

**Institute for Fundamental and Clinical  
Human Movement Sciences**

**Assessment of Research Quality**

**2007**



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## **Preface**

This report concerns the procedures and results of the quality assessment of the Institute for Fundamental and Clinical Movement Sciences (IFKB) in the Netherlands during the period 2001-2006. The assessment was carried out by a Review Committee consisting of four overseas members with specialist knowledge of relevant research areas together with a colleague from another institution in the Netherlands.

The Review Committee started from the Self-evaluation Report, the mid-term Review Report 2003 and the Annual Reports of the Research School from 2001 to 2005. These reports were produced by the Research School in accordance with the instructions of the VSNU Protocol, 1998, for research assessments and, for the annual reports, in accordance with the guidelines of the Faculties involved. The information provided in the Self-evaluation Report was very helpful as the starting point for the Committee's activities.

Scrutiny of the Self-evaluation Report resulted in a preliminary assessment of each programme by three members of the Committee and raised a series of issues that were discussed during interviews held in Amsterdam and Nijmegen with members of the Faculty boards and the directors of the research programmes or their representatives. In addition, there were interviews with students and visits to the laboratories. As a result, a preliminary version of the report was drafted by the Committee and forwarded to the IFKB for comment. Taking into account the comments and remarks from the Faculties, the present final version of the report was prepared.

On behalf of the Review Committee I would like to thank all the staff of the two Faculties for their hospitality and excellent organisation during the site visits. In particular we thank Professor Stienen who acted as Secretary to the Committee and Kirsten Bijker who looked after us magnificently. As Chair of the Committee I would also like to thank my colleagues for their enthusiasm and for the time and effort they have put into the evaluation itself and the preparation of this report.

David Jones

Chairman of the Committee



## 1. Summary and recommendations

The Review Committee has had the opportunity of reading the Self Evaluation report of the IFKB, reviewing the published outputs, meeting the Directors, staff and students and visiting the facilities of the Faculty of Human Movement Sciences of the VU University Amsterdam (VU) and the Radboud University Nijmegen Medical Centre (UMCN). The Committee was given every assistance in their task and were provided with all the additional information that was requested.

The IFKB has proved to be a considerable success providing a stimulating environment and opportunities for collaborative research; the clinical associations have been particularly valuable to staff at the VU. The facilities and environment for research are of a very high standard.

The Research School provides an excellent environment for Ph.D. students, with regular symposia at which the students have the opportunity to present their work, specialist courses and yearly appraisals. This aspect of the IFKB's activities is important since the value of good research students for an active research programme cannot be overstated.

There are two main problems facing the Institute. The first is uncertainty about the future in view of the intention of the two parent universities to develop autonomous research centres, *MOVE*, in the case of the VU and the *Institute for Neurosciences* (which was thought to be called the *Institute for Cognitive Neurosciences* at the time when the Self Evaluation report was written) at UMCN. The second problem is of raising external grants which may become more acute if central funding diminishes.

The Committee was impressed by the research activities of the Institute and hopes and expects that it will continue in the same manner into the future.

The recommendations of the Committee are that:

The host institutions, the VU and UMCN, should be reminded frequently of the benefits of the collaborative nature of the IFKB and the value for money that it represents, especially in relation to the training of Ph.D. students.

The Institute should be proactive in seeking ways in which the development of *MOVE* and the *Institute for Neurosciences* can complement and enhance the work of the IFKB.

New developments in tissue engineering, cell and molecular biology should be encouraged as these are of intrinsic interest and importance and may also lead to additional sources of funding.

## **Summary and recommendations**

More translational research should be encouraged in collaboration with suitable partners, especially in clinical and health care areas.

Every effort should be made to explain to the public, administrators, charities and research councils that the study of human movement sciences has a central role to play at the interface between fundamental research at the molecular and cellular level and the translation of this to the benefit of society.

## 2. Introduction

### 2.1 General

The Institute for Fundamental and Clinical Human Movement Sciences, the IFKB, is an interuniversity research school with two main participants: the Faculty of Human Movement Sciences of the VU University Amsterdam (VU) and the Radboud University Nijmegen Medical Centre (UMCN). The Research school was founded in 1995 and officially approved by the Royal Academy of Arts and Sciences of the Netherlands (KNAW) in 1996 and once again in 2002. The IFKB provides courses for Ph.D. students and performs multidisciplinary research regarding the nature and significance of human movement with respect of health and well-being. This represents an integrative field of research which covers an array of studies from the fundamental properties of muscle, nerves, bone and the organisation of neuronal activity in the brain up to, for instance, the optimisation of movement in sports and prevention of tripping in the elderly.

This assessment of the research quality concerns the overall structure of the research school and the nine research sub-programmes. These sub-programmes are centred around 3 main research themes: mechanics, metabolism and control. This assessment is based on the scientific input and output during the six years period 2001-2006. In 2003, a reorganisation of the research lines was implemented, based on the recommendations made during the previous assessment as well as new developments within the IFKB.

Recent developments both in Amsterdam and Nijmegen will be important for the future of the IFKB. In Amsterdam, a new interfaculty research institute MOVE has been formed which will include all research currently carried out within the IFKB in Amsterdam. The formation of this Institute provides exciting possibilities for clinically oriented movement research and may further strengthen the national and international position of the research groups of the Faculty of Human Movement Sciences in Amsterdam. A similar development will take place in Nijmegen, the focus there will be on Cognitive Neuroscience.

## **2.2 Composition of the Review Committee**

(See Appendix 1 for curricula vitae)

- Prof Dr. D.A. Jones (Chairman), School of Sport and Exercise Sciences, University of Birmingham and the IRM, Manchester Metropolitan University, United Kingdom.
- Prof Dr. A. Cappozzo (theme A: mechanics), Department of Human Movement and Sport Sciences, Istituto Universitario di Scienze Motorie, Rome, Italy.
- Prof Dr. P.E. de Prampero (theme B: metabolism), Sezione di Fisiologia Umana, Udine, Italy.
- Prof Dr. D. Elliott (theme C: control), Department of Kinesiology, Hamilton, Ontario, Canada, and School of Sport and Exercise Sciences, Liverpool John Moores University, United Kingdom.
- Prof Dr. J.G. van Dijk (Dutch representative), Department of Neurology and Clinical Neurophysiology, LUMC, Leiden, The Netherlands.
- Prof Dr. G.J.M. Stienen (Secretary), Department of Physiology, VUmc, Amsterdam, The Netherlands.

## **2.3 Data provided to the Committee**

The data provided to the Committee consisted of the research Self Evaluation Report 2001-2006, the mid-term review report 2003, the annual reports of the research school from 2001 to 2005, PDF-files of all key publications of the different themes and all Ph.D. theses completed during the assessment period. The management of the IFKB was extremely helpful in promptly providing all the detailed additional information requested by the Committee.

## **2.4 Procedure followed by the Committee**

The procedure followed by the Committee was in accordance to the guidelines described in the Standard Evaluation Protocol 2003 – 2009 for Public Research Organisations of the VNSU, NWO and KNAW.

All members of the Committee studied the Self Evaluation Report prior to the site visit which started on Tuesday 18<sup>th</sup> of April 2007. Three members of the committee were asked to prepare a preliminary report on the research within the 3 research themes. These reports and the discussion within the Committee during the first day of the assessment formed the basis of the questions and topics raised during the interviews of the senior management of the IFKB, the Ph.D. students and the site visits of the laboratories. Following the interviews and visits the forms provided with the Standard Evaluation Protocol were completed by the individual members of the Committee. These assessments were discussed in the Committee meeting on Friday morning 21<sup>st</sup> of April 2007 and formed the basis of the Initial Conclusions of the Committee presented by its chairman during a general gathering of the members of the IFKB, starting at noon on the 21<sup>st</sup> of April 2007 in Amsterdam.

## 2.5 Structure of this report

This report contains a review of the entire Institute with an assessment of the leadership, quality of the resources, the academic reputation, the societal relevance, the balance of strength and weaknesses, the national positioning and the Ph.D. programme. The Committee was asked to assess the Institute against five headings: *Leadership, strategy and policy; Quality of resources, funding policies and facilities; Academic reputation; Societal relevance; Strengths and weaknesses*; each on a scale of 1-5 with 5 being “excellent”.

This overall assessment is followed by an assessment of the 9 separate research sub-programmes in terms of quality, productivity, leadership, coherence, resources and facilities, funding policies and future perspectives. In each case there is a summary of the research programme with some narrative comments and, in some cases, recommendations. This is followed by quantitative assessments of each sub-programme in five categories: *Research Programme; Quality; Productivity; Relevance; Vitality and feasibility* on a scale of 1-5 with 5 being “excellent” together with an “*Overall*” rating, again, on a scale of 1-5.



### **3. Review of the entire Institute**

The Self Assessment document (Self Evaluation Report), which was central to this evaluation, was found to be an accurate and impressive record of achievement providing very comprehensive information about the activities of the Institute from 2001-2006. Consequently the Committee was of the opinion that this evaluation report can be relatively concise and does not need to repeat information that can be found in the Self Assessment document. The sections on “Strengths and Weaknesses” were particularly useful, had clearly been written with a high degree of candour and indicated an awareness on the part of management and individual research groups of the opportunities and problems currently facing human movement science.

Having reviewed the Self Assessment document and other material made available, interviewed management, staff and students and visited the facilities both in Nijmegen and Amsterdam, the Committee came to the conclusion that the IFKB is unique in the field of human movement sciences in terms of its size, scope, interdisciplinary and translational research.

The overall mission of the IFKB is to “generate fundamental and clinical knowledge about healthy and pathological movement and the functioning of the human motor apparatus” and the self assessment document goes on to explain that, amongst others, one of the aims of the Institute is the application of the understanding of human movement to specific problem areas, populations (e.g., the elderly) and activities, as encountered in orthopaedics, rehabilitation, ergonomics and sports.

To these ends the Institute has two functions, one to promote a wide range of research related to human movement and, secondly, the education of post-graduate students which is the role of the Research School. In reality these two functions overlap since Ph.D. students benefit from exposure to a wide variety of research ideas and techniques while the research output is dependent, in large measure, on keen, hard working and well supervised students. The success of the Research School makes a major contribution to the success of the IFKB as a whole and for this reason we include a section (4) where the activities of the School are briefly reviewed.

#### **3.1 Leadership, strategy and policy**

The participating faculties and medical centres have largely delegated responsibilities for the pursuit of their scientific mission, the education of Ph.D. students, the quality assurance and financial management of these activities to the board and directors of the IFKB.

The IFKB has a General Management Board consisting of members from the VU, UMCN and the AMC. The Board is chaired by Professor PJ Beek and there are three Directors appointed from the three different participants, who are currently, Professor DF Stegeman (Chair, UMCN), Professor A de Haan (Executive, VU) and Dr L Blankevoort (AMC). We were struck by the enthusiasm and hard work of the leadership, in particular Professors de Haan, Stegeman & Beek. In addition there is an Educational Subcommittee with three staff members as coordinators and student membership from both UMCN and the VU.

Research, by its nature, is difficult to direct since it is a creative activity and can easily be stifled by over regulation and direction. However, the leadership does have an important role to play in providing a supportive environment, encouraging useful collaborations and, at some point, discontinuing support of research sub-programmes that are unproductive or inappropriate to the overall mission of the Institute. In our discussions with staff it was generally agreed that whilst the management structure may not be a representative democracy, the current directors have the full support of staff and are felt to be acting in a consensual manner. The reorganisation of the IFKB membership that occurred in 2003 clearly indicates that the management is also prepared to implement difficult decisions.

The stated mission of the IFKB (page 7, Self Evaluation Report) is to generate fundamental and clinical knowledge about healthy and pathological movement and the functioning of the human motor apparatus, in particular:

The development of a theoretical framework, based on empirical research, for understanding the execution, control and constraints of normal human movement;

The development of an understanding of disordered human movement as a result of various diseases, trauma and age-related impairments;

The integration of knowledge about human movement from different disciplines, both basic and applied, especially in the understanding of adaptation, aging and fatigue;

The application of the understanding of human movement to specific problem areas, populations (e.g., the elderly) and activities, as encountered in orthopaedics, rehabilitation, ergonomics and sports.

The emphasis of the Institute is directed towards bridging the gap between fundamental knowledge and the field of applications. The committee felt that this could be made more explicit in the mission statement.

Nevertheless, these are excellent policy objectives and although there is no explicit description of the strategy adopted to achieve these objectives, it is evident that the very establishment of the IFKB and its organisation and administration as a cooperative venture involving a number of disciplines, constitutes such a strategy.

The Committee was therefore interested to see whether this strategy has been effective.

In the Faculty of Human Movement Sciences at the VU all research activity is devolved to the IFKB which means that the Directors have had considerable success in guiding the direction of research with appointments at professorial, assistant professor and post-doctoral level as well as by the allocation of Ph.D. students to various sub-programmes. The IFKB does not have quite the same control in Nijmegen and here the influence of the leadership is exercised through the activities of the Research School and by the example of successful collaborations between the VU and UMCN.

The question was repeatedly raised by the Committee as to whether the association between the VU and UMCN within the IFKB has benefited the research activity of the separate institutions, i.e. is the whole greater than the sum of the parts? The senior management in Amsterdam and Nijmegen independently indicated their strong support for continuing the association with the IFKB and stressed the benefits both in educational terms for the research training it provides students and for tangible benefits to the research output. When the same question was put to members of staff in different sub-programmes there was a slightly more mixed response. In many instances, where there are already collaborative links, the staff were enthusiastic about the IFKB while in other sub-programmes the benefits of IFKB membership for research were not so evident, but all agreed that membership did no harm and opened up the possibility of collaboration in the future.

In terms of future development, the Directors expressed an intention to expand the activities of the IFKB into areas of tissue engineering, molecular biology and cognitive neurosciences, objectives that the Committee fully endorse.

### **3.2 Quality of resources, funding policies and facilities**

The majority of funding for the IFKB comes from the parent Institutions although members are strongly encouraged to seek outside support. The Committee notes the success of this policy as external funding has increased both in absolute terms and as a proportion of the total budget over the last six years. The IFKB suffers in much the same way as movement sciences in other countries in finding it difficult to access research funds. This is partly to do with the composition and preconceptions of committee members on the granting bodies and the Committee suggests that the IFKB should engage in a dialogue with the funding agencies to explain the importance (see Societal relevance) and quality of the research being undertaken.

The IFKB receives k€45.5 a year from the VU to support the part time manager and run the educational activities. The results would appear to represent excellent value for money.

One of the strengths of the IFKB is the workshop facilities that makes and supports equipment used at the VU and UMCN. In times of financial constraint for universities there is always pressure to cut back on support services, it being argued that commercial supply of equipment is more cost-effective. In the case of movement sciences this is rarely the case as the work requires specialist one-off equipment.

In general the IFKB has good laboratory space and excellent equipment (thanks in large part to the workshop facilities)

### **3.3 Academic reputation**

The Self Assessment document contains a detailed section (1.7) analysing the impact of staff publications in a number of different ways, all of which show that the standard of publications is being well maintained, if not improving, and staff have individual reputations comparable with international colleagues in similar fields. Although there is increasing pressure to quantify research output with various different metrics, the Committee was not overly concerned with impact factors, preferring to rely more on the reputation of journals within their own field.

In as much as the reputation of the Institute relies on the reputation of its members the Committee can confirm that the IFKB has a high reputation nationally and internationally and this will be evident in the assessments of the themes and sub-programmes (see below). Whether the outside world always associates this good work with the IFKB, rather than the VU or Nijmegen, is more problematical. The IFKB needs to have a high profile if it is to negotiate successfully for outside funding and needs to take every opportunity to publicise its activities. The IFKB should be acknowledged in all publications, but this is not always the case at present.

### **3.4 Societal relevance**

Societal relevance is very difficult to assess. It is difficult, for instance, to compare the “value” of a clinical drug trial with research concerning the fundamental control of muscle contraction. The immediate application of the first may be more evident than the other but the second may represent a greater intellectual achievement and, possibly, have applications in the future that cannot be predicted at present. The study of Movement Science is intellectually challenging, bringing together, as it does, so many other disciplines, and provides the critical link between studies of function at the molecular, biochemical and physiological level with their application in clinical practice, rehabilitation, health promotion, ergonomics and sport. The Committee considered the work of the IFKB to be highly relevant to the study of movement science and therefore to have a high societal relevance. In assessing individual research sub-programmes we have tended to give slightly higher scores where the application is immediately obvious but we still value highly the more fundamental work.

### 3.5 Strengths and weaknesses

In the analysis of strengths and weakness there are two areas for consideration. One concerns the local situation, the workings of the Institute and its relationships with its host Universities; the other is the broader national and international environment for research where changing priorities and funding policies can have profound effects on the direction of research.

The Committee broadly agreed with the analysis presented in the Self Assessment document (Section 1.1) and the comments below mainly relate to subsection 5, Analysis and adjustments in strategy.

Taking the local situation first, the two Universities are clearly intending to develop local research centres, possibly at the cost of collaborative ventures such as the IFKB. The development of MOVE at the VU and the Institute for Cognitive Neurosciences at UMCN may be perceived, therefore, as posing some threats. It is difficult to know how this will affect the IFKB in the future but, on balance, the Committee felt they are positive developments for the research area as a whole, offering many new opportunities for collaboration and applied research. It may be necessary, however, for the IFKB to be proactive in identifying the positive ways in which the new developments can help the IFKB and to be persistent in making the two universities aware of the advantages of continued collaboration in the Institute.

Whilst the collaborative nature of the IFKB has been of considerable benefit to research students in both universities, the benefits in terms of collaborative research differ considerably between sub-programmes. For some sub-programmes the benefits of collaboration have been considerable but, while none have been adversely affected by membership of the IFKB, the Committee felt that there were opportunities for closer collaboration in a number of instances; these are commented on in section 5 below.

From a wider perspective, a major problem faced by nearly all movement science departments is to raise research funds since integrative human biology does not attract substantial funding from charities and research councils that appear mainly concerned with molecular biology or overtly clinical applications. The solution here may be two fold. Institutions such as the IFKB need to position their research, at least in part, to allow for these funding developments, emphasising the translational research aspects, clinical applications etc (and in this case close associations and joint applications with clinical departments are important). Encouraging sub-programmes to acquire cellular and molecular biology techniques is another way of moving forwards, although this probably needs to be done in collaboration with individuals or departments that have a track record in these areas.

The Committee was pleased to see that both these ideas, in essence, were incorporated into the IFKB's suggestions in Subsection 5 for adjusting the strategy.

The second challenge in the area of funding is to engage with the research councils and the EU to explain the importance of integrative human biology in the translation of fundamental research into practical applications. It is essential in this respect that memberships of the critical committees can adequately represent the interests of movement sciences.

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On balance the future for research undertaken within the IFKB is very positive.

*Quantitative assessments:*

<b>Leadership, strategy and policy</b>	<b>5</b>
<b>Quality of resources, funding policies and facilities</b>	<b>5</b>
<b>Academic reputation</b>	<b>4-5</b>
<b>Societal relevance</b>	<b>4-5</b>
<b>Strengths and weaknesses</b>	<b>5</b>

## 4. The Research School

Although there is a full description of the Research School in the Self Assessment document, the importance of the School for the success of the IFKB was not fully recognised until the Committee began talking to management and staff in Amsterdam and Nijmegen. As mentioned above, high research productivity depends on well trained and enthusiastic Ph.D. students. The IFKB has put in place procedures that ensure students have a well structured plan of research and this is reviewed, and modified as necessary, on a yearly basis following an interview with the IFKB Directors. There is also a series of courses, some providing background knowledge such as the General Master Class in Human Movement Sciences and the Introductory Master Class, the latter being for students without a background in movement science; others are concerned with specific techniques such as EMG and use of MATLAB. The IFKB organises meetings twice a year at which students present either orally or in poster format and at which there are two external speakers. The success of the Research School can be judged from the increasing number of Ph.D. defences over the last six years and the fact that completion times are now around 4 years.

Students who spoke with the Committee reported that their research plans and the Annual Reviews were very useful. All reported they were happy with the level of supervision they received and had good access to their supervisors. Equipment and facilities were also reported to be good.

Some students (especially at Nijmegen) were a little vague as to what courses they should be taking but those who had taken courses reported them to be valuable.

The students had a number of suggestions that the Committee agree may be helpful for the future of the School.

- It would be helpful to have more information about the IFKB Research School, its structure and activities, for students at the start of their course. This is especially so for students at UMCN where the IFKB does not have as high a profile as at the VU.
- There have been some problems with the timing of the taught courses. Uncertainty as to when the courses will be held means it is difficult for students to plan their time. Holding the courses at a fixed time in the year would help in this respect. Many of the students at UMCN are around 0.4 fte and part time study makes it even more difficult to fit in courses that may span several days full time.
- Other useful courses might include molecular biology and statistics.



## 5. Review of Research Programmes

### 5.1 Theme A: Mechanics

#### 5.1.1 Mechanics of musculoskeletal injury and adaptation (VU)

TA1

This is a large group working on a well defined range of topics. The principal researchers have a high profile at both the national and international level working with senior colleagues and a large number of non-tenured staff and Ph.D. students.

##### *Research area*

There are two main areas of research. One group is concerned mainly with the way force is transmitted from muscle fibre, through the connective tissue network to tendons and beyond. The area of work has expanded recently to include the cellular mechanisms whereby muscle fibres grow and adapt to hormonal and other stimuli. The other research programme is concerned with the motor control and biomechanical aspects of tripping and falling, the origin of these problems in susceptible populations and how they may be addressed by suitable interventions.

The research of both groups within this sub-programme was considered to be of a high quality. With the likely restructuring of this group in the near future some concern was expressed about the work on muscle mechanics continuing and being applied in modelling of the musculoskeletal system. The slightly lower mark for “Vitality and feasibility” reflects this uncertainty. Whilst in theory there is a link between mechanics at the level of muscle connective tissue and whole body function, there is still some way to go before the connection is made. The Committee welcomes the new cell biology work and suggest that it might be associated with future developments in tissue engineering and molecular biology.

<b>Research Programme</b>	<b>5</b>
<b>Quality</b>	<b>4-5</b>
<b>Productivity</b>	<b>4-5</b>
<b>Relevance</b>	<b>5</b>
<b>Vitality and feasibility</b>	<b>4</b>
<b>Overall</b>	<b>5</b>

**5.1.2 Mechanobiology of musculoskeletal tissues  
(UMCN)**

**TA2**

This is a relatively small group working with well defined techniques on a wide range of problems. The principal researchers have a national and international profile working with senior colleagues and a large number of non-tenured staff and Ph.D. students.

*Research area*

This group is concerned with the mechanical properties of bone and the variety of materials used in orthopaedic surgery for joint replacements. The group forms an important interface between engineering and clinical practice and is concerned with all aspects of the topic from design and development to the evaluations of products. The team undertakes a great deal of consultancy work. The consultancy provides valuable income and supports a number of research students but there are occasional problems in providing the continuity of funding needed for a full Ph.D. research programme.

This sub-programme in Nijmegen seems a little isolated from the main activities of the IFKB. While synthetic materials will always be important, tissue engineering is a developing area and the cell biology interests of TA2 might complement new developments in tissue engineering within MOVE.

<b>Research Programme</b>	<b>4-5</b>
<b>Quality</b>	<b>4</b>
<b>Productivity</b>	<b>4-5</b>
<b>Relevance</b>	<b>4</b>
<b>Vitality and feasibility</b>	<b>4</b>
<b>Overall</b>	<b>4</b>

## 5.2 Theme B: Metabolism

The title of this theme is, perhaps, a little misleading as there is relatively little about metabolism and much about muscle physiology.

### 5.2.1 (Patho-) physiology and mechanics in human performance TB1 (VU/UMCN)

This is a large group working in well defined areas but on a diverse range of topics. The principal researchers have a high national and international profile working with senior colleagues and a large number of non-tenured staff and Ph.D. students.

#### *Research area*

The topics covered in this sub-programme range from metabolic changes in single muscle fibres to wheelchair propulsion. In part, the research concerns the way in which muscle and the circulatory system is affected by, and adapts to, the stimuli presented by use, disuse, training and disease as well as using transgenic mouse models, an important new development in the field. Other aspects of the work are concerned with rehabilitation and the physiology and biomechanics of wheelchair use. The more fundamental work on muscle physiology at the VU is considerably strengthened by the clinical links with UMCN and of all the sub-programmes this is probably the one that has benefited the most from the collaborative nature of the IFKB

As yet there is a gap between studying the function of arms and hands and the problems of wheelchair propulsion. The Committee anticipates that the expertise in muscle physiology will soon be applied to the upper arms and wheelchair propulsion.

<b>Research Programme</b>	<b>5</b>
<b>Quality</b>	<b>5</b>
<b>Productivity</b>	<b>5</b>
<b>Relevance</b>	<b>5</b>
<b>Vitality and feasibility</b>	<b>5</b>
<b>Overall</b>	<b>5</b>

**5.2.2 Neuromuscular and neurometabolic disorders  
(UMCN)**

**TB2**

This is a large group working on a wide range of topics. The principal researchers have a high national and international profile with a large number of non-tenured staff and Ph.D. students.

*Research area*

There are two broad areas of research within this sub-programme; one concerns the development of EMG techniques to investigate clinical problems and to map and discover the functional role of human motor units. The other area is concerned with understanding the pathophysiology of various neuromuscular and metabolic disorders.

This is a very active and productive sub-programme, the only criticism might be the weakness they themselves identify that some of the research is a little unfocused. Pressed on this point group leaders argue that one of the main aims, in relation to the EMG research, is to develop non-invasive testing and diagnostic procedures, which is slightly at odds with their stated aim of elucidating mechanisms. In future the aim of developing non-invasive testing could be made more explicitly. The future plans for this sub-programme could be better articulated and there may be opportunities to focus more on mechanisms. These latter comments are mainly concerned with the presentation in the Self-Assessment Document and do not reflect adversely on the quality of the actual research.

<b>Research Programme</b>	<b>5</b>
<b>Quality</b>	<b>4-5</b>
<b>Productivity</b>	<b>5</b>
<b>Relevance</b>	<b>5</b>
<b>Vitality and feasibility</b>	<b>5</b>
<b>Overall</b>	<b>5</b>

### 5.2.3 Respiratory muscle pathology in COPD (UMCN)

TB3

This is a very small group working on a narrow and well defined topic. The principal researcher has a large number of Ph.D. students.

#### *Research area*

The scientific research is concerned with the pathology, pathophysiology and treatment of patients with chronic obstructive pulmonary disease (COPD) and is concerned as much with basic (animal experimental) as clinical patient related research.

This group is a relatively new addition to the IFKB and is a strong group focused on changes in function of the diaphragm in COPD but, more recently, also as a consequence of heart failure.

The group seems a little isolated. The study of muscle physiology would fit well with the activities of TB1 and/or the work in TB2 concerning muscle metabolism.

The group is very dependent on the principal investigator and as such, perhaps, a little vulnerable. Closer links with TB1 and/or part of TB2 might help with supervision of students and ensure the long term viability of this important line.

<b>Research Programme</b>	<b>4-5</b>
<b>Quality</b>	<b>4-5</b>
<b>Productivity</b>	<b>5</b>
<b>Relevance</b>	<b>5</b>
<b>Vitality and feasibility</b>	<b>4-5</b>
<b>Overall</b>	<b>4-5</b>



## 5.3 Theme C: Control

### 5.3.1 Coordination dynamics (VU)

TC1

This is a large group working on a well defined range of topics. The principal researcher has a high national and international profile working with senior colleagues and a large number of non-tenured staff and Ph.D. students.

#### *Research area*

Research in this sub-programme is concerned with complex issues in motor control associated with the timing and coordination of movements, often repetitive movements such as juggling or finger tapping. The approach focuses on phenomena observed at different levels of description such as force and movement, muscle EMG and brain activity (EEG & MEG) and attempts to link observations across those levels. The work is relevant to both the learning of motor skills and their re-acquisition following cerebral vascular accident.

This group produces work of high quality and quantity. There is firm leadership strongly grounded in dynamical systems approach but the Committee was pleased to note that this theoretical orientation does not preclude interaction with other groups in Theme C.

<b>Research Programme</b>	<b>5</b>
<b>Quality</b>	<b>5</b>
<b>Productivity</b>	<b>4-5</b>
<b>Relevance</b>	<b>4-5</b>
<b>Vitality and feasibility</b>	<b>5</b>
<b>Overall</b>	<b>5</b>

**5.3.2 Perceptual motor control: development, learning and performance  
TC2  
(VU)**

This is a small group working on a narrow and well defined range of topics. The principal researcher has a good national and international profile with a relatively large number of non-tenured staff and Ph.D. students.

*Research area*

Current research of this program focuses on perceptual-motor control in the acquisition and performance of motor skills and how this varies with developmental age. The work is relevant to skills involved in sporting activities such as catching a ball but is also an important step in understanding movement disorders such as in children with cerebral palsy.

The group has a strong focus on development and learning, is very productive and produces work of a high quality. Members of the group expressed some concern about the sport-related aspects of their work since publications in sports science journals generally have a low impact factor. However the Committee was not overly concerned with impact factors and would encourage the group to continue with the applied sports science aspects of their work, as it complements their more theoretical contributions.

This group is relatively weak on direct research funding, but strong on collaborative links with the UK.

<b>Research Programme</b>	<b>5</b>
<b>Quality</b>	<b>4</b>
<b>Productivity</b>	<b>5</b>
<b>Relevance</b>	<b>4-5</b>
<b>Vitality and feasibility</b>	<b>5</b>
<b>Overall</b>	<b>4-5</b>

### 5.3.3 The biophysics and psychophysics of sensorimotor control TC3 (VU)

This is an expanding group working on two different but well-defined topics. The principal researchers have a national and international profile with a good number of senior colleagues, non-tenured staff and Ph.D. students.

#### *Research area*

This research group covers two main topics, one is the biomechanics of movement which seeks to relate the contractile and physical properties of muscles and tendon with the actual performance of humans and animals in tasks such as vertical jumps, while the second, and newer line of research is concerned with issues of perception and motor control.

This area has experienced a major shift in overall focus in the last year with several new appointments. While these developments have raised the international profile of TC3, it has created two quite independent streams of research within this sub-programme. Specifically, while one group focuses on perceptual and cognitive influences on goal-direct movement and sensory-motor interactions, the other research group is concerned with biophysical problems associated with body segment interactions, force generation and energy optimization. The two groups share an interest in simulation and mathematical modelling of human movement, and have just initiated a collaboration that may provide the basis for a greater degree of integration between the two research programmes. Given more time, there is the potential for the development of a coherent research unit. If this does not transpire within the next year or two, it may also be appropriate to consider moving the biophysically oriented group to Theme Area A (i.e., TA1) where collaboration with other biomechanics researchers may prove fruitful.

<b>Research Programme</b>	<b>4-5</b>
<b>Quality</b>	<b>4-5</b>
<b>Productivity</b>	<b>4</b>
<b>Relevance</b>	<b>4</b>
<b>Vitality and feasibility</b>	<b>4-5</b>
<b>Overall</b>	<b>4</b>

**5.3.4 Disorders of central motor function  
(UMCN)**

**TC4**

This is a large group working on a wide range of topics. The principal researchers have a high profile national and international profile with some senior staff and a large number of Ph.D. students.

*Research area*

Research in this sub-programme currently focuses on disorders of motor control in health, in normal aging and in two major categories of human neurological disease. The first category entails neurodegenerative diseases, in particular Parkinson's disease (PD), atypical Parkinsonian syndromes such as Multiple System Atrophy (MSA) and progressive Supranuclear Palsy (PSP), Huntington's disease and Alzheimer's disease. The second category includes disorders of balance or gait, not only as these are seen in diseases of the first category, but also in a wider range of neurological and vestibular disorders.

This is a productive group with work of a high quality. It has grown rapidly in the last six years and this places a heavy responsibility for supervision on the senior staff. There is a need for more post-doctoral staff, and the Committee understands that this issue is being addressed. It would seem there could be useful collaborations with colleagues in TA1.

<b>Research Programme</b>	<b>5</b>
<b>Quality</b>	<b>5</b>
<b>Productivity</b>	<b>5</b>
<b>Relevance</b>	<b>5</b>
<b>Vitality and feasibility</b>	<b>5</b>
<b>Overall</b>	<b>5</b>

## Appendix 1

### **Professor DA Jones (Chairman)**

David Jones graduated from the University of Birmingham, having studied Medical Biochemistry, and then worked in the Biochemistry Department in the Institute of Psychiatry, London first as a PhD student and then Research Assistant, before moving to the Royal Postgraduate Medical School where he first began working with muscle. The work involved physiological and biochemical studies of patients with a range of muscle disorders as well as exploring the mechanisms underlying fatigue. In 1976 he was appointed Senior Lecturer in the Department of Medicine, University College London, where his research continued along the same lines but expanding in scope to include muscle pain and damage, the response to strength training and the development of muscle during childhood and adolescence. In 1992 he was appointed Professor of Sport and Exercise Sciences, and Head of School, at the University of Birmingham and, more recently, has taken a part time appointment as Professor of Muscle Physiology at Manchester Metropolitan University where he continues his interests in muscle fatigue and training responses. Professor Jones has been an Editor of Clinical Science and Distributing Editor the Journal of Physiology; he was instrumental in setting up the Human Physiology interest group in the Physiological Society.

### **Professor PE di Prampero**

Born in Udine (Italy) in 1940, Pietro E. di Prampero graduated in Medicine "cum laude" at the University of Milan (Italy) in 1964. Assistant Professor in the Institute of Physiology of the University of Milan, directed by the late Professor R. Margaria (1964-72), in 1972 he was appointed Professor of Applied Physiology at the School of Medicine of the University of Milan. In 1979 he was nominated "Maître d'Enseignement et de Recherche" at the Department of Physiology of the School of Medicine of the University of Geneva (Switzerland). Since 1986 he is Professor of Human Physiology at the School of Medicine of the University of Udine (Italy) of which he has been Dean from November '89 to October '93. Chairman of the Department of Biomedical Sciences of the university of Udine (1998-2003), he is presently President of the School of Sport Sciences and Director of the School of Specialisation in Sports Medicine of the same University.

Pietro E. di Prampero has spent several periods abroad for research in well known Universities and Scientific Institutions (Göttingen, Germany, April - December 1965 and May - July 1974; Buffalo, N.Y., USA, August 1971 - September 1972, May - July 1973 and May - October 1976 and Toronto, Canada, June - August 1967). He has been lecturer of Physiology at the Schools of Medicine of Mogadishu (Somalia) (January - May 1978) and Yaoundé (Cameroon) (January - February 1985). He has been member of the Life Sciences Working Group of the European Space Agency

(ESA) in the period 1986-89, Chairman of the same group for the period 1989-90 and member of the Microgravity Advisory Committee of ESA in the period 1991-9. He is member of several scientific societies and Editor in Chief of the European Journal of Applied Physiology.

His main fields of interest are the physiology of muscular contraction, the cardio-respiratory adaptations to muscular exercise on Earth and in microgravity and the biomechanics and bioenergetics of human locomotion. He is author, or co-author, of about 300 scientific publications, a relevant fraction of which is published in extenso in international journals with editorial policy, and of a book on the energetics of human locomotion.

### **Professor A Cappozzo**

Aurelio Cappozza has a degree in Electronic Engineering at the Polytechnic of Milan (1970) and a Philosophy Doctorate at the Bioengineering Unit, University of Strathclyde, Glasgow, UK (1982). Since 2000, he is full professor of Biomedical Engineering at the University Institute of Movement Sciences, Rome. Aurelio Cappozzo is a former member of the Executive Council of the European Society of Biomechanics and President of the International Society of Biomechanics. He is also honorary member of the Latvian Society of Biomechanics, of the Czechoslovak Society of Mechanics and of the European Society of Biomechanics. He is a former member of the Editorial Board of the Journal of Biomechanics, the Journal de Biophysique et Biomécanique, Clinical Biomechanics, The Journal of Sports Medicine and Physical Fitness, of Gait and Posture, and of Technology and Health Care and co-editor of three volumes with international circulation. He has organised four international congresses. His research activity takes place mostly in the human movement area in collaboration with national and international institutions. He has participated in research programmes funded by NATO, CEE, MIUR and Istituto Superiore di Sanità with co-ordination responsibilities.

### **Professor D Elliott**

Digby Elliott is Professor of Motor Control and Behavioural Neuroscience at Liverpool John Moores University. He received his B.Sc. (1976) and M.Sc. (1978) in Kinesiology, and his Ph.D., in Psychology from the University of Waterloo (1982). He taught and conducted research at McMaster University from 1982 to 2007 where for the last 7 years he was a Canada Research Chair in Motor Control and Special Populations. Professor Elliott's research interests include visual control of upper limb movements, visual selective attention, motor learning, manual asymmetries in motor control, and perceptual-motor problems associated with Down syndrome, Williams syndrome and autism. He is a past president of both the Canadian Society for Psychomotor Learning and Sport Psychology, and the North American Society for the Psychology of Sport and Physical Activity. He is an International Fellow of the American Academy of Kinesiology and Physical

Education. He has held visiting scholar fellowships at the University of Queensland, the Katholieke Universiteit Leuven and the University of Otago (William Evans Fellow). In 2000, he was awarded the Down Syndrome Research Foundation Award for Research Excellence. Professor Elliott sits on the editorial board of the Journal of Motor Behavior, Acta Psychologica and the Open Psychology Journal.

**Professor JG van Dijk**

Having studied medicine at Utrecht University, Gert van Dijk completed his training as a neurologist at Leiden University under Professor G.W Bruyn in 1987. Afterwards he was appointed as 'chef de laboratoire' at the then Department of Clinical neurophysiology of the Leiden University Hospital. In 1992 he obtained his PhD degree entitled "Neurologic deficit and autonomic nervous system testing", again under professor Bruyn. He was appointed as head of the department in 1994, and was made secretary of the Department's Science Committee in the same year. In 1995 he was made assistant professor regarding "Methods and methodology in Neurology". He has been vice-chairman of the Department of Neurology since 1998, and was appointed as full professor of Clinical Neurophysiology at Leiden University in 2001.

His main research interests include motor nerve conduction testing and the autonomic nervous system. He has been Chairman of the postgraduate education committee of the Dutch Society of Clinical Neurophysiology, and was Chairman of that Society from 2001-2004. He sits on the editorial board of Muscle & Nerve.

**Professor GJM Stienen**

Ger Stienen studied Physics at the University in Nijmegen and graduated in 1975. In 1981 he obtained his PhD degree at the University of Amsterdam on research performed in the Department of Physiology concerning the mechanical and biochemical properties of skeletal muscle. In 1985 he was appointed as staff member of the Laboratory for Physiology of the Free University in Amsterdam. In the years thereafter his research gradually changed focus from skeletal towards cardiac muscle function. In 2006, he was appointed Professor in Human Physiology in the Faculty of Exact Sciences of the Free University in Amsterdam. He has been member of the Science Committee of the Faculty of Medicine, editor of the Journal of Physiology, series editor of Regulation of Muscle Contraction, Kluwer Academic Press, chairman of the European Society for Muscle Research, member of the evaluation committee of the Departments of Anatomy and Physiology in Padua, organizer of the 31<sup>th</sup> European Muscle Conference and currently is board member of the European Society for Muscle Research and member of the science committee of the Institute for Cardiovascular Research.