and postdocs (n=2). It is co-directed by two known experts in Huntington's disease.

The team focuses on Huntington's Disease (HD) as a gateway to identify compensatory responses to mutant Htt-induced stress, which could drive neuronal resilience. The goal is to use this novel knowledge to identify preventive strategies (rejuvenation) and allow precision medicine as well as biomarker development. There are four major aims in the project, which vary from the exploration of published datasets using multi-omic integration to the experimental validation of resilience mechanisms using various approaches. The project is very broad and appears very ambitious given the manpower present. However, the previous track record of the investigators, both in terms of publications and funding output, evidence that this might be doable, at least in part. The team has already established a number of collaborations with experts which should also contribute to the feasibility of the project.

RECOMMENDATIONS TO THE TEAM

The project should be more specific and focused. The team needs to set up a strategy to attract sufficient non-permanent staff to carry out the project.

New Team 9: Synaptic Plasticity and Neural Networks
 Name of the supervisor: Rebecca Piskorowsky/Vivien Chevaleyre

THEMES OF THE TEAM

This team focuses on hippocampal area CA2. The team uncovered:

- 1) a novel delta-opioid mediated inhibitory plasticity,
- 2) a novel plasticity induced by social interaction involving endocannabinoid signalling,
- 3) and how hypothalamic inputs convey social novelty information and act on hippocampal area CA2 to enable memory formation.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Not applicable since the team will be evaluated in its original unit (IPNP).

WORKFORCE OF THE TEAM: in physical persons at 1/1/2025

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	0
Sous-total personnels permanents en activité	2
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	1
Doctorants	0
Sous-total personnels non permanents en activité	1
Total personnels	3

EVALUATION

Overall assessment of the team

Not applicable since the team is coming from the Institute of Psychiatry and neuroscience of Paris (IPNP where it will be evaluated).

Strengths and possibilities linked to the context

Not applicable

Weaknesses and risks linked to the context

Not applicable

Analysis of the team's trajectory

Both team leaders are world-renowned experts in hippocampal physiology, plasticity and electrophysiology. Their project aims to study:

- 1) how CA2 is altered during pathological states using animal models of neurodevelopmental and psychiatric disorders,
- 2) the role of experience in shaping the CA2 through a regulation of lipidic/inflammatory signalling,
- 3) and the neuromodulators underlying the effect of exposure to novel and rewarding food.

Their arrival at the Neuro-SU will enable them to develop in vivo approaches and cutting-edge fibre photometry, circuitry analysis and high-level computation. They will also profit from a conceptually very strong environment to launch their project. They will be able to dissect in greater detail the role of CA2 in various memory and emotional processes both under normal and pathophysiological conditions.

The team obtained several important grants (Narsad, 5 ANR with 3 as coordinator, FRM equipe) and around 650 Keuros have been secured for 2023–2027.

RECOMMENDATIONS TO THE TEAM

The team is excellent/outstanding in most areas of evaluation and should then apply to EU grant (such as ERC grants).

New Team 4: Cortical development and pathology

Name of the supervisor: Fiona Francis

THEMES OF THE TEAM

Team 4 is a recently formed group that is joining NPS-SU for the upcoming contract. The team's focus revolves around investigating the mechanisms involved in cortical development, with the primary goal of uncovering novel regulatory and dysregulatory processes affecting cortical cell types during corticogenesis. In their previous work, the team successfully identified disrupted pathways that play a crucial role in the formation of abnormal brain circuits. Notably, they pinpointed new gene mutations in patients with cortical malformations, shedding light on unexpected molecular and cellular patho-mechanisms associated with heterotopia.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Not applicable since the team is evaluated at the Institut du Fer à Moulin, its previous hosting unit.

WORKFORCE OF THE TEAM: in physical persons at 1/1/2025

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	2
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	6
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	2
Doctorants	0
Sous-total personnels non permanents en activité	2
Total personnels	8

EVALUATION

Overall assessment of the team

Not applicable since the team is evaluated at the Institut du Fer à Moulin (IFM), its previous hosting unit.

Strengths and possibilities linked to the context

Not applicable

Weaknesses and risks linked to the context

Not applicable

Analysis of the team's trajectory

Team 4 is a new team that will integrate into NEURO-SU for the next contract. This team was originally located in the Institut du Fer à Moulin (IFM) in Paris. The team topic addresses mechanisms underlying cortical development and aims to discover new regulation/dysregulation processes of cortical cell types during corticogenesis. In the

past they revealed key disrupted pathways contributing to abnormal brain circuits' formation. For instance, they identified new gene mutations in patients with cortical malformations and revealed unexpected molecular and cellular patho-mechanisms for heterotopia.

For the coming period the team has two main projects: one investigating organelle homeostasis mechanisms in progenitors and migrating neurons to test the hypothesis that disruption of organelle homeostasis can perturb cortical development, and the second one deciphering axonal and connectivity mechanisms during cortical development to test the hypothesis that axon growth and guidance are influenced by altered neuron position. They are proposing new areas providing novel entry points to further clarify cortical malformations, as well as normal developmental mechanisms. To achieve their goals, they will use mouse and human in vitro models that they will characterise at the molecular, subcellular, cellular, anatomical and behavioural levels, using various state-of-the-art approaches and focusing on progenitors, immature migrating and differentiating neurons.

Overall, the project will allow identification of potentially generalised mechanisms leading to abnormal circuitry as well as gene or environmental factors or specific mechanisms with clinical interest for several human diseases. The team has secured ~280K€ to start the project from 2025 to 2027 from ANR as coordinator and from E3M (as partner). The team will be composed of two researchers, one lecturer and two permanent technical staff.

RECOMMENDATIONS TO THE TEAM

The proposed research focuses on important aspects of development and plasticity. An additional effort should be made to better interconnect the two major projects. Given the high scientific value of the team and its visibility at the international level (ERC panel member, FENS program committee member, highly competitive international grants (Eragnet) obtained as coordinator, etc), the level of publications could still be further improved (with already Science, Nat Comm and Cell rep among the reached journals in 10% of their publications during the previous contract period).

New Team 5: Sleep and Emotional Memory

Name of the supervisor: Gabrielle Girardeau

THEMES OF THE TEAM

The team studies the role of the different sleep stages in the consolidation of memories involving an emotional component, the influence of emotions or emotion-related factors such as stress and anxiety on memory, and the regulation of emotional reactivity. Their approach is based on a large-scale, multi-structure electrophysiological recordings in freely behaving (learning/sleeping) rodents that allows recording a growing number of independent neurons as well as local field potentials. To investigate causality, they implement closed-loop paradigms in which neural patterns are detected and perturbed in real time with optogenetics.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Not applicable since the team is evaluated at the Institut du Fer à Moulin, its previous hosting unit.

WORKFORCE OF THE TEAM: in physical persons at 1/1/2025

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	1
Directeurs de recherche et assimilés	0
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	0
Sous-total personnels permanents en activité	2
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	1
Doctorants	0
Sous-total personnels non permanents en activité	1
Total personnels	3

EVALUATION

Overall assessment of the team

Not applicable since the team is evaluated at the Institut du Fer à Moulin, its previous hosting unit.

Strengths and possibilities linked to the context

Not applicable

Weaknesses and risks linked to the context

Not applicable

Analysis of the team's trajectory

The team leader was recruited as an Inserm researcher in 2018 at the IFM Unit and was granted an ATIP-AVENIR contract in 2019. In 2021, an Assistant Professor at Sorbonne University joined the team. Today, the team consists of one researcher, one teacher researcher, three PhD students, two postdocs, and one short-term contracted engineer. The team's project in the NEURO-SU Unit is to study sleep-dependent processes related to the

processing of memory and emotions, in normal conditions, under stress, or under pathological conditions. It will include a focus on networks of episodic memory and emotions (hippocampus, amygdala, and later prefrontal cortex (PFC)). The methodological approach is very original with innovative protocols based on closed- and open-loop large-scale and multi-structure in-vivo electrophysiology (MUA, LFP) and optogenetics, during spatial learning, emotional learning and emotional experiences, and during sleep. It is organised along two axes:

- (1) Role of the hippocampus-amygdala-PFC networks during REM and non-REM sleep for emotional memory and regulation, in rats (closed-loop studies) and in a collaborative human-rodent translational study (REM sleep and positive vs negative emotional processing);
- (2) Neural mechanisms underlying effects of stress and anxiety on memory (behavioural and pharmacological protocols to study stress or anxiety in learning, combined with large-scale electrophysiology).

Future projects include the use of fibre photometry, and the study of emotional memories in models of childhood trauma and PTSD.

It is a relatively small team, extremely dynamic, fully concentrated on the same original scientific objective, in line with excellent past achievements. All facets of the project are already funded: 90 k€ secured in 2024, and 689 k€ still active until 2026; this includes two grants supported by ANR, one of which is managed by the team leader through an international collaboration for translational research. A sophisticated experimental set-up is ready and will have to be moved with care to the Cassan building in the NEURO-SU environment. The team has all the skills and technical environment to design and carry out the protocols with the relevant hired multidisciplinary expertise (biological, psychological, computational).

RECOMMENDATIONS TO THE TEAM

The combination of complex animal behavioural studies and sophisticated data analysis can lead to long publication times. This should be of particular concern to the team leader with regard to PhD students.

The team should further develop its participation in European networks and consider applying to EU calls (an ERA-NET-Neuro grant application is pending).

The team will certainly find new opportunities of collaborations (conceptual, methodological and technological) with NPS teams when moving to the Cassan building.

As mentioned by the team leader, a strategy to attract or recruit an additional permanent position researcher should be envisioned to consolidate the team. Dedicated support staff could be considered in synergy with other teams of the future Neuro-SU Unit.

New Team 11: Neuroimmunity, development and plasticity

Name of the supervisor: Anne Roumier/Corentin Le Magueresse

THEMES OF THE TEAM

The team's work builds on two main topics. The first focuses on investigating the role of serotonin in microglia maturation and synaptic plasticity, utilising classical serotonin pharmacological ligands, genetic tools, and *in vivo* assessment with fluorescent biosensors. The second topic addresses the influence of complement in microglial properties and synaptic plasticity, employing advanced genetic tools.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Not applicable since the team will be evaluated at the Institut du Fer à Moulin for the past.

WORKFORCE OF THE TEAM: in physical persons at 1/1/2024

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	2
Personnels d'appui à la recherche	0
Sous-total personnels permanents en activité	4
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	0
Sous-total personnels non permanents en activité	0
Total personnels	4

EVALUATION

Overall assessment of the team

Not applicable since the team will be evaluated at the Institut du Fer à Moulin for the past.

Strengths and possibilities linked to the context

Not applicable

Weaknesses and risks linked to the context

Not applicable

Analysis of the team's trajectory

The researchers in the team have made significant contribution in unravelling the intricate interactions between immune processes and neuronal development, particularly focusing on microglia and complement system involvement. The team trajectory reflects a commitment to addressing key questions in neurodevelopmental disorders. The first question is related to serotonergic modulation of microglia. Based on the evidence that the expression of 5-HT2BR in microglia is crucial for synaptic pruning and structural plasticity related to memory

formation, the team will explore if 5-HT instructs microglial maturation and contributes to synaptic plasticity in adulthood. Objectives will include:

- a) the evaluation of morphological, electrophysiological, and transcriptomic changes in microglia lacking 5-HT_{2BR}, linking findings to neurodevelopmental disorders like ASD;
- b) investigation of 5-HT's role in microglia signalling during memory formation, employing biosensors, transcriptomic analysis, and live imaging.

The second main question is to study complement receptors in cortical synapse refinement. Based on the evidence that elevated C4 expression in the cortex linked to schizophrenia-associated phenotypes, the team will explore CR3 and/or C3aR, downstream of C4, and mediate pathological effects via microglia-neuron interactions. Objectives include the use of in utero electroporation to overexpress C4 in transgenic mice lacking CR3 or C3aR, examining abnormal maturation of cortical circuits and microglia-neuron contacts; investigate neuronal identity's role in synapse refinement by transforming neurons, identifying microglia subtypes involved in layer-dependent synaptic elimination. The team's trajectory is marked by a multidisciplinary approach, incorporating morphological, electrophysiological, transcriptomic, and imaging techniques. Ongoing projects aim to bridge gaps in understanding the roles of immune factors in neurodevelopment, offering insights into potential therapeutic targets for neurodevelopmental disorders. The minimal composition of the team will be two researchers, and two teacher researchers and a permanent technical staff.

ANR, FRC and Eranet Neuron grants have already been obtained on these topics by the team during their previous contracting period. Recently, they obtained additional grants from FRC, ANR and FDF all as coordinator securing 545K€ up to end 2026.

RECOMMENDATIONS TO THE TEAM

Efforts should be made to better integrate the two main projects together.

Team 3: Synaptic & Neuroenergetic Networks

Name of the supervisor: Bruno Cauli & Bertrand Lambolez

THEMES OF THE TEAM

The research themes include:

- 1) the regulation of neuroenergetic networks (interaction of cortical microcircuits with the glio-vascular network),
- 2) the glutamatergic transmission (role of GluD_s),
- 3) and the development of innovative neuroimaging techniques based on ultrasound and bioluminescence methodologies.

The three themes were developed in physiological and pathological contexts.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Recommendations included:

- 1) to apply for more international funding; the team obtained an ERA-NET Neuron grant as partner in 2022,
- 2) to further engage with non-academic agencies and the team interacted with medical foundations to obtain from them two grants and two PhD fellowships,
- 3) to get more HDR and possibly recruit postdocs; two additional HDR have been obtained in the last five years and two postdocs have been recruited, and finally
- 4) to keep the number of projects in balance with the workforce and develop transversal collaborations: the scientific dispersion in regard to the number of researchers seems to have been counterbalanced by active outside collaborations.

No transversal collaboration with other teams is mentioned in the report, although team members co-signed several publications of other teams.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	2
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	2
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	7
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	3
Sous-total personnels non permanents en activité	3
Total personnels	10

EVALUATION

Overall assessment of the team

The team is medium-sized with six permanents publishing regularly in excellent (elife, Mol psy, J Neurosci) to outstanding (Nat commun) journals. Its ability to raise funds (University, charities, ERA-Net Neuron, ANR) is excellent, amounting to 1.9 MEuros. Methodological development is truly innovative (fast ultrasound, optogenetic tools) but has not been valorised (no patents or private partnership). The team is well recognised mainly nationally. Its attractiveness is excellent towards PhD students, but it did not recruit permanent/postdoc young scientists in the last 6 years, this being its weakest point.

Strengths and possibilities linked to the context

The major contributions of the team in its field is the development of innovative methodologies (Fast ultrasound, optogenetic tools) that allowed significant new understanding of brain hemodynamic, neuroenergetics, and channel functions. Between 2017 and 2022, the scientific production of the Team consisted of 26 articles, mostly original research, eleven signed as First/Last authors by a team member, the other being co-publications with other teams of the unit, or with other laboratories. This shows that the team also relies on strong collaborations in the unit and with external laboratories. The main quality production is excellent as shown by the reputation of the journals where they publish (Trends Neuroscience, elife, Molecular psychiatry, Acta Neuropathol Commun, J Neuroscience) up to outstanding for several studies (Nature communication). All the permanent members of the team, whether they are PhD, Teacher/Researcher, or Academic full-time Researchers, publish on a regular basis. The team is well recognised nationally, regularly presenting oral communications (n=15) at the national societies (SEISC, SMC) relevant to the expertise of the PIs. Its international recognition is shown mainly by the level of publications of the team. In addition, one team leader also gave invited presentations at two international (Japan) conferences, and team members gave oral presentations at several other international meetings. The team shows an excellent ability to raise funds. Sources are diverse, ranging from local University environment and charities (PhD fellowships), to competitive national/international grants that include an ERA-Net Neuron as partner (200KE), and three ANRs, one as coordinator (230 to 290 KE), amounting to 1.9 ME over the period. The participation of the team in the evaluation of research is clear with some PIs in the editorial board of two Frontiers journals and of J Neurosci Res, and team members participating to University commission CNU 69 and to ANR evaluation panels. Finally, team members strongly participate in teaching at several levels (University, Engineering schools), and trained eleven PhD students and two postdocs over the period. As of today, 6 of the PhD published as first authors, and five as co-authors, which is an excellent index of Team commitment in PhD student training.

Weaknesses and risks linked to the context

Despite its involvement in methodological innovation, the team has no connections with industry (absence of contracts) and did not file patents during the period. The team does not participate substantially in actions oriented towards other non-academic interactions. Attractiveness of the team did not lead to the recruitment of permanent or non-permanent younger scientists over the period, which is probably an element considered when proposing a new reorganisation of the teams for the future period of activity.

Analysis of the team's trajectory

Not applicable since the team will be splitted into New team 2 and New Team 12

RECOMMENDATIONS TO THE TEAM

It is recommended to extend the connections of the PIs with industrial partners and to propose a new organisation in order to attract young researchers.

New Team 2: Brain Blood Communications
 Name of the supervisor: Bruno Cauli et Dongdong Li

THEMES OF THE TEAM

The new team 2 is emerging from team 3. This Team aims to understand how blood-borne metabolic cues influence brain functions, and in turn how the brain controls metabolic environments in health and diseases, especially Alzheimer's disease. The overarching goal is to understand how lifestyle impacts brain function, with a view to promote prophylactic habits.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

See team 3.

WORKFORCE OF THE TEAM: in physical persons at 1/1/2025

The team will be composed of three researchers, one Teacher-Researcher and two PARs.

EVALUATION

Overall assessment of the team

This new team was evaluated as part of Team 3.

Strengths and possibilities linked to the context

Not applicable

Weaknesses and risks linked to the context

Not applicable

Analysis of the team's trajectory

The team is a newly created team of medium size (3 researchers, one Teacher-Researcher and 2 Engineers/Technicians), in part issued from previous Team 3 (Synaptic & Neuroenergetic Networks). It is led by two PIs who already worked together in the past (3 joint papers). They propose to investigate specific aspects of the interplay between neurons, astrocytes and blood vessels, based on previously obtained results, some yet unpublished. They plan to determine:

- 1) how lactate shapes neuronal activity and neurovascular coupling,
- 2) how the neurovascular network respond to lifestyle-induced metabolic states,
- 3) and how cerebral blood flow, neuronal activity, neurovascular coupling and memory change in Alzheimer disease, and whether it is possible to slow down the progression of the disease through appropriate diet.

For this, they will use innovative mouse models of Alzheimer's disease, allowing the selective optogenetic control of selected neurons, together with imaging tools developed previously. So far resources are secured up to 2027.

RECOMMENDATIONS TO THE TEAM

The team is now well centered on the area of expertise of the two leaders and the research activities proposed are collaborative. The proposed research program targets important aspects of neurovascular organisation and functions. Heading towards high-level publications clearly highlighting PI leadership will increase international visibility of the team, and may allow securement of more international funds, and attraction of young scientists. Efforts to make connections with industrial partners are needed and should be facilitated by the technology background of the team.

New Team 12: Synaptic and neuroenergetic networks
Name of the supervisor: Ludovic Tricoire et Yvan Cohen

THEMES OF THE TEAM

This team is emerging from Team 3. It aims to understand the alterations of brain circuits that underlie intellectual disability, absence epilepsy, and vestibular impairments circuits, at both molecular and integrative levels.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Since emerging from team 3, see team 3 evaluation.

WORKFORCE OF THE TEAM: in physical persons at 1/1/2025

The team will be composed of three researchers, two teachers researchers

EVALUATION

Overall assessment of the team

This team has been evaluated for its past when belonging to team 3 of this current unit.

Strengths and possibilities linked to the context

Not applicable

Weaknesses and risks linked to the context

Not applicable

Analysis of the team's trajectory

The team is a newly created team of medium size (3 researchers, 2 teachers researchers), mostly issued from previous Team 3 (Synaptic & Neuroenergetic Networks). It is led by two active researchers of previous Team 3 who previously co-signed two articles. They plan to develop two clearly distinct axes of research. First, they will build up on their expertise in GluD receptors to better apprehend the functions of these receptors and their involvement in intellectual disability. Secondly, they will develop applications of state-of-the-art methodologies they set-up previously. Ultrasound/EEG tool will be applied to prediction of absence seizure occurrence. In vivo imaging/optical biosensor will be applied to the exploration of brain activities metabolism and signalling during seizure. Finally, through a collaboration with an external laboratory, they will participate in the exploration of the vestibular dysfunction.

So far, resources are secured up to 2024 only for five PIs.

RECOMMENDATIONS TO THE TEAM

The team needs to show more interconnections between the two aspects of its research program, which differ in both the themes and the methodology, in view to generate interactions between the team members. Funds may become an issue in 2025 if new grants are not obtained rapidly.

Team 9: Development of the Spinal Cord Organisation
 Name of the supervisor: Jean-Marie Mangin & Pascal Legendre

THEMES OF THE TEAM

The team studies the neurophysiology of the mouse embryonic and foetal spinal cord, defining the role of neurons and glial cells, notably the role of spontaneous neuronal activity generated during embryonic development. The team also works on brain metabolism with particular emphasis on the role of glial cells.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Previous recommendations from the panel of experts included the need to increase the rate of publication given the size of the team and the originality of the research developed and to reinforce its leadership through publications and significant grants. The team has published 26 articles over the period, including eight as senior authors in very good to excellent journal (Current Biol., eLife, Glia...) and in collaboration (Current Biol, PNAS, Cell Metabolism...). The team's publications were signed as last author by 4 team members. Regarding funding, grants were obtained by three team members. The team was well funded during the period but most grants end in 2023, one of the major grants will be running until 2025 (AFM Telethon).

Other points raised by the previous committee concerned the PhD-student training that should be more significantly supported by more team members and the need to hire more postdoc fellows and/or visiting scientists. Three members of the team have supervised PhD students during the previous period and the team received one postdoc during the evaluation period which follows on from the previous period.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	1
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	2
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	5
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	3
Sous-total personnels non permanents en activité	3
Total personnels	8

EVALUATION

Overall assessment of the team

The team has made important discoveries on the embryonic development of the spinal cord. It developed an innovative imaging technique to decipher the role of astrocytes in the brain. Its publication record is excellent, with publications as lead authors (8) and collaborative publications (18). Invitations to international conferences are scarce (2). Attractiveness for PhDs (6) is excellent but only one postdoc was trained. Funding has been excellent (>1.5 M€). There is no translational activity or relationship with the private sector, and outreach activities are limited.

Strengths and possibilities linked to the context

The team has clear expertise in the embryonic development of the spinal cord and brain metabolism. During the period, the team has worked on two distinct lines of research: embryonic and foetal development of the spinal cord, and the interaction between neurons and astrocytes for brain energy supply. These highly original and important areas of research were headed by different permanent researchers from the team, some of whom benefit from excellent international collaboration, particularly with China. The team made important discoveries in the field of embryonic development of the spinal cord (*J. Neuroscience* 2018; *eLife* 2021; *Current Bio.*, 2021) and dorsal root ganglia (*Glia*, 2018), and has developed an innovative imaging technique to decipher the role of astrocytes in brain energy homeostasis (*Neuroimage*, 2020). The team's scientific production over the period was excellent with eight publications in top-tier journals (*Current Bio.*, 2021; *eLife*, *Glia*, 2018...) with a permanent team member as leading author, and a large number of collaborative publications (18) including in excellent journals (*EMBO Rep.* 2021, *Cell Metab.* 2022...). The team's attractiveness was excellent when considering the number of trained PhD students (n=6). The team funding was excellent over the period for a total amount of 1.5 M€, with substantial grants from the FRM and AFM Téléthon as coordinator, and ANR (2) as partner. Of note, these grants have been obtained by three of the four PI of the team, which shows an interesting sharing of the projects among the senior researchers, and some of the grants run until 2025. Some of the team members are teaching at master level.

Weaknesses and risks linked to the context

Some researchers left the team during the evaluation period. These researchers published as leading authors and received funding (FRM team, AFM) during the period. Their departure from the team poses a risk for the continuity of some of the main research projects. The departure of some PIs with the 'Habilitation à Diriger des Recherches', required to supervise doctoral students, could also adversely affect the ability to train PhD students.

Only one postdoc has been recruited, which seems rather low in view of the finances obtained by the team. The number of invitations to international conferences remains very limited during the period for a team with five researchers and teachers-researchers (Munich, Germany; Beijing, China). Also, the team production in terms of publication is more than correct, the team has published more collaborative articles (18) than articles from its own research projects (8). Some of the publications in the most prestigious journals (e.g. Cell metabolism) have been on collaborative works, and a number of collaborative publications has only one member of the team as co-author. Given that some of the researchers involved in the collaborative publications have left the team, this could be detrimental to the team's scientific output. Although the team's project is highly original and focuses on potentially pathologically relevant research, it has no translational or added-value activities. The team has no translational research projects with the clinic and the team has not filed any patents, nor developed any initiatives to promote its activities or interact with the private sector. Finally, the team has very limited activities of dissemination towards the lay public.

Analysis of the team's trajectory

Not applicable since this team will fuse with Team 7 as New Team 7.

RECOMMENDATIONS TO THE TEAM

The committee recommends that the team attracts senior researchers with HDR to compensate for the departure of team members.

The committee recommends accepting more international postdocs and/or visiting scientists to increase its international visibility.

The committee recommends that the team increases the number of publications relating to its own projects, and further improve the quality of publications with articles in higher impact journals. Projects should focus on the core competencies of team members. The team needs to refocus on fewer projects, which would be easier to manage given the departure of two PIs. This would make it possible to have more articles in the position of lead author, and to increase the number of publications linked to the team's core project.

The committee recommends that translational research projects could be set up. This could reinforce the impact of the team's research on society, without affecting the scientific quality of the projects.

Team 7: Formation & Interaction of Neural Networks

Name of the supervisor: Elim Hong

THEMES OF THE TEAM

The team investigates the pre-motor spinal circuit and the habenulo-interpeduncular nucleus pathway in the embryos and larva of zebrafish. The idea is to understand the dynamics underlying the motility through cholinergic nervous system.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The team was an ATIP-Avenir team at the time of the previous Hcéres evaluation, and was therefore not the subject of any recommendation by the committee.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	0
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	2
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	2
Sous-total personnels non permanents en activité	2
Total personnels	4

EVALUATION

Overall assessment of the team

The team has an excellent publication record (n=8), with publications in top-tier journals as leading author (n=4), considering its relatively recent existence (created in 2017) and small size. Collaborative publications attest to its expertise in the neurodevelopment of cholinergic neurotransmission. Attractiveness is excellent in terms of doctoral (n=4) and post-doctoral (n=2) supervision. Invitations to international conferences (n=12) showed its visibility. The team was very well funded (total amount 900 k€). It was excellent to outstanding in popularising its research for the general public.

Strengths and possibilities linked to the context

This is a small size and relatively novel team (ATIP-Avenir from 2017 to 2021) composed of one permanent researcher, three engineers and technicians. Four PhD students and two postdocs were trained during the reporting period which shows an excellent attractiveness relative to the number of PIs. The team has a strong expertise in the field of neuro-developmental biology in the embryo and larva of zebrafish. It has been working along three different lines of research: cholinergic neuromodulation in the early development of the spinal cord, habenula-interpeduncular nucleus (Hb-IPN) projections, and more recently it discovered the expression of olfactory receptors in the brain of zebrafish. The team has demonstrated the expression of cholinergic receptors in spinal cord neurons during the early phase of development in zebrafish embryos (*Sci. Report, 2020*). On a

second line of research, it discovered a trans-inhibition of two afferent pathways, cholinergic and non-cholinergic, from the habenula to the interpeduncular nucleus (*Curr Biol*, 2021). Recently, the team observed the expression of olfactory receptors in the brain of zebrafish larvae, some of which could be found in adults, notably in the hypothalamus and habenula. The role of these receptors in the brain is not known, but may be relevant to studies of the impact of pollutants on the brain. The team has established collaborations with the team 'Development of spinal cord organisation' of NPS, with which it shares expertise in cholinergic neurons and spinal cord development (Collaborative publication in *Current Biol.* 2021). The team also collaborated with physicists during the evaluation period (*Physica A* 2020, *Journal of Biological Physics* 2020), but this collaboration did not concern the team's main projects and is not being pursued. The team members were invited to twelve conferences (7 national and 5 international, including a Gordon Research Conference and Max Planck Institute in Germany...) which shows an excellent recognition in the field of zebrafish neurodevelopment. Among the four PhD students and two postdocs trained in the team, two published first author papers in excellent journals (*Curr Biol* and *Scientific Reports*) and all students had first-author publications. The team has been very well funded with an ATIP-Avenir (2017–2021), and as partner in grants from the Fondation pour la Recherche Médicale (2016–2021) and the Region Ile de France (DIM Cerveau & Pensée 2017 – 2018 and ELICIT 2021–2023). The team was very active in communicating its research to the general public. It demonstrates originality and creativity in its outreach projects. We can mention the work with the musicology department to translate neural activity from zebrafish brain into art work, with the design of software which translates neural activity into music (*SMC Proceedings*, 2020). This was presented at the 'Fête de la Science' and 'Les Festives' organised by Sorbonne University.

Weaknesses and risks linked to the context

The team has only one permanent researcher. Although production is excellent for a small team, this situation poses a risk for project follow-up, and supervision of PhD students and postdocs. The team appears to drive three distinct projects, on at least two different brain structures (habenula-IPN pathways and spinal cord). There is therefore a risk of dilution of activity, as the team is small. The contracts listed in the reporting document end in 2023. Some lines of research have a definite translational interest, as highlighted in the self-assessment report, but this does not seem to be developed.

Analysis of the team's trajectory

Not applicable since this team will fuse with Team 9 as New Team 7.

RECOMMENDATIONS TO THE TEAM

The team has only one permanent member. The committee recommends attracting senior researchers who could supervise postdocs and PhDs and lead long-term projects.

The committee recommends focusing the team's research on the most promising projects in terms of scientific outputs.

The committee recommends guaranteeing financing capacity beyond 2024.

Translational research could be further developed. Collaborations with clinicians could be envisaged, as projects on the early development of the spinal cord or the role of the habenula to the interpeduncular nucleus in psychiatric diseases are of significant translational interest.

New Team 7: Formation & Interaction of Neural Networks

Name of the supervisor: Elim Hong & Jean-Marie Mangin

THEMES OF THE TEAM

The team aims to decipher how cholinergic signalling participates in the development of the central nervous system of vertebrates.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Not applicable since team newly created from the fusion of Teams 7 and 9.

WORKFORCE OF THE TEAM: in physical persons at 1/1/2025

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	1
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	3
Personnels d'appui à la recherche	2
Sous-total personnels permanents en activité	7
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	0
Sous-total personnels non permanents en activité	0
Total personnels	7

EVALUATION

Overall assessment of the team

Not applicable since team newly created from the fusion of Teams 7 and 9.

Strengths and possibilities linked to the context

Not applicable

Weaknesses and risks linked to the context

Not applicable

Analysis of the team's trajectory

The future projects of the newly formed team 7 (from former teams 7 and 9) are oriented towards four main objectives:

- 1) understanding how cholinergic signalling arises in the vertebrate nervous system,
- 2) how it influences neural network development between neuron and glial cells,
- 3) how it regulates behaviour
- 4) and how these mechanisms are altered by nicotine exposure.

To achieve their goals they will use rodent and zebrafish as animal models and a variety of state-of-the-art techniques that include large-scale calcium imaging single-cell electrophysiology, optogenetics, CRISPR gene editing and behavioural assays.

These projects are the direct follow-up of what has been investigated during the past contracts and should extend the current knowledge on the role of cholinergic signalling in central nervous system development with a potential interest for neural pathologies that arise after foetal exposure to molecules perturbing cholinergic signalling pathways (such as nicotine for example).

Regarding funding, one AFM grant and one FDF (50K€) will end in 2026 and two grants from AFM (coordinator), one SU-emergence and one ANR (partner) will end in 2025. Fortunately, a recently obtained ANR (285K€) as coordinator will start in 2024 up to 2028.

RECOMMENDATIONS TO THE TEAM

For this newly formed team, the committee recommends to make efforts to guarantee financing capacity for the coming period, to develop more translational activities and to efficiently manage the team workforce to focus on the most promising projects.

Team 14: Gene Regulation & Adaptive Behaviour

Name of the supervisor: François TRONCHE

THEMES OF THE TEAM

The main topic of the team concerns the identification of molecular mechanisms and brain circuits mobilised to translate life experiences such as stress exposure or social life events into long-term behavioural adaptation in mice. They address this question in physiological contexts and in models of psychiatric diseases (addiction, depression) or neurodegeneration (Parkinson's) with a particular interest for the glucocorticoid receptor function in these situations.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The main recommendations of the previous committee were that 'the team should work synergistically to produce pioneering research, maintain a high publication standard and increase their productivity'. It is underlined in the present report that they 'favour a collaborative attitude among team members', illustrated by the number of team members as co-authors in publications (Nature com. 2018; 2022; Cell death and diff. 2019). Other points were to encourage scientists with tenured position to obtain an HDR, but according to the documents provided it is still not the case; and to consider getting more involved in teaching, but there is still no faculty in the team.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	4
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	6
Enseignants-chercheurs et chercheurs non permanents et assimilés	1
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	4
Sous-total personnels non permanents en activité	5
Total personnels	11

EVALUATION

Overall assessment of the team

The team scientific output is excellent to outstanding (27 articles, including 2 Nat. Commun. As leading authors), some with collaborations abroad (Nat. Neurosci.) showing outstanding visibility. Attractiveness is outstanding (2 new researchers, 8 PhD and 2 postdoc welcomed). Team members belong to national councils (CNRS, ESR). Their ability to secure money is impressive (2M€, mostly as coordinator). Team members display outstanding links with the society (patent, coordination of national events to lay public). The committee considers that the team has an outstanding contribution to its field of research.

Strengths and possibilities linked to the context

The team is composed of 6 permanent researchers (1 emeritus), one professor, one engineer, eight PhD students and two postdocs.

Over the period, they deciphered the role played by the interaction between the glucocorticoid receptor and SWI/SNF chromatin remodel complexes in controlling gene expression in response to chronic stress (Nature com. 2022) and, the impact of stress exposure on the progression of Parkinson's disease (Nature com. 2018; Cell Death and Diff., 2019). They also described the mechanisms underlying social hierarchy in mice (Psychoneuroendocrinol., 2020; bioRxiv 2021 published in Biol. Psychiatry, 2023). Over the evaluated period, the scientific productivity in terms of publications where the team is main author is excellent to outstanding, when considering the size of the team and the amount of money they collected.

The team's scientific output is excellent to outstanding with a total of 27 publications, including 4 original publications signed by team members as first or last author in outstanding journals (Nature com. 2018, 2022; Cell Death and Diff. 2019; Biol. Psychiatry, 2023). Members of the team are also collaborators on 21 publications including in excellent journals (1 Nature Neuroscience, 2017). This highlights the recognition of the team not only at the national but also at the international level (papers co-signed with numerous teams abroad including Lausanne, Braga, Seattle). The quality of the PhD supervision is excellent (8 PhD students trained over the period, 4 defend their PhD and three are first authors on publications; 2 Nature com, one Cell death & diff.; 1 Biol. Psychiatry). The attractiveness of the team is outstanding. They were able to attract two researchers (mobility, CRHC), eight PhD students and two postdocs from France and abroad. Several elements illustrate their high international profile. PI were invited for talks (5) and co-organised (3) international meetings. They are associate editors of journals (Frontiers in Behav. Neurosci., Molecular and Cellular Neurosciences, Genomics Proteomics and Bioinformatics). They obtained European collaborative grants (DFG-ANR Germany; FVA/Alzheimer, Netherlands; EU-Marie Curie contract) and two travelling grants with Netherlands and Portugal.

The team leader has also an outstanding visibility at the national level, member of the 'Conseil scientifique du CNRS' and of the 'Conseil National de l'enseignement supérieur et de la recherche' and winner of the Desmaret award of the Deniker Foundation (2022). The team's ability to secure funding is outstanding (over the period >2000k€ secured) from national and international research grants and foundations mostly as coordinator. The team leader was member of the Labex BioPsy. The team displays outstanding socio-economic interactions linked to their research on addiction problems (patent, co-funded company for treatment of alcohol use disorders, expertise in national and European committees). Team members are strongly involved in scientific culture diffusion through regular interventions in schools and in national media. Team leader is also the national coordinator of the 'semaine du cerveau'.

Weaknesses and risks linked to the context

The long delay in publishing might affect their ability to secure money in the future and also may represent a difficulty for postdoc and PhD students.

Analysis of the team's trajectory

Not applicable since the team will fuse with Teams 4 and 8.

RECOMMENDATIONS TO THE TEAM

The committee had no major recommendations to this team, although efforts should be made to improve publication rates for PhD students and postdocs.

Team 4: Glial Plasticity & Neuro-Oncology
 Name of the supervisor: Hervé CHNEIWEISS & Marie-Pierre JUNIER

THEMES OF THE TEAM

The main topic of the team concerns cell heterogeneity and plasticity in one of the most frequent and aggressive human brain tumour types, the glioblastoma. They performed several omics analyses including at the single cell level to get a systemic view of the molecular pathways, in particular the metabolic pathways, involved in tumour cell plasticity. For their studies, they have access to a collection of patient-derived cells from adult and paediatric tumours. We should also mention the remarkable involvement of the team in bioethics issues regarding genome editing, neurotechnologies and organoids at the national and international level.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The recommendation was 'Scientific publication with a higher impact should be sought in the future'. There is no publication in top journals of large readership but nevertheless still papers in top specialised journals (such as Acta neuropathologica).

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	1
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	5
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	1
Sous-total personnels non permanents en activité	1
Total personnels	6

EVALUATION

Overall assessment of the team

The team's scientific output has focused on excellent collaborative work (14 co-signed articles inc. Cancer Cell, Nat. Comms), but also includes four primary research articles as lead. Involvement of team members in dissemination of ethical issues is outstanding (UNESCO; lay public; 13 articles concerning ethics issues). Their attractiveness is excellent (1 foreign faculty, 2 postdocs, 1 PhD, Erasmus students welcomed), with an impressive reputation (invitation to >60 talks, frequent funding panel contributions). The funds raised are excellent (>1M€).

Strengths and possibilities linked to the context

The team is currently composed of two researchers, one faculty and one engineer. The team's scientific output is very strong with 38 publications, although only 4 original publications were signed by team members as first, last or co-last author (2 Acta Neuropathologica, 1 Acta Neuropathologica com, 1 Cell death and disease). The

constitution of their patient-derived cells collection and their expertise in manipulating them has led to numerous collaborations in France (5) and abroad (Spain, USA, Brazil). It produced fourteen publications including in renowned journals (Cancer Cell, Nature Com., Oncotarget, Oncogene, Cancer research, Scientific reports) and one patent. Thirteen publications (including Science, Cell Stem Cell) are relative to ethical issues and six correspond to editorial and didactic contributions. Over the period, the team trained one PhD student (first author in Acta Neuropathologica com, Cell Death and Disease) and attracted an international invited teaching assistant, and two postdocs (one first author in Acta Neuropathologica). National and international recognition of the team is impressive. It is illustrated by the high number of publications performed in collaboration in high-ranked journals. Team members were invited to participate to two EU projects and a project gathering several French teams (InCa). Their expertise continues to attract novel collaborations inside the IBPS, in the French scientific community (Curie Institute, CNRS Bordeaux) and abroad (Israel, with a physicist to develop IA strategies). Team members were also asked for their expertise to review papers for numerous scientific journals and evaluated several applications to research funding for national and international bodies (MESRI, Swiss Cancer League, ERANET Neuron, FRSQ-Canada, FRM, ...). The remarkable scientific visibility of team members is exemplified by the numerous national and international invitations the team leader and team members received (>60 conferences and seminars; 3 symposia in France and abroad). Team leaders also have a remarkable visibility on ethical issues e.g. chair of UNESCO international bioethics committee, OECD working group, Conseil d'Etat, ... Team leader and team members were recipients of several awards (FRM, Légion d'honneur, Les Entreprises contre le Cancer). A team member is strongly active in teaching, being responsible for metabolism teaching at the undergraduate level (more than 700 students). He is a member of the Biology department council. The team's ability to raise funding is excellent, such that team members obtained a large amount of money (>1000k€) mostly as coordinator at the national academic level (2 ANR, 2 INCA, APHP) and through foundations (FRM team, LaLigue). Team members are heavily involved in knowledge and scientific culture diffusion towards the lay public. The team leader is a regular media contributor about ethics issues related to emerging technologies in the health and life science research. Links to society are therefore outstanding.

Weaknesses and risks linked to the context

The team hosted French and foreign students (Erasmus) including one bachelor, two master 1 and 4 master 2 but the number of PhD student was relatively low (n=1). The team leader is director of the unit that could be a weakness in view of the increasing administrative duties. The strategy of the team is to largely disseminate their results and models through collaborations for a rapid development of new therapeutic solutions. As a result, the publication record is dominated by publications as collaborator rather than as lead, which may have consequences for the international profile of the earlier career researchers.

Analysis of the team's trajectory

Not applicable since the team will fuse with Teams 14 and 8.

RECOMMENDATIONS TO THE TEAM

The committee found that this team did not suffer from any significant issues but highlighted the need to increase the attractiveness of PhD students. The importance of publishing the team's focal work as owners could be prioritised.

Team 8: Neuronal Networks & Physiopathological Rythms
 Name of the supervisor: Régis Lambert & Nathalie Leresche

THEMES OF THE TEAM

The team studies the functional interplays between cortex and thalamus in sensory processing in relation with physiological and pathological behavioural states. The team's expertise allow it to analyse the functioning of the thalamocortical system from the molecular level (ionic channels, neurotransmitters) to the behaviour (sensory perception) and to associated pathologies (absence seizure, chronic pain). Part of the team was studying the physiology of glycine-binding NMDA receptor subunit, GluN3A, a project that came to a stop with the departure of the project leader in January 2021.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The recommendation was 'to make some efforts in improving the rate of publication', which has been achieved (16 publications with 10 as leading authors), and 'to hire more postdoc fellows and PhD students' but only three PhD were trained over the period.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maîtres de conférences et assimilés	2
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	0
Sous-total personnels permanents en activité	4
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	1
Sous-total personnels non permanents en activité	1
Total personnels	5

EVALUATION

Overall assessment of the team

The scientific production is outstanding (16 publications, 10 as lead, 4 in top journals). Attractiveness is excellent to outstanding (1 postdoc, 3 PhD students welcomed); their scientific expertise is internationally recognised as shown by the large number of international collaborations (McGill, Malta, Germany...) and invitations to teach abroad (Germany). The resources are excellent (<1M€). One faculty has important responsibilities (director of Neuroscience Doctoral school) and is also very active in outreach activities. The committee considers that the team is excellent to outstanding.

Strengths and possibilities linked to the context

Two major contributions were made to the main topic of the team: they decrypted the functional relationships between cortical layer 2/3 neurons and layer 5 neurons in sensory-evoked response (Cell report, 2018; J. Neurosci Methods, 2018); they identified a role for centrally expressed Cav3.2 T-type calcium channels in the initiation

and maintenance of allodynia (eLife, 2022). The project concerning the physiology of glycine-binding NMDA receptor subunit, GluN3A resulted in two major publications (Nature com. 2018; Science, 2019). The team's scientific production is outstanding with sixteen publications in peer-reviewed journals. Among them ten were signed by team members as first, last or co-last author (6 articles, 4 reviews); four articles are published in outstanding journals: Cell reports and eLife regarding the thalamocortical system and, Science and Nature com. on NMDA receptor studies. Of note, a collaboration with Cardiff University on the role of the thalamocortical networks in absence seizure resulted in an important paper in Nature Neuroscience (2018), a review in Nature review Neuroscience (2018) and a publication in Brain (2020).

Over the evaluation period, the team trained three PhD students and a post-doctoral researcher. The PhD students signed high-level publications as first author (Cell reports, eLife, Nature com.). A clear strength of the team that contributes to its excellent to outstanding attractiveness is its national and international recognition related to its renowned expertise in performing multiscale analyses of the thalamocortical system. They developed fruitful collaborations at the international (Cardiff University, MacGill university, Malta) and national (IGF Montpellier, ENS Paris) levels resulting in important publications (Nature Neuroscience, eLife). They also developed a long-lasting interdisciplinary collaboration (Nice University) allowing setting up a robust method to reconstruct functional connectivity of small networks using an experimentally realistic amount of data (J. Neurosci. Methods). Team leaders were invited to teach in Germany and to write a chapter for a book (Oxford University Press, 2023). One PI is a member of the editorial board of J Neurosci methods and organised two international symposia (Mediterranean Neuroscience society, 2017, 2022). One PI is 'chargé de mission' for Neuroscience at the national level (CNRS). Both team members are remarkably active in teaching, one being the head of the Neuroscience doctoral school (more than 400 students). The team's ability to raise funding is excellent, team members are partners of two ANR projects on thalamocortical networks (401k€) and coordinator of an ANR linked to GluN3A project (230k€). Links to society are also excellent. Team members organise school events (Rencontres Declics), and sharing knowledge with non-specialist public (semaine du cerveau ; article in Medecine/Sciences, Paris).

Weaknesses and risks linked to the context

The size of the team, three permanent researchers, including two faculty strongly involved in teaching and with high – level responsibilities in a context of lack of technical support is clearly a weakness. Links with society and lack of interaction with the economic world could be considered as a weakness too but this must be put into perspective in view of the composition of the team and the quality of its scientific output.

Analysis of the team's trajectory

Not applicable since the team will fuse with Teams 4 and 8.

RECOMMENDATIONS TO THE TEAM

No major recommendations emerge except the need to increase the links with industries and to promote the attraction of more postdoc or junior researchers from abroad.

New Team 13: Gene Regulation and Adaptive Behaviours

Name of the supervisor: François Tronche et Vincent Parnaudeau

THEMES OF THE TEAM

The team's scientific strategy revolves around unravelling the molecular, cellular, and physiological mechanisms governing long-term behavioural adaptations and the onset of pathological conditions resulting from life experiences. Internationally recognised, the team specialises in dissecting the function of the glucocorticoid receptor (GR) in stress-related psychiatric and neurological disorders. Their approach involves creating refined mouse mutants to pinpoint the cell types and brain circuits where GR and associated factors modulate specific behaviours in healthy brains or models of psychiatric and neurodegenerative disorders.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Not applicable since new created team by fusion of Teams 4, 8 and 14.

WORKFORCE OF THE TEAM: in physical persons at 1/1/2025

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maîtres de conférences et assimilés	3
Directeurs de recherche et assimilés	4
Chargés de recherche et assimilés	5
Personnels d'appui à la recherche	2
Sous-total personnels permanents en activité	15
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	0
Sous-total personnels non permanents en activité	0
Total personnels	15

EVALUATION

Overall assessment of the team

Not applicable since new created team by fusion of Teams 4, 8 and 14.

Strengths and possibilities linked to the context

Not applicable

Weaknesses and risks linked to the context

Not applicable

Analysis of the team's trajectory

The team's trajectory encompasses a comprehensive exploration of stress's impact on cognitive, social, and neurodegenerative aspects, employing diverse methodologies and collaborating extensively with various research entities in France (Necker or Bichat Hospitals in Paris, IBV at Nice, CFB at Caen and IGF at Montpellier)

but also abroad (Israel, Portugal, Greece, Brazil, Belgium, Spain). Their commitment to knowledge dissemination aligns with the institutional missions of Inserm and CNRS.

Specific projects include:

- 1) Investigating the impact of stress and glucocorticoids on thalamo-frontal circuits crucial for cognition and social behaviour using ex vivo and in vivo recordings and establishing causal links between synaptic changes and behavioural alterations through pharmacogenetic and optogenetic manipulations,
- 2) Addressing the role of glucocorticoid receptors (GR) in non-motor symptoms of Parkinson's disease and of stress-elicited glucocorticoids on Alzheimer's disease symptoms,
- 3) Investigating the impact of dopamine and GR on social status and behaviour using automated complex environments and employing circuit-specific pharmacogenetic approaches to dissect brain networks involved in social hierarchy and unravelling molecular and epigenetic mechanisms underlying social fate, and finally.
- 4) Delving into molecular mechanisms involved in enduring changes due to repeated stress, focusing on SWI/SNF remodel complexes recruited by GR using transcriptomics, epigenomics, and nuclear organisation studies to understand nuclear plasticity dynamics.

The new team has secured enough funds for the next mandate (>1.3M€), 800K€ ending in 2027.

RECOMMENDATIONS TO THE TEAM

While welcoming new staff with complementary expertise is a definite added value, the key issue remains the integration and cohesion of these people from three different teams on a common goal.

Team 13: Development & Plasticity of Neural Networks
 Name of the supervisor: Alain TREMBLEAU & Isabelle DUSART

THEMES OF THE TEAM

The team used molecular and cellular approaches to understand the development and plasticity of neuronal networks in mice and more recently zebrafish models.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The team was previously found to be excellent. The minor limitations pointed by the previous HCÉRES panel were intrinsic to the composition of the team (few permanent researchers) which has not been solved perfectly but remain a very minor lack in this team. The PIs chose to focus on hiring doctoral students rather than post-doctoral fellows, and this is understandable given the geometry of the team.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	2
Maîtres de conférences et assimilés	1
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	5
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	2
Sous-total personnels non permanents en activité	2
Total personnels	7

EVALUATION

Overall assessment of the team

The team scientific production is quantitatively modest but the team prioritises publications in excellent to outstanding journals (Cell Rep, eLife...), 50% of them as leading authors, including all PhD students. The team showed an excellent attractiveness (a visiting Professor, 10 PhD trained) with national and international collaborations. The team funding was excellent over the period (>800K€, including NIH and ANR grants). The team also showed an outstanding contribution to science evaluation and institutional reviewing as well as to science outreach in the community.

Strengths and possibilities linked to the context

The team is a medium/small team, with one researcher, three teacher/researchers and one permanent engineer.

The team uses molecular and cellular approaches to understand the development and plasticity of neuronal networks in mice and more recently zebrafish models. The major contribution to knowledge of the team has been the discovery of the role of the primary cilium in neuronal migration and major contribution in Netrin 1 biology and its pathophysiological roles.

The team has a clear positioning in developmental neuroscience, with strong expertise despite its small size. The scientific production of the team is quantitatively modest (16 articles, including 3 reviews). However, the team

prioritises quality over quantity as shown by the publication record in excellent to outstanding journals (including *Science Advances*, *Cell Report*, *eLife*). It is noteworthy that the team was able to publish in outstanding journals either as main authors or as collaborators, showing their important contributions in these articles. Importantly, PhD students all published as first or co-first authors.

The team has been very attractive during the period, welcoming a Professor from Yale University as part of a joint NIH grant, and through numerous national and international collaborations (Quebec, Canada; Yale, USA). Every team member has trained at least two PhD students over the period (10 overall). All PhD students have published as first or co-first authors in excellent journals. The team capacity to raise funds was excellent, including 4 ANR and a participation to an NIH-R01 grant. The team's researchers and teacher researchers have demonstrated an outstanding commitment to society. Team members headed the Paris neuroscience doctoral school and the CNU (Conseil National des Universités) for neuroscience. Team members have led the Brain awareness week in Paris and are now national coordinators of the 'Brain Awareness Week' for the French Neuroscience Society. Team members co-founded the association 'Cerveau en Seine', co-organised 'Vie ma vie de chercheur' and take part in 'Fête de la science' events.

Weaknesses and risks linked to the context

While the team has international visibility, there was no post-doctoral fellow recruited and most (if not all) PhD students were locally recruited. Another intrinsic feature of the team is its lack of technology transfer or interactions with socio-economic partners. These should not be considered as major weaknesses as production is excellent to outstanding, and contribution to society and academic life of the PIs is exceptional.

Analysis of the team's trajectory

Not applicable since the team is closing.

RECOMMENDATIONS TO THE TEAM

The committee encourages all PIs to pursue their fantastic engagement into science diffusion and institutional involvement in their futures teams. The excellent quality of their scientific production may be used to attract more postdocs from abroad.

Team 11: Axon Degeneration & Regeneration

Name of the supervisor: Fatiha Nothias

THEMES OF THE TEAM

The team addresses the molecular and cellular mechanisms underlying axonal plasticity and neural cell remodelling in the adult nervous system in response to traumatic lesions. They use in vivo rodent animal models and in vitro modelling (axon regeneration vs degeneration). They also developed tissue engineering and in combination with others, synergistic approaches, in the field of tissue repair. The works have a translational value.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous recommendations pointed that the team should limit the numbers of projects, which could have been overwhelming in terms of implication and blurry in terms of visibility, and focus on the microfluidic approach and the novel topic tissue repair. The team performed well because the projects are connected to the three-main axis the team was proposing. The visibility and the coherence might have favoured the success for grant applications.

Another recommendation was to involve more permanent researchers (or lecturers) in PhD supervision or research, and to increase the level of publications. These recommendations could not be followed.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	4
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	5
Sous-total personnels non permanents en activité	5
Total personnels	9

EVALUATION

Overall assessment of the team

The team is considered as excellent. It has a very good/excellent research record (12 original papers in recognised journals), an excellent ability to be funded (~2M€ during the contract, including from the competitive call of ANR) with excellent to outstanding links to society when considering the development of new therapeutic approaches and biomarkers (start-up), with excellent attractiveness of PhD (n=9), and an excellent participation in teaching and local or national boards.

Strengths and possibilities linked to the context

The team has pursued its main line of research in developing three main axis that are interconnected. The development of microfluidic devices has allowed boosting the projects of the team and the addition of tissue repair in the topics of the team is valuable.

The whole picture allows for the team to develop several collaborations in the lab, or in France (Grenoble) but also internationally (Oxford, NY, Philadelphia). The level of publications is appropriate. The team published more than fourteen peer-reviewed articles or reviews (12 original articles, 3 reviews). They lead authorships in recognised journals including Journal of Biomedical Materials Research Part A, Scientific Reports, Biomaterials. They also co-authored publications in *Glia*, Scientific Reports, or Nature Communications in partnership. They have shown an excellent ability to raise funds, which went beyond 2M euros. The funds came from institutional calls (ANR, NIH), foundation (FRM), private companies, and SATT Lutech/SU. They also developed a start-up and collaborations with the private sector (Servier). All these, testify of the dynamism of the team with excellent/outstanding capacities of transfer to the society. The team is attractive for PhD students (n=9), and in a lesser extend for postdocs (n=2). Among the 9 PhD students crossed the period of reference, 4 or five of them currently continuing their PhD. For most of them, they are participating as first author in original articles. The PhD/Post-docs students are participating to meetings and conferences as well. The team is participating in the life of the University (two members are lecturers/readers). They also have a strong involvement in institutional activity (such as in the CNRS national committee since 2012 by different members of the team), scientific expertise (grants, journals), national research evaluation (univ. recruitments, HCÉRES panels).

Weaknesses and risks linked to the context

Although the team has a satisfactory level of publications, it can surely be improved taking into an account the number of PhD students, PIs and collaborations. The risk in maintaining this level of publication is the loss of confidence for national/international calls. The collaborations could involve more foreign partners. The lack of permanent staff in support of the projects is a weakness, probably independent of the will of the team.

Analysis of the team's trajectory

Not applicable (moving to Development Adaptation and Ageing (dev2a) unit which will be the evolution of the Developementla Biology laboratory (LBD) unit at Sorbonne University.

RECOMMENDATIONS TO THE TEAM

The interconnection of the themes should be pursued to strengthen the visibility of the team. The team could increase the number and level of publications by focusing on several aspects with the hiring of more students/postdocs from abroad. The team should develop more collaborations with foreign partners.

Team 10: Neuroplasticity of Reproductive behaviours
 Name of the supervisor: Sakina MHAOUTY-KODJA

THEMES OF THE TEAM

The team's research focuses on both basic and applied aspects of reproductive biology, exploring neural mechanisms of sex steroids in reproductive regulation and assessing the impact of environmental endocrine disruptors on human health to improve the understanding of molecular targets for fertility regulation and developing biomarkers for health risk assessment.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

It was recommended by the previous evaluation committee to increase the international visibility by getting involved and applying to European projects. The team was extremely effective in raising funds from several national agencies (ANR, Anses) and from the European commission.

It was also recommended to attract a full-time researcher to ensure productivity of the team. The team has increased slightly in size. It comprises one full-time researcher, three teachers researchers including one who was recently recruited in 2021, one postdoc and one engineer. The team highlights difficulties in increasing further. It is related to insufficient allocated space (laboratory and offices), and working conditions in the Cassan building.

Finally, the team was advised to focus on understanding the androgen receptor's role in endocrine disruption, particularly exploring distinct neural cell populations like neurons and astrocytes. The team was successful in developing strategies to understand the role of brain cell types sensitive to endocrine disruption and developing strategies to rescue phenotypes in animal models.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maîtres de conférences et assimilés	2
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	0
Sous-total personnels permanents en activité	4
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	2
Sous-total personnels non permanents en activité	2
Total personnels	6

EVALUATION

Overall assessment of the team

The team's collaborative and supportive environment nurtures scientific excellence, attracting researchers at various career stages to contribute to innovative projects. Specialising in behavioural reproductive neuroendocrinology and neuroendocrine disruption, the team excels in research, boasting extensive national and international engagement. Their leadership is shown by the success in obtaining research funding, totalling around 1M€ in the past term. With a notable publication record their work spans journals with large readership, such as Comm Biol and Environmental Health Perspectives, and more specialised ones.

Strengths and possibilities linked to the context

The team demonstrates a remarkable/excellent capacity for fundraising, securing a substantial 1 100Keuros from prominent national agencies like ANR and the European Commission. The team's excellence is underscored by the acquisition of four grants supported by ANR. In terms of scientific productivity, the team has a commendable output with 42 publications in internationally recognised journals such as Environ Pollut, Environ Health Perspect, Enviro Res, Chemosphere, Comms Biol, and J Cereb Blood Flow Metab. This is then an excellent productivity. Furthermore, the 7 PhD students, which can be considered as an excellent to outstanding attractiveness for a such small team, have collectively generated 23 publications, with five of them having at least one first-authored publication, showcasing a strong commitment to mentorship. The team's projects, centered on fertility and environmental health, have significant societal implications, exemplified by the organisation of Reprosiences days, including a Lay-Public conference on 'endometriosis.' Engaging with the public through lay-public conferences, media interviews, and active participation in scientific initiatives in schools, the team further accentuates the societal impact of their research, particularly regarding the data obtained on phthalates. These implications in society can then be considered as excellent to outstanding. In addition, the team leader chairs the working group on endocrine Disruptors at ANSES since 2017.

Weaknesses and risks linked to the context

In terms of areas for improvement, it's worth noting that while the team has been productive, there is an opportunity to enhance visibility by targeting publication in higher-impact journals. Additionally, recognising the significance of innovation, consideration of exploring and acknowledging potential patents could further strengthen the team's profile.

Analysis of the team's trajectory

Not applicable (moving to Development Adaptation and Ageing (dev2a) unit which will be the evolution of the Developmental Biology laboratory (LBD) unit at Sorbonne University.

RECOMMENDATIONS TO THE TEAM

In light of the phthalate analysis findings, known for environmental and human contamination, there's a recommendation to increase efforts in linking this research to society. By expanding outreach, sharing outcomes, and fostering understanding, the team can contribute more to public awareness, thus making a positive societal impact.

New Team Avenir: Morphogens and neural development

Name of the supervisor: Julien Ferent

This ATIP/avenir team just started at the Institut du Fer à Moulin (IFM) and will move to the future Neuro-SU unit in 2025, and will not be evaluated.

Team 6: Neurophysiology and behaviour

Name of the supervisor: Philippe Faure and Alexandre Mourot

Team moved to another location and will be evaluated for the past at ESPCI, its new hosting laboratory.

Not

CONDUCT OF THE INTERVIEWS

Date(s)

Start: 04 décembre 2023 à 9 h

End : 05 décembre 2023 à 18 h

Interview conducted : on-site

INTERVIEW SCHEDULE

**Research Lab Visit program
NEUROSCIENCE PARIS SEINE (NPS)
Date of the visit: december 4-5 2023 (on site)
Present Lab director: Mr. Hervé Chneiweiss**

HCÉRES Scientific advisor: Mr. Giovanni Stevanin

Research committee:

Ms. Nora Abrous, expert, Bordeaux
 Mr. Olivier Bertrand, expert (**Vice President**), Lyon
 Mr. Philippe De Deurwaerdere, CNU representative and expert, Bordeaux
 Mr. Luc Dupuis, CSS4 representative and expert, Strasbourg
 Mr. Jean-François Ghersi-Egea, expert, Lyon
 Mr. Etienne Guillaud, PAR representative and expert, Bordeaux
 Ms. Ellouise Leadbeater, expert Panel HCÉRES (**President**), London
 Mr. Jacques Noel, CoNRS25 representative and expert, Nice
 Ms. Fabienne Pituello-Berniere, expert, Toulouse
 Ms. Muriel Thoby-Brisson, expert, Bordeaux
 Ms. Elisa Zanier, expert Panel HCÉRES, Milan

Observers:

Ms. Kim Charvet, CNRS-Biologie

December 4th

9:00-9:30	Welcome coffee (closed-door): Visiting committee with the HCÉRES advisor (ROOM Colibri C405)
9:30-9:45	Presentation of the evaluation process to the unit by the HCÉRES advisor
9:45-10:45	Presentation of the unit scientific outputs and strategy by the past/future lab directors (30' presentation + 25' discussion) Meeting room of the IBPS, Cassan building, 4 th floor
10:45-11:15	<i>Coffee break</i> (ROOM Colibri C405)
11:15-12:15	Presentation of the scientific programs and research results by group leaders (15' presentation + 14'discussion) Past & Trajectory
	Team 1 – Neurobiology of psychiatric disorders (Catalina Betancur & Vincent Vialou) Team 2 – Neuronal Signalling & adaptive behaviour (Jocelyne Caboche & Peter Vanhoutte)
12:15-1:30 p.m.	Lunch (closed-door with the committee and HCÉRES advisor)
1:30 p.m.-3 p.m.	Presentation of the scientific programs and research results by group leaders (15' presentation + 14'discussion) Past & Trajectory
	Team 5 – Neuropharmacology of VGLUTs (Stéphanie Daumas & Nicolas Pietrancosta) Team 12 – Cerebellum, Navigation and Memory (Laure Rondi-Reig) New Team 6 – Insect Cognitive Neuroethology (Martin Giurfa)

- 3 p.m.-3:30 p.m.** Coffee break
- 3:30 p.m.-4:30 p.m.** Visit of local facilities
- 4:30 p.m.-6:40 p.m.** Presentation of the scientific programs and research results by group leaders (10' presentation + 9'discussion) **Trajectory**

New Team 8 – Brain compensation dynamics in neurodegenerative diseases (Christian Neri & Emmanuel Brouillet)

New Team 4 – Cortical development and pathology (Fiona Francis)

New Team 11 – Neuroimmunity, development and plasticity (Anne Roumier & Corentin Le Magueresse)

New Team 9 – Synaptic Plasticity and Neural Networks (Rebecca Piskorowsky & Vivien Chevaleyre)

New Team 5 – Sleep and Emotional Memory (Gabrielle Girardeau)

- 6:40 p.m.-7:10 p.m.** Private meeting of the visiting committee (closed-door)
- 7:30 p.m.** Evening dinner (only committee members and HCÉRES Scientific advisor)

December 5th

- 8:30-9:00** Welcome coffee (closed-door): Visiting committee with the HCÉRES advisor
- 9:00-10:15** Presentation of the scientific programs and research results by group leaders (20' presentation + 14'discussion) **Past & Trajectory**

Team 9 – Development of the Spinal Cord Organisation (Jean-Marie Mangin & Pascal Legandre)

Team 7 – Formation & Interaction of Neural Networks (Elim Hong)

New Team 7 – Formation & Interaction of Neural Networks (Elim Hong & Jean-Marie Mangin)

(25' presentation + 14'discussion) **Past & Trajectory**

Team 3 – Synaptic & Neuroenergetic Networks (Bruno Cauli & Bertrand Lambolez)

New Team 12 – Synaptic and neuroenergetic networks (Ludovic Tricoire & Yvan Cohen)

New Team 2 – Brain Blood Communications (Bruno Cauli & Dongdong Li)

- 10:15-10:45** Coffee break
- 10:45-11:35** Presentation of the scientific programs and research results by group leaders (30' presentation + 19'discussion) **Past & Trajectory**

Team 14 – Gene Regulation & Adaptive Behaviour (François Tronche)

Team 4 – Glial Plasticity & Neuro-Oncology (Hervé Chneiweiss & Marie-Pierre Junier)

Team 8 – Neuronal Networks & Physiopathological Rythms (Régis Lambert & Nathalie Leresche)

New Team 13 – Gene Regulation and Adaptive Behaviours (François Tronche & Sébastien Parnaudeau)

- 11:35-12:35** Presentation of the scientific programs and research results by group leaders (10' presentation + 10'discussion) **Past**

Team 13 – Development & Plasticity of Neural Networks (Alain Trembleau & Isabelle Dusart)

Team 11 – Axon Degeneration & Regeneration (Fatima Nothias)

Team 10 – Neuroplasticity of Reproductive behaviours (Sakina Mhaouty-Kodja)

- 12:35-2 p.m.** Lunch and debriefing (closed-door with the committee and HCÉRES advisor)

From 2 p.m. Meetings with the various categories of personal (ROOM C404)

- 2 p.m.-2:30 p.m.** Discussion with engineers, technicians and administrative personnel (in French)
- 2:30 p.m.-3 p.m.** Discussion with PhD students and postdocs
- 3 p.m.-3:30 p.m.** Discussion with scientists (without team leaders)
- 3:30 p.m.-4 p.m.** Discussion with the previous and future team leaders (closed-door)
- 4 p.m.-4:30 p.m.** Discussion with the representative of the managing bodies (closed-door) & local representatives
- 4:30 p.m.-5 p.m.** Discussion with the past/future directors/co-directors (closed-door)
- 5 p.m.-6 p.m.** Private meeting of the visiting committee (closed-door) (SALLE C404)

6 p.m.

End of the visit

PARTICULAR POINT TO BE MENTIONED

The supervising bodies highlighted the quality of the science produced by the unit and its crucial investment in the local ecosystem and at the national level. They also pinpointed the critical need of a good integration of the teams from IFM and others units in the Cassan building where the NPS unit is already located with an important and substantial effort of the university and of the IBPS institute to host them in renovated floors (deadlines still under negotiation).

GENERAL OBSERVATIONS OF THE SUPERVISORS

Marie-Aude Vitrani
Vice-Présidente Vie institutionnelle et démarche
participative
Sorbonne Université

à

Monsieur Eric Saint-Aman
Directeur du Département d'évaluation de la recherche
HCERES – Haut conseil de l'évaluation de la recherche
et de l'enseignement supérieur
2 rue Albert Einstein
75013 Paris

Paris, le 18 avril 2024

Objet : Rapport d'évaluation DER-PUR250024442 - NPS - Neurosciences Paris Seine.

Cher Collègue,

Sorbonne Université vous remercie ainsi que tous les membres du comité HCERES pour le travail d'expertise réalisé sur l'unité de recherche « NPS ».

Sorbonne Université n'a aucune observation de portée générale à formuler sur le rapport d'évaluation transmis.

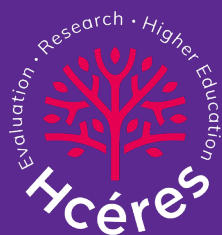
Je vous prie d'agréer, Cher Collègue, l'expression de mes cordiales salutations

Marie-Aude Vitrani
Vice-Présidente Vie institutionnelle
et démarche participative



The Hcéres' evaluation reports are available online:
www.hceres.fr

Evaluation of Universities and Schools
Evaluation of research units
Evaluation of the academic formations
Evaluation of the national research organisms
Evaluation and International accreditation



2 rue Albert Einstein
75013 Paris, France
T. 33 (0)1 55 55 60 10

hceres.com

[@Hceres_](https://twitter.com/Hceres_)

[Hcéres](https://www.youtube.com/Hceres)

