Centre d'études de la sensori-motricité

Rapport Hcéres

agence d'évaluation de la recherche
et de l'enseignement supérieur

Section des Unités de recherche

Evaluation report

Research unit
Centre d'études de la sensori-motricité

University Paris 5

March 2009

agence d'évaluation de la recherche
et de l'enseignement supérieur

Section des Unités de recherche

Evaluation report

Research unit

Centre d'études de la sensori-motricité

University Paris 5

Le Président
de l'AERES

Jean-François Dhainaut

Section des unités
de recherche

Le Directeur

Pierre Glorieux

March 2009

Evaluation report

The research unit :

Name of the research unit : Centre d'études de la sensori-motricité

Requested label : UMR CNRS

N° in case of renewal : 7060

Head of the research unit : M. Pierre-Paul VIDAL

University or school :

University Paris 5

Other institutions and research organization:

CNRS

Date of the visit :

17th December 2008

Members of the visiting committee

Chairman of the commitee :

Ms. Eve MARDER, Brandeis University, Boston, USA

Other committee members :

M. Jean-René CAZALETS, Université Bordeaux 2, France

M. Bernard JASMIN, Faculty of Medicine, Ottawa, Canada

M. Jean-Louis VERCHER, Institut des Sciences du Mouvement, Marseille, France

CNU, CoNRS, CSS INSERM, INRA, INRIA, IRD representatives :

Ms. Catherine SOULA, CNU representative, France

M. Remi GERVAIS, CoCNRS representative, France

AERES scientific representative:

M. Erwan BEZARD

University or school representative:

M. Bruno VARET, Université Paris 5

Research organization representative :

Ms. Nathalie LERESCHE, INSERM

Evaluation report

1 • Short presentation of the research unit

- Total number of lab members : 48 including
  - full time researchers : 7
  - researchers with teaching duties : 18
  - post doctoral fellows : 5
  - PhD students : 7
  - technicians and administrative assistants : 11
- Number of HDR : 19
- Number of students who have obtained their PhD during the past 4 years : 8
- Average duration of thesis during the past 4 years : 3 years
- Number of lab members who have been granted a PEDR : 3
- Number of "publishing" lab members : 25 out of 25

2 • Preparation and execution of the visit

The preparation and execution of the visit was as specified in the Aeres guidelines. The visit went smoothly with all aspects of the evaluation covered satisfactorily.

From 8 :30 to 9 :00
Time length : 30 minutes
Door-closed meeting : Committee members and AERES representative

From 9 :00 to 9 :30
Time length: 30 minutes including questions
Presentation by Dr. Vidal : past activity and projects

From 9 :30 to 10 :15
Time length: 45 minutes including questions
Presentation by the leader of team #1 : past activity and projects

From 10 :15 to 11 :00
Time length: 45 minutes including questions
Presentation by the leader of team #2 : past activity and projects

From 11 :00 to 11 :45
Time length: 45 minutes including questions
Presentation by the leader of team #3 : past activity and projects

From 11 :45 to 12 :30
Time length: 45 minutes including questions
Presentation by the leader of team #4 : past activity and projects

Lunch from 12 :30 to 13 :15

From 13 :15 to 14 :00
Time length: 45 minutes including questions
Presentation by the leader of team #5 : past activity and projects

From 14 :00 to 14 :45
Time length: 45 minutes including questions
Presentation by the leader of team #6 : past activity and projects

From 14 :45 to 15 :30
Time length: 45 minutes including questions
Presentation by the leader of team #7 : past activity and projects

From 15 :30 to 16 :15
Time length: 45 minutes including questions
Presentation by the leader of team #8 : past activity and projects

From 16 :15 to 16 :45
Time length : 30 minutes
Two meetings at the same time
- Meeting with PhD students and postdoctoral fellows
- Meeting with engineers, technicians and administrative assistants

From 16 :45 to 17 :15
Time length : 30 minutes
Door-closed meeting : Committee members, AERES representative, University and Research Organization representatives

From 17 :15 to 18 :45
Time length : 90 minutes max
Door-closed meeting : Committee members, AERES representative

3 • Overall appreciation of the activity of the research unit, of its links with local, national and international partners

This unit brings together a large group of investigators with disparate interests in neural systems from the cellular to the behavioral level. An unusual feature of this laboratory is the large number of investigators who carry heavy teaching and clinical duties, thus giving them less time and opportunity for research and making it more difficult for them to participate as completely in the international research community. The vitality and commitment of these individuals to science, education, and health-care delivery is to be commended. At the same time it is important to recognize that the impact of some of these projects may be limited by the inability of these researchers to spend as much time doing research as other scientists without significant teaching or clinical commitments. During the past years the group has improved the quality of the journals in which they are publishing, so that many more of the group's publications are now in first-rate refereed journals.

The students, postdocs and technicians of this group appear to find it a supportive and collegial environment, and every indication is that facilities and know-how are shared not only within these teams but across other laboratories at the institution.

The strengths and weaknesses of this laboratory are linked : the large number of topics to be studied certainly broadens the culture of the laboratory, but also can lead to a lack of a specific research focus. The inclusion of a significant number of teaching faculty is commendable for many, many reasons, but also necessarily results, to some degree, in a more modest contribution to the international research community. It is hard to fault investigators who are full-time teachers for not accomplishing more, but it then makes it triply important that the non-teaching scientists be highly productive, and contribute consistently and significantly to the generation of new knowledge.

4 • Specific appreciation team by team and/or project by project

Team 1. Development biology and neuromuscular differentiation

During the past 4 years, members of this team focused their attention on neuromuscular development and plasticity during early embryonic development in Xenopus and mouse. Part of their activity was aimed at studying the functional role of FGF6 during myogenesis in mouse. Using FGF6 (-/-) mice, they have provided evidence for a specific phenotype for the soleus of the mutant mice that led them to propose a model accounting for a specific dose-dependent effect of FGF6 in muscle regeneration. This model suggests that FGF6 stimulates the proliferation of myogenic stem cells or regulates muscle differentiation and phenotype via a calcineurin-signaling pathway. This work has been included in two publications (Growth Factors, 2007; J. Cell Physiol., 2005). The second aspect of their projects constitutes the basis of their future work and is focused on studying molecular mechanisms underlying neuromuscular development in Xenopus embryo. They have recently cloned MRF4 cDNAs and their proximal promoters in Xenopus and showed that MRF4 mRNA displayed differential expression during myogenesis compared to other members of bHLH transcription factor family, XMyoD and XMyf-5 (Dev. Dyn., 2006). Their main goal is now to identify new cofactors of bHLH transcription factors and analyse their function during somitogenesis and neuromuscular development in Xenopus. They will also concentrate in the characterization of the distinct myogenic programs they have evidenced along the anteroposterior axis in Xenopus embryo. This team, mainly composed of researchers with teaching activities, has a long lasting and solid experience using the Xenopus embryo to investigate the complex question of early myogenesis process. The team has been strengthened by the recent recruitment of a young researcher with good experience in molecular biology. Overall, this group has been productive in the past, and should continue to be so in the future.

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
B	B	B	A	A

Team 2. Extracellular matrix and formation of neuromuscular junction

During the past few years, the team has made significant progress on several fronts. First, after leaving the ENS in Paris, the principal investigator established at the U. de Paris V an independent, competitive and vigorous research program focused on the cellular and molecular mechanisms involved in the development and maintenance of the neuromuscular junction. This work has impact because the main issues are interesting, important and timely. Productivity during the past years has been good, with 2 papers published in the JCB and MCN; two excellent peer-reviewed journals. Second, young and very promising scientists have joined her team. This is viewed as an extremely positive sign of the reputation and potential calibre of this team. Third, the principal investigator has also been able to attract excellent graduate students, thereby demonstrating her commitment to training the next generation of scientists. Finally, while setting up her laboratory and recruiting personnel, she maintained her teaching and administrative responsibilities. The overall academic contributions of the team may thus be viewed as excellent. The principal investigator presents clear and coherent vision for her proposed research program. Her presentation was viewed as one of the best, if not the best, of the entire Vidal laboratory. It was clear, concise and well detailed. The accompanying proposal included in the material distributed before the meeting is also very clear and described in details the different projects her team will tackle in the future. The principal investigator outlined 3 main projects: 1) role of MuSk and Wnt in axonal guidance; 2) role of ColQ in the development of the postsynaptic apparatus in skeletal muscle: and 3) role of doublecortin in the remodelling of the neuromuscular junction. All of these projects are viewed as novel with

highly original hypotheses. In particular, project 1 is very exciting given the importance of MuSk in the formation of the neuromuscular junction. It is highly likely that many laboratories are currently addressing similar questions thereby showing the competitiveness and importance of this work. The work is solidly based on previous and preliminary findings from the team. The methodological approach is state-of-the-art and the experimental design appropriate. These experiments should therefore be performed in a timely fashion and important new information will be generated. Given the progress demonstrated in recent years and the future plan, we expect substantial future contributions from the team for years to come in a research field that is essential for increasing our understanding of the events underlying synapse formation, maintenance and plasticity. It would be ideal if the principal investigator could have her teaching and administrative load reduced to facilitate and better support her research endeavors.

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A	B	A	A	A

Team 3. Physiology of cholinergic processes

The principal investigator is internationally recognized for his earlier work in the Massoulie group that focused on the molecular biology of the cholinesterases (ChE). During that time, he made a number of seminal contributions that were published in highly regarded scientific journals. Since leaving the Massoulie lab and establishing his own group, the main focus of the principal investigator's work, while remaining on the study of ChE, has somewhat shifted from a molecular approach to more cellular and physiological studies. This is admirable as the principal investigator is clearly trying to better understand the roles of ChE in a physiologically-relevant context. Naturally, the main disadvantage of this shift in orientation is that it does not fully capitalize on the strong molecular expertise of the principal investigator. Additionally, for many of the previous studies, the principal investigator reached out to establish new collaborations. While this can also be very productive, it often resulted in the team being a collaborator on the papers as opposed to being the leading investigator in those studies. Accordingly, although productivity over the last few years is very good with several high-quality papers, it appears that the principal investigator is often a middle author. The research plan for the next few years is seen as ambitious (perhaps even too ambitious) tackling many distinct, yet inter-related questions. However, it is logical as it is based on on-going research efforts, previously published work and preliminary findings. It is important to note that some of the preliminary findings are viewed as extremely exciting (Potential therapy with ColQ). Finally, for many of the proposed studies, the principal investigator will continue to collaborate with other experts. While overall this line of work is to be strongly encouraged (physiological studies and collaborative work), it would be nice to see the principal investigator continue to make important contributions with regards to the molecular biology of ChE especially given his vast expertise in that area.

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B	B	B	B	A

Team 4. Neuromuscular degeneration and plasticity

The research performed by this group consists of complementary behavioural, physiological, electrophysiological cellular and molecular approaches, and has a strong original, creative component. The team is led by a young researcher who has published significant papers in this domain with new and interesting advances on the effect of exercise on central nervous system in normal (overtraining, aging) and pathological (ALS, AMS) conditions. They study the potential neuroprotective action of exercise in neurodegenerative pathologies and aim to understand the mechanisms implicated that could have a therapeutic potential. It is a very dynamic group which has developed and patented a device for stimulating swimming in mice. Their proposed project is to identify the neurons that are selectively involved in the response to exercise, to identify the molecular mechanisms and the consequences of these adaptations on the central nervous system.

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A	A	A	A	A

Team 5. Vestibular system and vigilance

This team is directed by a very young talented scientist. The team is studying the interactions between vigilance (orexinergic neurons from the lateral hypothalamus and melanin-concentrating hormone) and vestibular system (vestibular interneurons located in the brain stem). It has been recently shown that these two systems are anatomically connected, but no data are available about the functional consequences of this coupling and the functioning of this network. Four main questions will be explored:

- The functional properties of the neurons and neuronal networks implicated in the vestibulo-ocular system

- The modulation of the vestibular system by orexin and MCH

- The influence of the vestibular system on vigilance state modulation

- The impact of the perturbation of vigilance states on the vestibular system

The team will approach these problems using cellular and molecular biology tools, in vitro electrophysiology, modeling, and behavioral approaches both in animal and human. All of these techniques are currently available within the team, or the laboratory. The proposed project is original, well focused and suited to the small size of the team. The outcome in terms of publication over the last 4 years is very good with especially when considering the small size of the team.

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A	A	A	A	A

Team 6. Ontogeny and ecophysiological plasticity of gaze and posture control: from neuron to behavior

This new team consists of part of the former "sensorialité et motricité" team. This team is composed of three senior researchers plus a promising young (post-doc) researcher. The reduction of the size of the team makes the research more coherent and potentially efficient. The projects of this team are centered on the establishment of plasticity in the neuronal networks that control gaze and posture during locomotion. A large section of these studies will be carried out on different preparations from adult and larval Xenopus, as well as in pigeons and rodents. The combination of in vitro and in vivo approaches has the advantage of allowing the study of both the intrinsic properties of the neurons (intracellular recordings) and the network properties during active locomotion. Seven research programs will be carried on with a common interest on long- and short-term adaptation of sensori-motor systems. Some of these projects include collaborations with other teams within the same unit; others with external teams. A large set of techniques, know-how and instruments will be used; most of them are available in the lab. The main challenge of this team is to propose to oversee sensori-motor adaptation across various levels, from cell membrane to behaviour. A keyword needs to be explicated: "eco-physiology", as used by the team leader, means studying physiology of a system when this system is working in real conditions. Over the past four years, the members of the team published an impressive number of well-cited papers in excellent journals such as J. Neuroscience, J. Neurophysiol., J. Physiol. London, Neuroscience, Current Biology. The past activity and the visibility of the three senior members is indeed a very positive point which enhances the credibility of the project, in spite of the large span and diversity of the sub-projects presented in the document. The team is encouraged to strengthen the collaboration within the team, and with the other teams of the unit.

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A+	A+	A	A	A+

Team 7. Multisensory control of the forelimb

This team results from the integration of two former groups. The main goal is to confront and hopefully unify two different perspectives in motor control studies concerning structure-function relationships: a) the position that the brain has developed predictive capabilities that help to overcome the delays inherent to information processing and transmission within the central nervous system, and b) the position that the generation of the command by neural networks is constrained by the mechanical properties of the effectors. The research will concern hand reaching, grasping and manipulating movements in healthy subjects and in patients. The team will consider a question that is characteristic of the debate in motor control: how is body-segment impedance controlled? During the past four years, the four people gathered in this new team published a significant number of papers in high quality journals (J. Neuroscience, J. Neurophysiol., etc) in a number of different fields: experimental neuroscience, clinical neurophysiology, neural computation, and robotics. Additionally, they have been extremely successful in competing for funding on the national (ANR), European (FP7), and international (NASA) levels. The outcome of the project will have important implications for robotics (how to better control a life-like robotic arm) as well as guide clinical studies (how to better understand neurological diseases affecting motor control). There is high potential of the proposed research in both fields. Additionally, the team is encouraged to look for partnerships in the Industry. The cross-fertilization between two different (and somewhat opposed) theoretical points of view is a strength. It is unusual for groups with opposing history to band together to challenge each other's assumptions on a daily level. This is a unique and particularly attractive feature of this group. It is also attractive because of the cross-fertilization between the experimental research in humans and animals on one hand and theoretical neuroscience (modelling) on the

other hand. This strength could become a weakness, if the two senior researchers of this group fail to work together. Hopefully they will be able to publish together in the next years.

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A	A	A	A	A

Team 8. Neurosensory plasticity

The team works on a variety of questions related to neural plasticity in sensory systems with various approaches and in several sensory modalities. These include a large basic science component, and a large more clinically targeted translational component.

Proposed basic science projects. A first set of studies are designed to use animal models to study modulation of inhibitory GABAergic and glycinergic neurons in the inferior colliculus following cochleectomy. This is an interesting model for revealing the consequences of peripheral auditory lesions that frequently occur in humans (Neuroscience 2006). This first part of the project will look for possible involvement of GABAB receptors in the neural response to the lesion. The second part will determine the effect of electrical stimulation of the primary auditory cortex on GABAergic plasticity in the colliculus. The third goal will study the GABAergic plasticity in the auditory cortex following peripheral lesions. This appears to be an interesting project which would benefitted from a better justification of the different working hypothesises. Another study is dedicated to the study of plastic response of the facial nerve following axotomy. In rats, the project would like to test for possible correlation between recovery of facial motor neurons and functional recovery of vibrissae movements.

Proposed Clinical/translational projects. The second set of projects consist a series of clinically relevant issues: (1) Tinnitus and audioprotheses. The goal is to determine the importance of symmetric auditory loss and the amplitude of auditory impairment on the efficacy of audioprothesis on improvement of function. (2) Visual virtual reality and attenuation of persistent painful acouphenic phenomenon. (3) Studies on vestibular function and olfactory perception.

The attempt to closely tie basic and clinical work within a team is laudatory. Nonetheless, the large number of diverse research projects is seen as potentially diluting the effectiveness of the group. Synergies between this group and others in the laboratory working on the auditory and vestibular systems are a potential strength. At this point, as attractive as some of the studies might appear, the international competitiveness and impact is difficult to assess. On balance, the committee would encourage a more focussed attack on fewer problems to gain both in productivity and international impact.

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5 • Appreciation of resources and of the life of the research unit

The committee felt that there was considerable cooperation and communication across the individual investigators, the students, and the postdoctoral fellows. The intellectual synergies across many of the investigators are strong.

6 • Recommendations and advice

— Strong points :

The diversity of the research projects that are found within this laboratory ensures that a wide variety of viewpoints, perspectives, and techniques are available to inform the specific experiments of the investigators.

— Weak points :

The committee noted that the laboratory can almost be broken into two groups, those working at the molecular and cellular level, and those working at the systems and behavioral level. While the laboratory strives to find the common ground between these levels of organization, it is not completely apparent that those connections will be easily made. Certainly, having groups working across the spectrum of levels in neuroscience is, in theory, likely to foster the greatest of intellectual cross-fertilization, but there is some concern that the laboratory is too broad, with too many projects.

— Recommendations :

Support for the activities of the laboratory is endorsed. Some attention should be made to focus some of the teams on a smaller number of research projects to ensure that outstanding progress will occur in the coming years.

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A	A	A	A	A

UNIVERSITÉ
PARIS DESCARTES

Le Président
Axel KAHN

Paris, le 31 mars 2009

DRED 09/n°115

Monsieur Pierre GLORIEUX
Directeur de la section des unités de l'AERES
20 rue Vivienne
75002 PARIS

Monsieur le Directeur,

Je vous remercie pour l'envoi du rapport du comité de visite concernant l'unité «**UMR 7060 Centre d'études de la sensori-motricité (CESEM)**» rattachée à mon établissement.

Ce rapport n'appelle pas de commentaire particulier de la part de l'Université.

Je vous prie de croire, Monsieur le Directeur, à l'expression de ma meilleure considération.

Le Président de l'Université

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Commentary to the report by the AERES committee on the evaluation of the LNRS UMR 7060 and the creation of the future CESEM

Evaluation carried out by the appointed committee of the AERES on December 17, 2008

We thank the members of the committee for the evaluation of our past research and our scientific project for the next four years. The restructuring we describe in our proposal represents a turning point in the evolution of the LNRS in two major respects: First, the LNRS has grown incrementally over the years, primarily through the addition of new individuals to the existing teams. In our new proposal we have regrouped into eight smaller teams working together on more focused projects. Second, we have made a concerted effort in our proposed structure to pool resources, specifically in the form of four common technical facilities: a Xenopus platform and breeding facility, a mouse facility, a platform for sensorimotor studies in healthy and diseased humans (in common with other Units on site), and a clinical platform in the ENT department of Lariboisière Hospital. The eight teams we proposed for the future CESEM will revolve around these platforms to promote multidisciplinary projects, where electrophysiologists, morphologists, molecular biologists and clinicians could coexist. Given the major effort we have made to restructure the UMR to better prepare for our future research, we are pleased to have received positive feedback from the committee about the suitability of these changes.

The division into teams centered on specific projects and common techniques is a logical way to structure the work of the lab. Nevertheless, dividing in this way does present a challenge for the coherence of the unit as a whole. Indeed, the committee points out that the methodological spectrum from the molecular to the systemic levels seems to be large, if not too large. The pitfall is that coherence across these levels might be difficult to achieve within the CESEM Laboratory. However, thanks to the diverse backgrounds and expertise within each team, we feel that we have a unique opportunity to develop translational research on sensorimotor systems.

We fully agree, therefore, that we must develop the associations between the different levels of analysis within the lab, both by reinforcing the existing links and by developing new lines of collaboration. We also need to increase the visibility of these projects within the overall framework of the lab. These will, in fact, be two of our major goals over the next four years. We regret, therefore, that in our choice of presentation format during the review, our message did not get across to the members of the committee. To correct for this oversight, we identify below some of the existing and potential links between the different teams and emphasize the added value that can be obtained by joining together studies that span the spectrum in from molecular to integrative Neurosciences.

Teams 1, 4 and 6

Unraveling adaptations to increased activity in the central nervous system (CNS) requires a pluridisciplinary approach. Indeed, our latest publications concerning the neuroprotective effect of

exercise in mouse models of neuromuscular (Grondard et al. 2005; Biondi et al. 2008) are signed by investigators from three different teams within CESEM (C. Chanoine, Team 1; F. Charbonnier, Team 4; PP Vidal, Team 6). These synergetic collaborations are ongoing, with the recent submission of a paper in January 2009.

In the future, members of all 3 teams will collaborate bilaterally or trilaterally on multidisciplinary projects in which neurophysiological, biochemical and molecular approaches are required, such as the analysis of myogenesis in the neurodegenerative model mice (ALS and SMA). We will reinforce the links between Team 4 and Team 6 through a study of the effects of exercise on aging and the sense of balance (F. Charbonnier/ P. Lopes, Team 4; M. Beraneck/PP Vidal, Team 6). Long-term collaborations between Team 1 and Team 6, built on the common use of amphibians as an animal model, will continue. One of the most promising avenues concerns the role of vestibular asymmetry in idiopathic scoliosis (C. Chanoine, Team 1; H. Straka, Team 6). In addition, Team 1 and Team 4 will foster strong links, and will notably investigate protein-protein interaction involvement in *Xenopus* and mouse neuromuscular system.

Teams 2 and 8

One of the projects of Team 2 is to explore the role of wnts in muscle innervation. Understanding this process is crucial given the common occurrence of traumatic, viral and postoperative peripheral nerve injuries. To stimulate formation or regeneration of the neuromuscular junction, one needs to understand the molecular and cellular bases for the establishment of such a specialized contact where the pre and postsynaptic cells become precisely apposed and differentiate. The biological models we are planning to use *in vivo* include the rat facial nerve section generated by Team 8.

Teams 3 and 7

Team 7 works on sensorimotor control on the systems level. It is clear that four main factors determine the overall behavior of the motor system: peripheral structure (actuators), network connectivity, activity within the network and the intrinsic properties of each cell in the network. This fourth, molecular or cellular aspect has so far not been taken into account in the models developed by the team. It would be a step forward in future models to account for some of the intrinsic properties of the neural elements, e.g. the motoneurons, or the peripheral (muscular) elements. Team 3 could provide crucial information to this effect since they analyze the limiting factors of the neuromuscular junction.

Teams 6, 7 and 8

A major question concerning the control of the upper limb in humans is that of multisensory integration for eye-hand coordination. The vestibular system is likely to provide critical information when defining the orientation of our limbs and the orientation of objects that we wish to manipulate. In an ongoing collaboration, members of Team 6 (PP Vidal) are working with members of Team 7 (M. Tagliabue, J. McIntyre) to study the contribution of otolithic cues to reach and grasp behavior through the use of galvanic stimulation. These experiments will potentially lead to complementary studies performed with vestibular patients (Team 8).

As a final note on the question of cohesion within the laboratory as a whole, we would point out that the UMR conducts in-house seminars that cover the gamut of subjects and disciplines represented the lab. These regular meetings cannot help but foster discussions of work to be carried out at all levels.

In addition to the constructive comments provided by the committee concerning the integration of the UMR as a whole, the ensemble of the laboratory's members were pleased with the generally positive feedback concerning the research projects proposed by each team. The need to pursue a reasonable number of projects so as to achieve efficiency and coherency was a remark addressed to more than one team. In response to this concern, the individual teams wish to reiterate their commitments to implement synergistic research strategies within each group.

- Team 1 would like to confirm that the arrival of a young researcher, as mentioned in the committee report, is already strengthening the team; we have just published a recent paper in Developmental Biology (2009).
- Team 3 acknowledges the importance of developing research programs in which the members of the team are the prime movers. They point out that the team leader is corresponding author of articles in press at the Journal of Neuroscience while 3 other recent submissions concern work carried out primarily by members of the team. These works capitalize on the team's expertise in molecular biology, immunology and morphological analysis. Furthermore, physiological studies are now performed within the team itself, with the external support from an acknowledged expert in the field.
- Team 6 points out that M. Beraneck has been ranked first for a CR2 position. The possibility of his permanent recruitment will further strengthen the interactions within the team.
- Team 7 acknowledges the risk taken by uniting the groups of two senior scientists with not necessarily converging views. On the positive side, this integration provides a challenge and a clear goal. It is our opinion that through this intellectual diversity we will challenge ourselves sufficiently to stimulate the scientific endeavor and productivity of the team.
- Team 8 works on the neuronal plasticity in different models of peripheral sensory lesions: vestibular neurotomy or labyrinthectomy, cochleectomy and facial nerve sections. In our work, we combine both fundamental and clinical research. Our aims are two-fold: 1) to better understand the mechanisms of repair of the central nervous system and 2) to develop new therapies in patients suffering from these sensori-motor pathologies, which are frequently encountered in ENT departments. In the future we will collaborate with Teams 4 and 6 to improve the strength of our publications. In addition, to be more focused and competitive, we will limit our study on tinnitus in the part of the auditory system and we will remove from our project the clinical study of the olfactory system.

In conclusion, therefore, we believe that CESEM is well on its way toward meeting the challenges presented by the ambitious research project that we have proposed. Through a restructuring of teams we hope to conduct focused research of excellence while at the same time we hope to encourage integrated studies at multiple levels through interactions between the individual teams. Such a strategic harmonization in our laboratory is entirely appropriate given the newly created Institute of Neurosciences and Cognition at the Université Paris Descartes. The stated goal of this institute is to bring together laboratories with various but complementary approaches, ranging from molecular studies to integrative neurosciences, just as we hope to do within CESEM itself. We take this opportunity, therefore, to reiterate our predilection for a more fully integrated institute that would remove barriers between the existing UMRs that will eventually make up the Institute of Neurosciences and Cognition.

Sincerely,

Dr. Pierre-Paul Vidal, M.D.
Research Director