The Research Council of Norway

Molecular Biology

Panel 3

Evaluation
Division for Science

The Research Council of Norway

Molecular Biology – Panel 3

Microbiology, immunology, cell biology, biochemistry, molecular biology, genetics, genomics, biotechnology including breeding and bioinformatics

The Research Council of Norway
P.O.Box 2700 St. Hanshaugen
N–0131 OSLO

Telephone: +47 22 03 70 00
Telefax: +47 22 03 70 01
bibliotek@rcn.no
www.rcn.no/english

The report can be ordered at:
www.forskningsradet.no/publikasjoner
or green number telefax: +47 800 83 001

Design: Agendum as
Printing: 07 Gruppen AS
Number of copies: 500

Oslo, November 2011

ISBN 978-82-12-02991-0 (print)
ISBN 978-82-12-02992-7 (pdf)

Table of contents

Preface from the Research Council of Norway

The Research Council of Norway (RCN) is given the task by the Ministry of Education and Research to perform subject-specific evaluations. According to the plan for these evaluations the RCN carried during 2010 and 2011 out a comprehensive evaluation of Norwegian research within biology, medicine and health in Norwegian universities, hospitals, relevant university colleges and relevant research institutes. Evaluations have previously been performed within these subjects/fields, in biology in 2000 and medicine and health in 2004.

Due to the large span in disciplines and the number of scientific groups involved in the evaluation, seven international panels of experts were established; each of them reviewed one of the following subfields:

Panel 1	Botany, Zoology and Ecology-related Disciplines
Panel 2	Physiology-related Disciplines
Panel 3	Molecular Biology
Panel 4a	Clinical Research – Selected Disciplines
Panel 4b	Clinical Research – Selected Disciplines
Panel 5	Public Health and Health-related Research
Panel 6	Psychology and Psychiatry

The Research Council of Norway would like to thank the panel for the comprehensive work the panel has performed.

Oslo, October 2011

Hilde Jerkø (sign.)
Director
Division for Science

Mari K. Nes (sign.)
Director
Division for Society and Health

Statement from the panel

The members of the Evaluation Panel for the Review of Research in Molecular Biology at Norwegian Universities and Research Institutes submit the following report, based on the general conclusions and recommendations of Panel 3.

The primary objective has been to review applied and basic research within the general area of molecular biology. However, as in previous evaluations, the scope is broader as many of the issues identified relate to external factors such as legal and managerial constraints imposed on universities from ministries and funding agencies. Additionally, the internal organization of research institutions in Norway has been a significant theme. The interface to other European and non-European countries has also been a focus area for the panel – the strategies to foster internationally competitive science are more important than ever and here networking with the rest of the scientific community is essential. Over the past ten years the interface aspects have grown in significance as determinants of the competitiveness of the research carried out.

In general, the review panel did not assess research performance at the level of the individual researcher but remained at the level of university departments, institutes and research groups. This report addresses the performance of both the research and the funding systems at the national level and addresses the structural issues that we saw as limiting the ability of Norwegian scientists to compete at the highest international level.

The panel had three female scientists and six male scientists and a male secretary. The views expressed in this report are the consensus views of the panel members. The members of the panel are in collective agreement with the assessments, conclusions and recommendations presented. None of the panel members has declared any conflict of interest.

September 19, 2011

Professor Søren Brunak,
Technical University of Denmark & University of Copenhagen (leader of the panel)

Professor Edith Sim
University of Oxford, England

Professor Ralf-Rainer Mendel
Technische Universität Braunschweig, Germany

Professor Janet M Lord
University of Birmingham, England

Professor Peter Langridge
University of Adelaide, Australia

Professor Karin Dahlman-Wright
Karolinska Institutet, Sweden

Professor Klas Kärre
Karolinska Institutet, Sweden

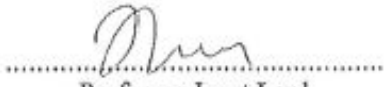
Professor Stephen Cusack
EMBL, Grenoble, France

Professor Lubbert Dijkhuizen
University of Groningen, The Netherlands

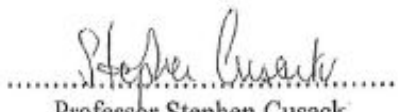
Secretary: Professor Lars Juhl Jensen, University of Copenhagen, Denmark

Professor Søren Brunak
Technical University of Denmark
Denmark
Chair

Professor Edit Sim
University of Oxford
England



Professor Janet Lord
University of Birmingham
England



Professor Stephen Cusack
EMBL, Grenoble
France

Professor Ralf. R. Mendel
Technical University Beaunschweig
Germany

Professor Karin Dahlman-Wright
Karolinska Institutet
Sweden

Professor Peter Langridge
University of Adelaide
Australia

Professor Klas Kärre
Karolinska Institutet
Sweden

Professor Lubbert Dijkhuizen
University of Groningen
the Netherlands

Lars Juhl Jensen, University of Copenhagen, Denmark, acted as secretary for the panel.

Executive summary

The evaluation panel met with representatives from a wide range of universities, research institutes, departments and research groups representing highly diverse aspects of biological research in Norway. A separate meeting with postdocs from different environments also took place. A significant number of the groups interviewed conducted very good to outstanding research, while others did engage in research that was assessed to be more incremental, derivative research, which is not internationally competitive.

It is clear that considerable efforts have been (and are being) made to respond to recommendations from previous evaluations, aiming to focus the research, create strong centers and develop strategic leadership. However, across all the different areas assessed by the panel it was apparent that in this process of change, there is a substantial divide between groups and departments in Norway, which were able to adapt successfully to the rather inflexible Norwegian resource allocation and staff management systems, and those who are moving towards a mode of resignation blaming (often rightly) the constraints imposed on them as the major reason for the less fruitful outcome of their research programs. It became clear to the panel that the Norwegian system within biology and medicine does not sufficiently facilitate the research process– and this problem reduces the competitiveness of Norwegian research relative to other European countries. The panel felt that the Norwegian system does not work synergistically with its biological research communities to create environments, which smooth the progress of research at the highest level of quality and productivity. In the Norwegian system resources are often locked up in areas of past priority, permanent staff that do not perform optimally in their current role can generally not be repositioned or made redundant in the organisation, and there is essentially no coherent and efficient scheme in place for mentoring the next generation of researchers – problems which by and large were present across the entire set of institutions evaluated.

The panel also identified a number of other areas where revisions would potentially strengthen the Norwegian research climate within biology. These included the Norwegian bioinformatics infrastructure, grants office assistance in attracting international funding, structural conflicts between independent research institutes and universities, and the model for improving the research leadership at the departmental level.

The major issues identified by the panel were:

- **Inflexible resource allocation to and within universities.** Compared with many other countries in Europe and elsewhere the institutional core funding in Norway is relatively high, but extremely inflexible. Resources are locked up in an inflexible system in which staff cannot be repositioned or even made redundant and it is thus difficult to quickly obtain critical mass in new, promising areas where the opportunities are greatest. It is in general very difficult for the Norwegian research leaders at various levels to channel resources to new areas. This is reducing the impact of Norwegian research, which may be one important factor explaining the results of recent studies of the citation ranking of Norwegian

publications presented to the panel. The panel definitely felt that this inflexibility was a critical, general problem within essentially all research areas reviewed.

When reading the earlier review reports from evaluations of Norwegian research in 2000, 2003 and 2004 it is remarkable, despite general awareness in many self-assessments, and concrete measures taken by several institutions, how many of the previously identified weaknesses still seem to represent major issues in the Norwegian research environment. Prior to the interviews conducted by the panel, the research council staff did provide recently performed bibliometric analysis and the question was asked what other, comparable countries did in order to keep up the growth in citation impact, given the observed stagnation in Norway. Denmark, a close neighbour to Norway with many similarities – culturally, financially, and in terms of societal organization was mentioned as an example.

After hearing and discussing with more than 50 research groups/departments, it was clear to the panel that one major difference between Norway and many other countries is the lack of freedom to reallocate resources and to create critical mass by closing down underperforming areas or areas of low priority. Given a large number of bureaucratic and self-imposed constraints it is perhaps not surprising that basic structural problems remain unsolved. The core funding to university research in Norway is not low, but the freedom to use these funds is lower than in many comparable countries. All countries have oddities in their research funding schemes, but Norway seems to have far too many constraints, which are unreasonable and limit performance.

- **Lack of a tenure track system.** Another major problem identified was the lack of a transparent career development scheme. It is recommended to establish a tenure track system (see also Evaluation report 2000) with clear rules and a limited number of position levels (i.e. PhD, postdoc, assistant prof., associate prof., full prof.), where the assistant professor level represents a "test period" as junior, independent PI, which does not automatically lead to a permanent position. Position categories such as research fellow, research assistant, and prof. II, with unclear roles with respect to career development, should be phased out. Additionally, to ensure that persons with valuable competence and skills, but who are unlikely to succeed, or unwilling to take on the challenge, as PIs, are not lost from the system, we propose that staff scientist positions be used for this purpose. The evaluation panel acknowledges that introduction of a tenure track system as out-lined above is a complicated process possibly involving new legislation and agreements between representatives from employer and employee. Yet, the evaluation panel strongly suggests that such discussions are initiated.

- **Quality of the research.** The panel evaluated a large number of research units and the scientific quality varied considerably. The panel was able to identify several research groups carrying out research at the highest levels, "very good to excellent" or "excellent". These groups are carrying out either basic research or medically oriented research, none of the more applied areas belonged to these highest quality categories. The panel was concerned that so many groups were in the category "good". This indicates that the research is of medium quality often representing incremental work advancing science slowly. Overall the panel felt that there are some real strengths and enormous potential in molecular biology

research in Norway. The strong research groups are well distributed across Norway and could provide a solid base for helping to lift other groups to a higher standard. The poor state of applied research is a worry given the economic importance of this type of research. Several of the recommendations in this report should help address this weakness and build a strong applied research framework for Norway.

- **Varied quality of research leadership.** The panel found that many departments could benefit from increased strategic thinking and leadership in order to maximize fruitful and competitive use of the funds available. The panel felt that negative effects of the missing career development schemes applied to all levels, including the leadership level. As this problem is tightly connected to the inflexible Norwegian resource allocation system, it should be solved in a concerted manner.

- **Lack of dedicated funding streams for young scientists.** The evaluation panel suggests that the fraction of the resource budget earmarked for younger scientists be increased. In a country with an ageing population of senior professors, there is an amazing and profound lack of an active system for selection and mentoring of the best junior staff as senior postdocs for the next generation of faculty.

- **Few PhD students per professor.** The panel noticed that the ratio between the number of PhD students and the number of professors (I + II) in general was very low. The panel was not able to carry out a more detailed analysis, but it is not unlikely that the two problems, a rather low number of PhD students and the general lack of a human resource management for scientific personnel at universities in Norway (mentioned above), are (inter)linked. It is recommended changes be initiated in the general human resource management area.

- **Structural conflicts between independent research institutes and universities.** The panel recommends that the role of these two forms of research bodies within the biological area is clarified. In particular these two types of organizations should be complementary in their activities rather than duplicating effort without reaching critical mass. In the latter case, mergers should be considered.

- **Low level of EU, NIH and other international funding.** With a few notable exceptions the level of EU and NIH funding was exceptionally low for the units interviewed by the panel. It also appeared that the institutions in general do very little in order to motivate their staff to obtain international funding and the panel recommends that new initiatives are taken to improve the situation.

- **Bioinformatics infrastructure.** Norway has a good basis for expanding the volume in computational biology related areas due to the previous (limited) investments. Going forward it is recommended to establish a more distributed system that will cover the local needs more effectively, in combination with centralized, hub-like efforts where these are advantageous.

- **General unawareness of TTO (Technology Transfer Office) models.** The panel recommends that initiatives are established to improve the situation in the technology transfer area. There seems to be a general lack of awareness of the rules and mechanisms available for commercialization of novel research-based discoveries.

General description of the field

The general area of molecular biology has drastically changed over the past ten-year period. High-throughput experimental techniques have enabled a wide range of new approaches, which have altered the ways data are produced. An integrated component in this development has been the adoption of computational methods in almost all phases of many wet-lab research projects, from the planning of assays, through to data collection and to data interpretation and publication. Molecular biology has become a multi-disciplinary endeavour much more than ever before. The field is now moving rapidly, and many scientific projects represent schemes involving larger, predominantly international teams, where the available infrastructure is critical for the competitiveness and the delivery of impact on an area. Today, there is less emphasis on the traditional "single investigator model" – even if highly original ideas often evolve in such smaller constellations, they typically need access to multidisciplinary, high-throughput technologies and interaction with other groups to test and further develop the concepts.

Molecular biology plays an immense role in basic biological research, disease etiology investigation, disease prevention and diagnostics, systems biology, environmental biotechnology, plant sciences, veterinary sciences, industrial biotechnology, chemical biology, nanobiotechnology and related fields. It forms the basis for innovation and industrial exploitation and it is clear that its importance will not decline in the foreseeable future. We are entering a phase in the history of science where a large part of the DNA existing on Earth today will be sequenced. Data will be generated at many levels of evolutionary complexity from entire human populations to highly diverse bacterial communities. Many other layers of interrogation will add to the data generated by sequencing DNA. If societal problems such as those associated with the aging population and a wide range of unsustainable production schemes are to be solved – solutions will often be based on insights that stem from research in molecular biology.

The rapid transitions within molecular biology represent a significant challenge to funders, to research leaders and to individual researchers. While no single country can control or force this development, flexibility and freedom to operate has never before been as important as it is now. One of the major challenges for Norway is to morph its research management system into a new framework that allows research leaders in the academic setting to make decisions and to use the allocated research budgets much more freely than is the case today.

General Recommendations

Norwegian funding landscape

Management of internal, university core funding is inflexible, and not used strategically

During the evaluation it became clear to the panel that there is a general lack of human resource management for scientific personnel at universities and hospitals in Norway. The panel noticed many examples of senior staff that have gradually lost contact with research and have become relatively unproductive in publication and scoring grants. Procedures for the restructuring of research units in response to national or international research trends appear to be lacking, making the system inflexible and slow to respond to any type of change. Specifically there did not seem to be procedures in place for personnel management, in the form of mechanisms to present and implement alternatives to staff who do not perform in terms of their ability to attract research funding or publish in higher impact journals. Such alternatives could include stimulation to new research directions, repositioning to work under the leadership of another PI or shift to other tasks in the academic system. The leadership does not appear to have sufficient power and human resource competence to deal with such situations.

All members of staff should be asked to jointly share the workload and be jointly responsible for the quality and productivity of their department, unit or section, and for securing external funding for personnel and new instruments. It is recommended that appraisal interviews are conducted annually with each member of staff, involving the group leader and head of department, using reports with a standard set of questions and topics for discussion, followed by written reports signed by the leadership and the staff member. Heads of department should have clear power to act, and change the level of position, salary scales, and suggest training for a career elsewhere, inside or outside the organization. The panel therefore recommends that unit heads are given authority to control the direction of the research unit and to reposition, make redundant individual staff members or research groupings that do not align with reasonable quality criteria.

Flexible institutional funds – are overheads fed back into the system in a transparent manner?

Given the limited amount of flexible, internal funds available for basic research, scientists have to compete for external funding at the national or international and/or European levels. During the panel interviews it became obvious that many researchers did not have a clear picture of how their institutions handled overheads resulting from the external funding received. The panel recommends that acquisition of external funding be encouraged and facilitated by all means possible, in particular at the application stage, for example by establishment of proactive and competent grants offices. In addition, the panel recommends that transparent processes are established by which scientists that successfully obtain competitive funds have direct benefit from the overheads that they bring in rather than allowing the funds to be hidden as support at the general institutional level.

Funding opportunities for young investigators

A Norwegian researcher has in the present system only four years to establish an independent research line and apply for permanent positions. In this process it is important to receive funding as a PI. Usually, it is very difficult for younger scientists to receive funding from RCN because they compete in the same arena as senior colleagues. The evaluation panel suggests that a larger fraction of the resource budget is earmarked for younger scientists. This could be used to support young PIs that are in the first "test phase" (e.g. as assistant professors after the postdoc period) in a tenure track system as suggested elsewhere in this report. As postdocs are usually paid from grants with senior colleagues as PI, they often do not get senior authorship on papers, and more generally are completely dependent on the PI. Senior authorship would constitute a competitive advantage when applying for grants. One possibility could be to introduce additional externally funded postdoc positions so that the most talented postdocs can be PIs for their own projects at this stage of their career. Postdocs also expressed concern that it is difficult to apply for grants without a permanent position, because of restrictions imposed by Norwegian grant agencies as well as departmental policies.

A related aspect is the organization of the postdocs across the country. If the postdocs organized themselves at the individual university level and nationwide they could provide a stronger voice for putting pressure on organizations and improving conditions for postdocs. The evaluation panel understood from the meeting with a group of postdocs that there were in general no such postdoc organizations in place. An organization could also help define expectations of postdocs for example in terms of teaching. Teaching is an important part of researcher development yet it must be limited to allow time for research. This seemed very unclear at the moment and varied considerably between the evaluated units.

Relationship between funding for applied research and basic research

The panel received the impression that within the general area of molecular biology and related disciplines support for basic research in Norway is relatively low. The general atmosphere seems to be that the best type of basic research is of the kind where future applications are easy to foresee and identify and – in the optimal case even within a relatively short time scale. This view is damaging for research within the biomolecular sciences where for example, non-hypothesis driven research now represent, a growing part of research carried out world-wide. Biological systems are currently also interrogated with techniques where numerous different types of readouts and the associated data are produced first, while hypotheses and discoveries on specific biological mechanisms are made later in unpredictable ways.

Even if the information received by the panel on the influence of Norwegian industry on the research policies in Norway was highly scattered it was repeatedly stated that industrial stakeholders push for research, which has an applied orientation. This is in contrast to many other countries where industry is emphasizing the need for basic research and warns against turning academic research into development environments. If Norwegian life science research should increase its competitiveness in the future it needs to be risk-taking and non-incremental. The Norwegian system within molecular biology and medicine seems not to have these priorities and the panel would like to recommend a change of strategy. These statements are in no way meant to be negative in relation to applied research, but rather reflect a concern that the balance between basic and applied

research appears to be incorrect within the university sector. Norway has a research structure that includes several strong institutions that interact closely with industry. The panel feels it is important that the industry orientated sector is balanced by a strong basic science capability built within Norway's universities. This is currently not happening and many researchers feel constrained in their abilities to undertake basic research leading to confusion about the roles of the different organisations and loss of science focus.

Level of EU/NIH funding is low in certain areas – improve mechanisms locally and nationally

With a few notable exceptions the level of EU and NIH funding was low in the groups interviewed by the panel. It became clear that the Norwegian system at the institutional level does not offer adequate support or encouragement for those researchers who intend to coordinate or participate in such projects, neither during the projects nor in the application phases. This can be difficult to develop at the level of research groups or even departments. To use the resources and networks optimally, it is important to organize a support structure with nodes at the national level as well as at the different universities and institutes. It also appeared that the institutions in general do very little to motivate their staff to obtain international funding. The panel recommends that new initiatives are taken to improve the situation. Internationally funded projects are important not just due to the extra resources they attract, but also as vital networks for Norwegian research, exchange of PhD students and postdocs, and to demonstrate the international relevance and competitiveness of Norwegian research. Some European universities have motivational schemes which, or variants of which, could be used as instruments also in Norway. One example is the University of Copenhagen, where DKK 500,000 is added as institutional support per grant attracted to those who receive EU funding above a certain level, either as coordinator or participant. Among the groups seen by the panel the issue of low international funding was most extreme for non-applied research.

Category 1 and 2 journal ranking – is this sufficient to measure and improve research output quality?

The system of dividing journals into categories 1 and 2, with category 2 journals providing more value in terms of governmental resource allocation, became known to the panel during the evaluation and interviews. The majority of the evaluated units stated that the resource allocation system made them focus on level 2 publications. However, there were also units that ignored the publication category system when choosing which journal to target for a specific manuscript and instead focused solely on publishing good papers. Some units expressed that there were very few category 2 journals in their field, for example in food science.

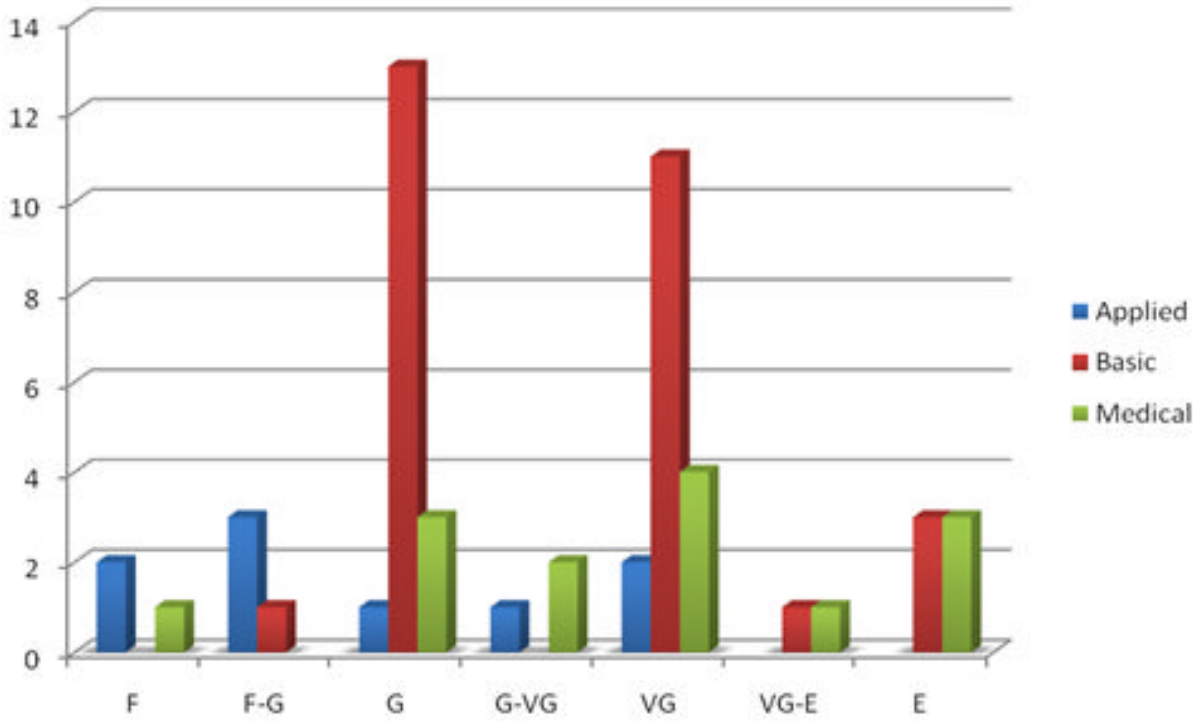
Although, the evaluation panel acknowledges the difficulties associated with developing a resource allocation scheme that rewards high quality research, dividing journals into two categories appears like a rather blunt instrument for resource allocation. This problem was exacerbated by the fact that the value of high impact publications is downgraded linearly by correcting for the number of authors. This acts as a major disincentive for collaborative research. There are clearly inherent difficulties when comparing different scientific fields in a resource system based on publications, and this is not made easier by the Norwegian system. Moreover, the committee responsible for the distribution of journals between category 1 and 2 effectively has significant influence over not only Norwegian resource allocation, but also how Norwegian research is exposed. The

evaluation panel suggests that alternative models for research resource allocation based on research output are considered, including the use of alternative bibliometric measures that also focus on citation statistics of the individual articles rather than on the journals in which they were published.

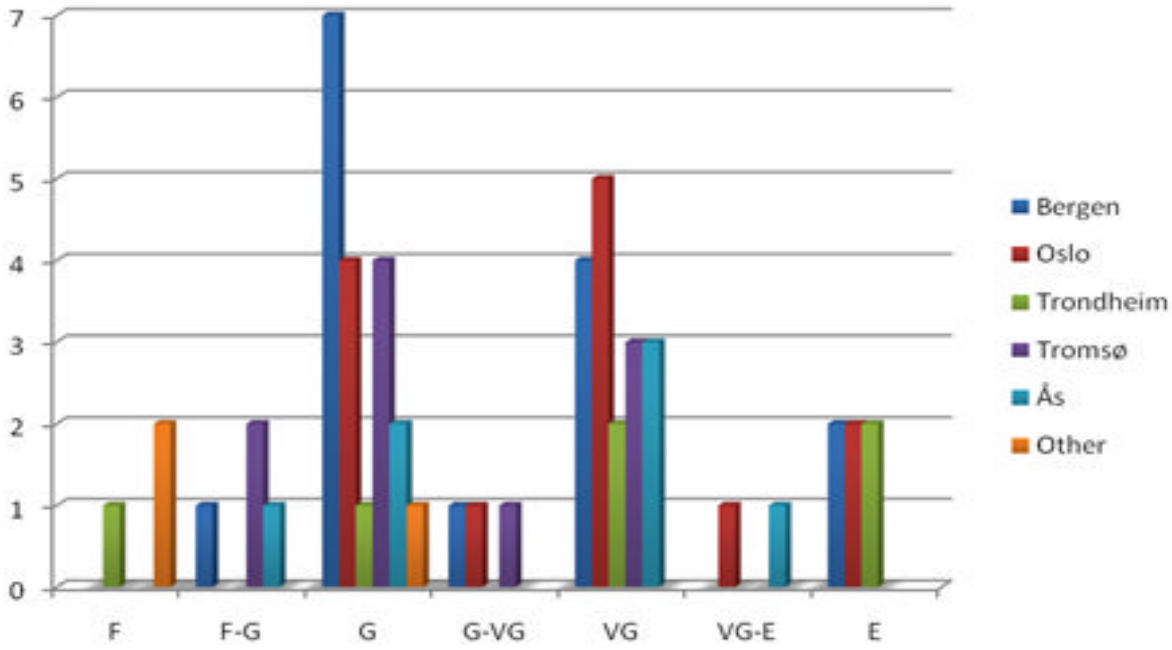
Quality and organizational aspects of Norwegian research

Scientific quality across the subareas evaluated

The panel evaluated a large number of research units and the scientific quality varied considerably. The distribution of grades given (from fair to excellent) is shown in the figure below. The panel was able to identify several research groups carrying out research at the highest levels, "very good to excellent" or "excellent". These groups are carrying out either basic research or medically oriented research, none of the more applied areas belonged to these highest quality categories. In Oslo the topics include medical genetics, immunology and transfusion medicine and microbiology, in Ås protein engineering and proteomics, in Bergen medical genetics, molecular medicine and marine molecular biology, and finally in Trondheim, microbial biotechnology and biopolymers. Most of the research units were evaluated as belonging to the categories "good" or "very good". The general assessment was positive since few groups were assessed as performing "fair" or "fair to good" (most of these came from the applied areas). However, the panel was concerned that so many groups were in the category "good". This indicates that the research is of medium quality often representing incremental work advancing science slowly. Special attention should be given to these groups, in particular in the context of the many structural problems mentioned elsewhere in the evaluation report summary.



The geographical distribution of the grades given is shown on the figure below. The highest quality groups are located in Bergen, Oslo, Trondheim or Ås. The lowest quality groups are essentially from all areas, except Oslo. Other trends which can be observed are that Bergen has disproportionately many groups in the category "good", while the category "very good", where many groups indeed have the potential for reaching the level "excellent", is more evenly distributed over the country.



In the three topical categories used above, it was generally easy to assign groups to categories. In a few cases it was more difficult, e.g. groups in medical environments which primarily carry out basic research (with or without a translational component). Here "Basic" was most often chosen. Similarly, a few units represent primarily core facilities. Here "Basic" was chosen based on the assumption that most of the usage serves basic research needs, rather than processing of clinical samples.

Overall the panel felt that there are some real strengths and enormous potential in molecular biology research in Norway. The strong research groups are well distributed across Norway and could provide a solid base for helping to lift other groups to a higher standard. However, this will be contingent on addressing the structural problems in research support, succession planning and international linkages. The poor state of applied research is a worry given the economic importance of this type of research. Several of the recommendations in this report should help address this weakness and build a strong applied research framework for Norway.

Lack of tenure track system, postdoc career track issues, lack of independence

There is a general lack of organization of career paths for young scientists in Norway. Postdocs seem to suffer from this most, with appointments for a maximum of four years. In a country with an ageing population of senior professors, there is an amazing and

profound lack of an active system for selection of the best junior staff as senior postdocs for the next generation of faculty.

The staff we saw and whom we assessed were in some instances all over 60 in one institution, in some cases even older. The overwhelming message was that there are very few scientists between the ages of 35 and 50 in Norway. This lack of a cadre of young developing scientists was commented on in the previous 10 year strategic review and it seems that the problem is now worse as the older scientists are now 10 years older. The rules governing length of employment appear to be applied stringently in some organisations and laxly in others. There are many anomalies and game playing with staff being employed on a series of contracts where the job title varies and in some cases alternatives between different titles. Some postdocs are able to transfer every 3-4 years to positions with slightly different labels or laboratories, to avoid or at least challenge the existing rules of Norwegian law. Further, it is unclear in some cases whether postdocs work for someone else, partly independent with supervisor responsibilities, or even have full PI responsibility. The effect is that depending on the interpretation of the employment rules, individuals at different institutions are subject to widely varying career options.

There is generally no uniform mentoring and training system in place for the community of postdocs in a department. They are not supervised to become independent in achieving grant funding, being first or last authors on papers, etc. They are largely dependent on the individual group leaders to allow and stimulate them in these matters although mentoring systems specific for females were in place at some of the evaluated departments. A mentoring system spanning whole universities or even nationwide might be more rewarding than locally organized mentoring system.

It is recommended to establish a tenure track system (see also Evaluation report 2000) with clear rules and a limited number of position levels (i.e. PhD, postdoc, assistant prof., associate prof., full prof.), where the assistant professor level represents a “test period” as junior, independent PI, which does not automatically lead to a permanent position. Position categories such as research fellow, research assistant, and prof. II, with unclear roles with respect to career development, should be phased out or used with caution. The panel encountered several examples, for example at the Sars centre, where temporary positions are in place resembling the first stages of a tenure track system (see evaluation of Level 1 and 2 units). Could this organizational model, or variants, be used as a starting point for suggestions of models for fully developed tenure track systems?

In a reorganized recruiting scheme young members of staff should be appointed as assistant professors, and have four to five years to meet a clear set of challenging criteria (e.g. an average of one to three peer reviewed papers per year, awarded grants to a minimum level as a PI, successfully supervising PhD students, successful in teaching as evidenced with student and course evaluations, national visibility, ability to lecture in Norwegian and English). After a certain period a standing faculty evaluation committee should interview them on the basis of their self-assessment and recommend promotion, or not. In the former case, they are promoted to associate professor with tenure. In the latter case they are asked to leave and supported to seek a career elsewhere, or occasionally hired under other PIs. A similar scheme should apply at higher levels.

Research leadership quality varies

As mentioned above in the description of the field, the panel see a rapid evolution in the biological sciences (genomics, proteomics, metabolomics, expensive infrastructure, data driven approaches, national and international networks). It is obvious that the need for research leadership has never been greater. The panel found that many departments could benefit from increased strategic thinking and leadership in order to maximize fruitful and competitive use of the funds made available. It was felt that it was not particularly attractive to become head of department in the Norwegian system. This may be explained by the lack of decision making power, the lack of discretionary funds, and the lack of influence in relation to human resource management. The conclusion was that the negative aspect of the missing career development schemes applied to all levels, including the leadership level. As this problem is tightly connected to the inflexible Norwegian resource allocation system it should be solved in a concerted manner.

The low PhD student/Prof I + II ratio and an MD PhD strategy

The panel noticed that the ratio between the number of PhD students and the number of professors (I + II) in general was very low. The panel was not able to carry out a more detailed analysis, but it is not unlikely that the two problems, the rather low number of PhD students and the general lack of a human resource management for scientific personnel at universities in Norway (mentioned above), are interlinked. There is no clear national system in place to enforce and maintain the quality of PhD degrees. Ideally, graduate schools should be established at the faculty level, with a clear set of rules for education and training of PhD students. As part of this there should be an obligation to gain experience abroad, to actively participate in international conferences with posters and talks and evaluation of student progress in oral presentations and written reports (for review by an in-house supervising and guidance committee). The panel noticed that PhD students are generally employed for three years research and one year of teaching. The impression was that postdocs generally are excluded from teaching, which is surprising, as they should be gaining extra experience in teaching at this stage in their career and they frequently make excellent role models for students. Information was generally lacking about the success rate of the PhD students and PhD study durations. Similarly it was unclear whether Norway has a formulated MD PhD strategy; it is recommended that this is also included in a revised human resource management scheme.

Conflicts between independent research institutes and universities

Norway has invested in research at both universities and focused research institutes and the quality of research for both is frequently of a high standard. However, the panel felt that there was often conflict between these two research bodies that detract from research quality and potential. The nature of the conflicts lay primarily in the perceived division of research activities between universities and institutes. The former consider themselves to be the main focus for basic science research and consider the latter to be a highly focused vehicle for the translation of their findings. The research institutes consider that they can also carry out their own basic research and have been successful in bidding for funding, though less so than in the university sector. The panel recommends that the role of these two forms of research bodies is clarified. It should in particular be clarified whether these two types of organizations should be complementary in their activities rather than duplicating effort without critical mass. In the latter case, mergers should be considered.

Bioinformatics and biometrics infrastructure; combine better a national network among bioinformaticians with local needs?

In 2002 Norway implemented the FUGE program to establish a coordinated and to some extent centralized bioinformatics program which was established in Bergen with collaborative groups from Oslo and Trondheim. The national program was not large and the ambition was unfortunately not to put Norway at the forefront of bioinformatics worldwide or in Europe. The program was created in response to an earlier review carried out in 2000 identifying bioinformatics as a weakness in the Norwegian research landscape. Many other countries have made considerable investments in bioinformatics and the related areas of computational systems biology, computational chemical biology and neuroinformatics. Consequently, the current situation in Norway is comparatively weak – leaving Norwegian life science research in a suboptimal position. This also became clear during the panel interviews, where there was a large spread in the level of adoption of relevant computational strategies. In several cases the poor bioinformatics capability was seen as a significant weakness in research programs which otherwise appeared to be strong. Norwegian bioinformatics research is in general strong, but due to the underfunding many bottlenecks exist. As most parts of life science research both now and in the future will depend on computational means, the Norwegian bioinformatics infrastructure should be broadened incorporating a wide range of groups. These groups are currently not using state-of-the-art computational techniques or participating in the development of tailor-made solutions. Such broadening should be combined with centralized, hub-like efforts where these are advantageous. Obviously the strong bioinformatics groups in Norway should play a major role here.

Biobanks – unclear organization and rules for long term safety and sample access

The health service system and population structure of Norway provide an excellent opportunity for large population surveys in epidemiology or epidemiology in combination with different laboratory disciplines. The panel touched upon this issue in the discussion with several units, and although there seemed to be well organized biobanks, there was an impression that this relied more on individual PIs and groups rather than a systematic effort at the national and university/hospital level. The panel did not have the time to penetrate this issue in depth. If there is no ongoing or recent report to set the rules for long-term quality maintenance, sample access etc., it is recommended to launch such an effort by a specialized committee with expertise in the relevant areas.

Gender situation – insufficient career mentoring for female scientists

The overall impression was that maternity leave and other career breaks did not appear to be a problem in terms of formal employment. However, in practice there appeared to be severe distortion with respect to the support for young scientists (covered elsewhere in the report). Maternity leave is available; however inevitable effects on publication and other outputs were evident in many cases. With respect to gender equality, there appear to be many more female PhDs, but many more male academics as permanent staff – a classical problem; the main issue is how to accelerate change. The lack of support for career development was most acutely voiced at the meeting with post-doctoral fellows who were predominantly young women. There was clear frustration over the lack of any obvious career development structure. Many of the young Norwegian scientists the panel met, were very focused on a local career and were not either able, for example for family reasons, or willing to look beyond their own town or Norway to explore career possibilities. There were a significant number of non-Norwegians amongst the young post-doctoral scientists we met; however, they also expressed frustration at the lack of career development structure.

The panel recommends that Norway implements a system for female staff career development as has been done in many other countries. One example is the highly competitive Rosalind Franklin system that has been running successfully at the University of Groningen for a number of years. Selected female candidates enter the tenure track system as assistant professors. A very large number of excellent candidates apply every year, in open competition for any field, followed by negotiations with 5-10 candidates, also engaging heads of departments to ensure proper allocation in research groups.

The interface between innovation and basic research

Technology Transfer Office model in Norway

From questions asked to many of the groups seen by the panel, it was not evident that there was a generally accepted and well-known practice for how to handle research results with commercial potential. This was most apparent in the basic research environments. Different countries have different models for how to handle intellectual property rights (IPR), varying from the rights belonging solely to the researcher (e.g. Sweden) to rights belonging solely to the university (e.g. Denmark). Irrespective of the model implemented, it is very important that the staff and students know the rules and practices such that opportunities are not lost. The panel recommends that initiatives be made to improve the situation in the technology transfer area.

Industry funded research and the role of non-Norwegian industry

Research in universities and the institute sector is largely supported through external funding which runs mostly on a short-term basis. Particularly, Norwegian industry funds are nearly exclusively on a product-driven, short-term basis with the consequence that there is insufficient long-term funding to allow serious long-term strategic development and maintaining of competence on the research side. Another adverse consequence of this policy is that research units have to deal with a plethora of small short-term projects to finance their survival which further compromises long-term strategic research. This policy prevents the formation of larger task force groups for working on larger strategic projects. The panel recommends that Norwegian industry increases its support both to basic research and to longer-term strategic goals. The panel expects that the role of non-

Norwegian industry will further increase in the green and marine sector because these non-Norwegian funds are more flexible and therefore increasingly attractive in particular to researchers of the institute sector.

Several groups expressed concern to the panel that only Norwegian industry funds were eligible for some of the public sector funding schemes. This greatly limited the ability of research groups to develop partnership with industry since in several cases; the most logical partners were outside Norway. The panel recommends that the industry based funding schemes be expanded to allow non-Norwegian industry partners to become involved.

Description of each institute or institution including research unit evaluations

University of Bergen

Department of Molecular Biology, Faculty of Mathematics and Natural Sciences

Description

The Department of Molecular Biology was established in 1997 and by the end of 2009 has 42 UoB funded positions (11 professors, 1 non-tenured group leaders, 4 professor/assistant professors II, 12 PhD students, 12 technicians and 5 administrative staff) and externally funded PhD students (6) and postdocs (8).

There have been two new faculty appointments in 2010, and it is hoped to recruit into faculty positions two current group leaders. At the same time, the head of Department will retire in 2012. One of the most productive professors has recently left to become Head of the Biology Department and another professor is also retiring.

The department is subdivided into focus areas on (1) protein structure and function (6.5 PIs, 5 postdocs, 8.5 PhD students, 5.5 technicians), (2) developmental biology (4 PIs, 3 postdocs, 8.5 PhD students, 2.5 technicians) and (3) structural bioinformatics (0.5 PIs, 1 PhD student). The latter is being reviewed separately under the UoB Computational Biology Unit.

The self-assessed strengths include good and functional laboratory facilities with close proximity to other molecular biology labs and the bioinformatics unit. The weaknesses include stagnation of the department due to lack of turnover, a large variation between groups with regard to publication frequency and lack of internal collaboration between groups. Opportunities arise as several professors will step down within the next few years, which opens up for strategic recruitments of young active researchers. Opportunities in external funding of research need to be proactively pursued, in particular the new biotechnology programme and new centers of excellence. The perceived threats include the generally low funding for basic, as opposed to applied, research and strict work-force regulations on non-permanent positions and lack of career path possibilities.

Follow-up on previous evaluation

As a result of the previous RCN evaluation on Research in Biology and relevant areas of Biochemistry in Norwegian Universities, Colleges and Research institutes in 2000, the Faculty of Mathematics and Natural Sciences was reorganized in 2004 to give increased economic and strategic freedom to operate for the individual departments. However, due to the present economic situation of the Faculty and the large number of permanent staff, the flexibility is in reality still very limited. Also, a Scientific Advisory Board was established in 2006, based on whose advice improved starting packages have been offered to newly recruited, young group leaders. This is very positive in a situation where many structural problems remain.

Department of Molecular Biology

Description

The department was established in 1997 as a new department at the Faculty of Mathematics and Natural Sciences with staff from three different laboratories/departments. The current staff includes 11 professors, 4 professor II, 5 researchers and 23 internal and external PhD students and postdocs. The Faculty of Mathematics and Natural Sciences was reorganized in 2004 where the departments gained economic and strategic independence and Heads of Departments were appointed after open announcement. In 2011 the Head of Department will have his last year after serving as the leader of the reorganized department for two four year terms.

General comments

The department is rather small and appears to have suffered a decline over the last several years, with several groups having sub-critical size and very low productivity, leading to stagnation and lack of dynamism. The current head has done his best with limited resources to stem this trend. Reasons for stagnation seem to be the lack of staff turnover and failure of some faculty to adapt to the changing research trends and funding opportunities (notably poor participation in large co-operative projects or applying for EU funding, although apparently a department exists at the university level to assist with this) and thus not managing to maintain viable group size due to insufficient funding. However, teaching load, the perceived unattractiveness of the department for recruitment (due to insufficient funding) and the lack of intra-departmental collaborations, are also contributory factors.

Scientific quality

In terms of scientific quality the situation is particularly dire for the developmental biology unit which, due to retirement or departure, is left now with only three groups, which have minimal group sizes and low productivity (less than one paper per year). The Protein Structure and Function unit is in somewhat better shape, but has perhaps too diverse interests without the necessary critical mass in each. These include mass spectroscopy/phospho-proteomics and apoptosis, HIV proteins, role of N-tem acetyl-transferases in tumour biology, NMR and X-ray crystallography of RACK, spectrin, structure of histone binding modules, NAD signalling and phosphoinositide signalling. There have been two recent faculty appointments in this unit and one productive professor is currently on sabbatical in the USA, although there are also some groups with small group size and low productivity. The protein unit appears to need an upgrade in its biophysical equipment and could also benefit (as all other structural biologists in Norway) from an end to the protracted process of establishing a national high-field NMR unit somewhere. In structural bioinformatics, there are good connections with the UoB Computational Biology Unit, which is clearly advantageous, through the joint appointment of two staff, including one focused on protein dynamics.

Grade: Fair to Good.

Societal impact

The department has impact on society through its basic research activities and the substantial teaching effort.

Recommendations

Overall there is a clear need to revitalize the department and inject a new dynamic and focus into the research strategy; without this, the long-term viability of the whole department as a separate research entity is in doubt. The panel was surprised that given this situation and the pending retirement of the current Head, no clear future strategy for recruitment and research refocus had yet been developed in any detail, although there are some unclear plans to develop thematic programmes with other departments to enhance critical mass. In this respect, a positive element to be further promoted and coordinated is the focus on zebrafish as a model for development studies and for human disease, building on the joint zebrafish facility with the Biology Department. The panel suggests that that now might be the time to have a new in-depth assessment by the SAB, which last visited the department in 2007.

Computational Biology Unit, Faculty of Mathematics and Natural Sciences

As this level 1 unit contains only a single level 2 unit evaluated by Panel 3, the panel has only made level 2 comments:

Computational Biology Unit

Description

The Computational Biology Unit (CBU) is formally incorporated as a unit within the Bergen Centre for Computational Science (BCCS), which is a department in the organization known as Uni Research. Uni Research is the company used by UiB to organize some of its research where the conventional legal model for departments makes it difficult to carry out certain externally funded activities. CBU works closely together with the Departments of Informatics, Molecular Biology, Biology as well as a wide range of external collaborators distributed all over Norway and elsewhere. The leader of CBU is also professor at the Department of Informatics. CBU is the result of a strategic joint venture by UiB and the RCN (via the FUGE program) aimed at strengthening bioinformatics in Norway. The unit was formed in response to a RCN evaluation of the biosciences in Norway carried out in 2000 identifying significant weaknesses in bioinformatics and computational biology. UiB was given the National responsibility for providing research-based services and infrastructure in bioinformatics, and UiB chose to do this through CBU. While staff members have different affiliations, CBU serves as a common bioinformatics venue for staff both employed at CBU and at the various UiB departments. The CBU unit is highly collaborative and carries out projects with many groups throughout Norway and also internationally, for example in large genome projects.

In total there are 46 full-time scientific FTEs (Full Time Employees) associated with CBU of which roughly 1/3 are internally funded by the departments (including PhD students). Around 40-55% of the activities are funded by external grants with EU and other international grants making up a significant part of the total. In terms of EU funding the CBU deviates somewhat from the general picture in Norway, where non-national funding is low.

General comments

The FUGE funded CBU unit has to a certain extent centralized significant parts of the bioinformatics activities in Norway. This has made it possible to set up a group with critical mass, and it is likely that it would have been difficult to reach the same level starting with a more distributed model. It is critical to maintain bioinformatics competences in an environment which is difficult in the non-tenured track Norwegian system. Through the Uni Research model some of these problems have been circumvented. While a highly centralized scheme has been beneficial in the past ten years it is less clear that this is the best way forward. The rather modest investment in CBU can in no way meet the needs for computational biology in the future in the Norwegian setting. The new emerging European Bioinformatics Infrastructure ELIXIR has in its structure a central hub, but it is also highly distributed across countries and competences and that makes it necessary to reconsider funding schemes at the national level too.

The CBU has a group structure with five group leaders in temporary positions (except the CBU leader), where the general aim also is to spread excellence in the bioinformatics area as a consequence of group leaders taking up new positions in Norway or elsewhere. CBU also has several associated part-time group leaders, which have their main position in one the departments. It is a strong aspect that CBU uses a Scientific Advisory Committee in the process of recruiting group leaders to CBU.

Based on the activities research-driven services are provided to the outside. The FUGE program is terminated in 2012 and it is anticipated that the CBU can continue part of its service as a major contribution to the European Infrastructure for Bioinformatics, ELIXIR, which is currently being established as a pan-European EMBL special project. If Norway is not to enter ELIXIR at a significant level it is likely that the Norwegian bioinformatics research will loose visibility.

Scientific quality

The research groups at CBU are in general delivering research of very high quality. The unit reports 163 peer-reviewed publications in the 2005-2010 period. The section is overall very productive with many strong papers in excellent journals, although there also is room for consolidation and elimination of papers in low impact journals. The publication list includes three papers in Science, three papers in Nature Genetics, one paper in Cell and numerous papers in Nucleic Acids Research, Genome Research, Genome Biology etc. Several of the papers have also quickly picked up many citations. However, the highest impact papers are most often not having leading authors from CBU. While the application of bioinformatics methodology on the genome scale is strong, the methods development is somewhat weaker with a few excellent exceptions. In a future setup where the bioinformatics in Norway is more distributed focus on fewer topics may be the best strategy going forward.

Grade: Very Good.

Societal impact

CBU is definitely supporting research with translational focus, but also basic research that leads to innovation. The participation in several EU projects also contributes to a broadening of the funding basis for Norwegian research.

Recommendations

Increase the funding for bioinformatics and systems biology-related research in Bergen. Secure a high visibility within ELIXIR combined with participation in regional bioinformatics infrastructure activities, such as those being established in the Nordic countries. CBU should continue to play a strong role in the coordination of the national computational biology efforts in Norway in particular linking more closely to some of the strong groups in Oslo. Change the publication strategy towards more focus on high impact publications and fewer of low impact. At the same time the unit should consolidate and most likely reduce the number of topics studied.

Department of Clinical Medicine, Faculty of Medicine and Dentistry and Haukeland University Hospital

As this level 1 unit contains only a single level 2 unit evaluated by Panel 3, the panel has only made level 2 comments:

Section for Medical Genetics and Molecular Medicine

Description

At the Section for Medical Genetics and Molecular Medicine, Department of Clinical Medicine, the staff consists of three professors, one associate professor, four senior researchers and four postdocs. There has recently been significant turnover at the professor level.

General comments

The group has several outstanding international collaborators. There is in-house access to samples from cohorts with well-characterized and unique phenotypes. The unit has recently obtained funding for the high-throughput sequencing platform. It has extensive interactions with the bioinformatics center with bioinformatics presenting a bottleneck in the analysis of data from clinical samples. Expansion of the unit is limited primarily by space constraints. As all clinical departments, this group experience a competition for individuals between research and hospital duties and work actively to distribute teaching blocks to focused periods.

The unit has a very good track record in promoting young scientists in a tenure track system for which they acknowledge a generous grant from a local source focused on tenure track positions for your scientists. Of note, they completely ignore the publication points system. Their motivation is thus purely to publish good papers.

Scientific quality

The department delivers translational research of very high quality with focused projects, highly competent and enthusiastic staff, who have achieved an impressive increase in publications since the last review.

Grade: Excellent.

Societal impact

The translational research of this unit is expected to significantly contribute novel diagnostic and therapeutic strategies in the therapeutic areas under investigation.

Recommendation

Produce a strategy for optimal bioinformatics and IT infrastructure to support the projects. Particularly in light of the expansion in the high throughput sequencing area this is needed. Measures should be discussed to promote and give initiatives for clinicians to be involved in research. It is recommended that space should not be the limiting factor for this well-functioning group.

Institute of Medicine, Faculty of Medicine and Dentistry

As this level 1 unit contains only a single level 2 unit evaluated by Panel 3, the panel has only made level 2 comments:

Lipid Research Group

Description

The unit was the smallest which was assessed with only two members of staff. The group are under the umbrella of the Medicinal Biochemistry Section of the Institute of Medicine of the University of Bergen. The work of the unit is around identifying roles of lipids in preventative medicine and promoting mitochondrial health – an area of growing importance. The staff represents clinical biochemistry and medical nutrition, respectively, and the two areas work together extremely well as a team. The group also works closely with the Section of Cardiology to utilise patient cohorts and biobank material. Having a 20% position at the hospital has been helpful with respect to the research carried out at the university, enabling the group to do clinical trials. This has been an important aspect of their work. The availability of an animal house at the university and the access to clinical material is an extremely important combination in relation to the future development of materials as therapeutics or in the case of this unit as nutriceutical agents.

The main concern is that both members of the team are over 60 years old. They are however energetic and have been very active in securing funding through innovation related to the modified fatty acid tetradecylthioacetic acid which has been used in drug trials at the phase II level. The team has two major research themes: 1) Role of modified lipids in relation to mitochondrial health. This is focussed on the effects of a modified lipid and its effects; and, 2) Marine bioactive compounds as dietary ingredients for improved health. Through this route they have identified longer peptide compounds (~55aa) showing bioactivity with respect to mitochondrial oxidation. The approach for searching for biological activity depends to a certain extent on their industrial partners.

There are 3-4 PhD students who have for the most part carried our Masters degrees with the team. The funding for students is varied, but includes support from the Nordic Centre of Excellence, Mitohealth contracted to the University of Bergen. There is also technical support and the funding coming from industrial sources as well as two EU collaborative projects and public agencies. All staff apart from the two senior staff are female.

General comments

The group uses animal models and analytical techniques to study the effects of interventions. They also have experience in analysing human samples. The group has used animal models to study the effect of the modified fatty acid on parameters related to lipid metabolites and have used the Comprehensive Lab Monitoring System available at Bergen for continuous metabolic monitoring during animal experiments. This area of expertise is a further example of experience which will be lost without a serious emphasis on recruitment of younger staff to be trained by the excellent team.

The team currently has appropriate infrastructure with experienced and highly competent technicians for the research performed. They have excellent track records in the development of novel bioactive compounds targeting metabolic disorders and mitochondrial function. The team also has experience in working on identification of effects of marine bioactive materials as food supplements. This is an area which seems particularly appropriate in relation to other strengths in Norway. The team has established an international Mitohealth consortium. Many of the omics technologies are being established in collaboration with other organisations e.g. proteomics with University of Southern Denmark. The team uses a range of collaborations to expand their technologies including human adipose cell culture and primary muscle cultures from obese diabetic patients in collaboration with the Institute of Pharmacy in Oslo. The unit is well versed in translational research within preventive medicine based on collaboration with clinical research groups (Haukeland University Hospital, Rikshospitalet).

This group has been highly interactive in securing funding from a range of sources. They have established a productive collaborative network with industrial partners within the marine food sector and act as coordinator of a Nordic Centre of Excellence within food, nutrition and health. This Centre for Excellence runs out in 2012. They have also secured competitive funding both within Europe and in Norway, including an FP7 programme on atherosclerosis. The team has GC-MS and LC-MS/MS facilities for analyses of metabolites, however the team see this as an area where investment and strategic policies are required to ensure adequate instrumentation in future. This aspect is also hampered by the lack of continuity once research students leave on obtaining their doctorates or when international post-docs leave.

The major problem for the unit and for Norwegian science is the small number of senior scientists and that the team is nearing retirement age. The future of this unit would be safe-guarded by promoting recruitment of trained younger staff to allow exploitation of existing national and international collaborative networks. Prolonging the established Nordic Centre of Excellence would be a great advantage especially extending collaboration with other Nordic centers.

There is a need to identify administrative support to help with the interaction with industrial partners as this is an important aspect of promoting applied research. This has been a particular difficulty for this innovative group who have established a spin-out company which currently needs more investment and support in identifying resources to really move forward.

Scientific quality

The team have been active in publication with the two PIs having 55 and 31 peer reviewed articles or monographs. The publications range in the standing of the journals involved, including J. Biological Chemistry and J. Medicinal Chemistry, but also lower tier journals e.g. Biochimie and Chemical Biology International.

Grade: Good to Very Good.

Societal impact

The team is working in areas which are important to preventative medicine in relation to nutirion and obesity. The team have in vivo expertise which is essential in relation to drug and therapeutic development. They also have experience in relation to clinical trials and this is important to maintain. The team has industrial collaborations and again the interaction with the commercial sector has important societal and economic impact. This is particularly the case in relation to marine products which is a niche area for Norway.

Recommendations

The team has some outstandingly important features – one is the availability of expertise in animal work, particularly linked to an awareness of clinical trials. The training environment is excellent and the group has identified a young trained member of staff of sufficient calibre to carry on their work. In view of the age distribution of the senior team it is essential that young scientists are recruited. The expertise built up would be otherwise entirely lost. This area is one where a programme should be identified to support the work which will otherwise definitely be lost within 5 years.

The team should aim to increase the quality of journals in which they publish, but they have a good strategy for diversification in relation to funding and they should continue to build up their collaborative network as this will safeguard themselves in the short term and their successors in the longer term.

Department of Biomedicine, Faculty of Medicine and Dentistry

Description

The department is the second largest at the university and is divided into ten research groups and two technology platforms. Seven research groups and the two technology platforms are evaluated in Panel 3. The department represents a broad spread of activity reflecting commitment to medical education. A common theme is the molecular nature of the research with the ambition to be at the international forefront particularly within imaging, translational research, and bionanoscience. Overall the research teams and the technological platforms are of high quality and constitute an impressive competence in biochemistry, molecular/cellular biology, imaging, animal physiology, disease models, and in vivo imaging. The research groups explore the potential of available technological platforms. The department is "tied" together by collaborative projects, common infrastructure and common seminars.

There are 25 professors, 12 associate professors, 5 part-time professors, 28 post-docs, 14 researchers with a doctoral degree and 51 PhD-students at the department. The

department acknowledges the limited availability of predictable, long-term funding for researchers, especially for basic research, yet has managed to attract a lot of funding from regional health programs. The ratio of PhD students/postdocs to professors is low like in many other places in Norway and there is a lack of career path for young scientists, in particular no tenure-track positions.

Follow-up on previous evaluation

The department has undergone a significant reorganisation in response to the previous evaluation. This has focused on management and consolidation into viable thematic research areas. Responsibility was delegated to group leaders and administrative tasks reduced when possible to secure time for research. Overall, this reorganisation has been performed in a very professional manner and has undoubtedly strengthened the department to be prepared for future challenges. The success of this reorganisation was dependent on many factors including influx of new people that put new energy into the department and a significant equipment grant. The new group structure has now been in place for some years, but may need to be continuously changed to reflect changes in science over time. Importantly, in some cases, staff been reassigned to other units and projects to improve overall efficiency.

Biorecognition

Description

The focus of the Biorecognition Group is experimental and computational biophysical methodology for studies on biomolecular recognition, function and stability within networks of biomedical interest. The research group is relatively small (according to the material provided in the evaluation) 2 PIs (one professor and one associate professor) , 2 postdocs, 5 PhD students and 1 researcher) with a focus on protein misfolding and lipid and membrane biology. The research is organised into three broad themes, reflecting the focus of the PIs, with the protein folding theme being the best developed.

General comments

The group displays clear concerns regarding funding in the longer perspective. There is also a concern regarding access to high performance NMR instrumentation and particularly the lack of a nationwide strategy for this. The foundation for training is good, with a high PI to PhD/postdoc ratio. The group has experienced problems with recruitment, potentially connected with the biophysical nature of the work. The group collaborates widely at the departmental, university, national and international levels including co-supervision of students and several co-publications. The group is working together with industry when appropriate.

Scientific quality

The scientific productivity amounts to 73 publications in the reported period – which in terms of quality and quantity very good for a group of this size.

Grade: Very Good.

Societal impact

The work on orphan diseases has clear societal impact as few pharmaceutical companies (many SMEs) are active in this field, yet there is a significant unmet medical need.

Recommendations

Continued collaborations with other groups and industry are vital to develop the work of this group and to stay productive. At the national level, it is urgent to develop a strategy for an NMR infrastructure.

Cellular Networks Group

Description

The research group encompasses 4 PIs with a focus on tumor and vascular biology. Their discovery of a key role of Ax1 in angiogenesis is one of the themes further explored. One PI was recruited in 2002 and after a somewhat slow start the group is now on an upward trend and is reasonably well funded.

General comments

Initially there has been a focus to establish technological platforms including RNAi and chemical screens as well as advanced imaging. There is concern for the long term funding of the technological platforms. Recruitment has been difficult, but is improving in association with a better exposure of the group at the European arena.

Extensive local, national and international research collaborations exist and there are also interactions with industry.

Scientific quality

Very good research activity with 81 publications and a number of patents. The work on Axl is published in journals of high impact.

Grade: Very Good.

Recommendations

The possibility that this group is included in the Translational Cancer group and an alternative organisation for the Clinical chemistry/Nutrition work should be discussed. A strategy must be made for securing long-term funding for the technological platforms.

Cellular Dynamics & Communication

Description

The research group is an interdisciplinary research team combining cell biology and biomedical science with micro- and nanotechnologies. The unit encompasses two research laboratories, one focusing on cell-to-cell communication, and a new laboratory named UnB (Unit for Nano and Micro-Systems in Biomedicine) that is establishing and developing micro- and nanotechnologies for cell biological and biomedical applications.

General comments

The group explores five research themes that build on the original TNT discovery as well as developed nano and micro materials. The group has extensive national and international collaborations building on their unique competence.

Scientific quality

Good research output, with 38 publications, for a group of this size with the TNT discovery representing the absolute highlight which is now further explored.

Grade: Good.

Societal impact

At the moment there is a focus on basic science but the work has a clear potential for clinical applications.

Recommendations

The TNT discovery opens up for important clinical and commercial applications. It is recommended that the leadership in the long term develops strategies for this, including necessary collaborators and funding schemes.

Matrix Biology

Description

This is a small research group that was recruited in 2004. The two PIs focus on integrins and proteoglycans, respectively.

General comments

The PIs are well recognized for their work in their respective fields. The research is including the generation of novel mouse models which has the potential to be particularly informative if studied in depth. The group has had problems to recruit MSc and PhDs, but includes a number of PhD students. They express a lack of scientific activity in matrix biology locally and nationally but they compensate by international collaborations.

Scientific quality

44 publications are reported for the period which is a good output for a group of this size.

Grade: Good.

Societal impact

The research is mainly basic but clearly has translational potential. The group has close connections with a biotech company that is exploring the role of integrin a11 in osteoarthritis.

Recommendations

The group should consider possibilities to expand its activities both in term of growth in the number of active scientists as well as to actively work to establish links with clinical colleagues.

Neurotargeting

Description

The neurotargeting group consists of 3 professors, 1 associate professor, 2 researchers, 2 postdocs and 5 PhD students. The group works on several different aspects of the enzymes PAH and TH, their evolution, structure, mutations and disease implications. The

main focus of the group has been the molecular mechanisms related to neuropsychiatric disorders. In addition, several aspects of regulation of gene expression at the post-transcriptional level have been studied.

General comments

The group was formed in 2006 by joining forces from three research groups to establish a multidisciplinary research environment. However, it is not clearly outlined how this multidisciplinary environment is translated into novel research avenues. Interestingly, they just received a large grant from the Jebsen foundation to set up a new neuropsychiatric disease centre led by the group leader and in collaboration with the biorecognition group. The multidisciplinary research environment provides good training possibilities. There are significant research collaborations at the local, national and international level including epidemiological studies. They also present industrial interactions.

Scientific quality

Good scientific output with 72 publications and additionally five patents.

Grade: Good.

Societal impact

The optimisation of mRNA targeting elements with the goal of considerably improving production of medically relevant proteins is already explored for commercial applications. The work on ADHD has clear translational potential.

Recommendations

The possibility that the work on mRNA targeting elements would be better developed in another group should be tested. The grant from the Jebsen foundation gives the group an important chance in terms of freedom to operate which should be optimally explored.

Translational Cancer Research

Description

This is a large research group consisting of 8 PIs with permanent positions and 2 PIs with temporary positions (researchers). The research centers around malignant brain tumours, tumour-host cell interactions and mechanisms of central nervous system metastasis. A well funded group where the research on malignant brain tumor biology is the best established.

General comments

The group has attracted significant competitive funding including at the European level. Additionally, the group has been instrumental in establishing the Molecular Imaging Center. The group constitutes a multidisciplinary research environment providing a good milieu for researcher training. Research collaboration is good at the local, national and international level and industrial links are present.

Scientific quality

There is a very good scientific output of 105 publications with many papers in high ranking journals such as Cancer Research.

Grade: Very Good.

Societal impact

Treatment of groups of brain tumors represent a great unmet medical need.

Recommendations

The leadership is recommended to continue the present work, to further develop the successful research environment and to focus on exposing their research in high impact journals. The panel would also recommend that they seek additional international research support. With their present research portfolio, they should be attractive partners in for example EU projects and other instruments.

Translational Signaling Group

Description

This is a large research group, including 4 PIs, with a focus on diverse cellular signalling mechanisms with an emphasis on improving the understanding and treatment of disease. The group has extensive collaborations with clinicians to perform translational research.

General comments

It appears that parts of the research areas have not developed much in the last years and there is a slight impression of an element of stagnation. The group presents a good training environment for translational medicine. The group was instrumental in establishing the proteomics platform, PROBE. They point out extensive interdepartmental collaborations and present extensive national and international collaborators and also industrial connections.

Scientific quality

Good scientific output with 50 publications, including publications in high ranking journals such as JBC.

Grade: Good.

Societal impact

There is a clear potential to identify novel targets for cancers such as leukemias and autoimmune disease. An interesting aspect is the search for anti-leukemic compounds from marine sources. They point out the importance of training in basic science and that this is more valuable than currently recognized by society and try to explore this whenever they have an opportunity.

Recommendations

The leadership is recommended to work strategically to assure continuous scientific development. The leadership should present a plan that counteracts the stagnation in the research group.

Molecular Imaging Center (MIC)

Description

This is a small national technology platform within RCN's FUGE-program which provides imaging services employing a fee for service system ranging from EM and confocal microscopy to whole animal imaging. It consists of 1 PI and a postdoc and highly specialized and skilled technical staff. An additional PI, the platform leader is affiliated with the Translational Cancer Research Group. Several other researchers, belonging to other research groups in the department are formally associated with the platform.

General comments

Overall, the facility is well equipped, well managed and well used. The facility provides also an element of training to the Norwegian research community.

Scientific quality

The scientific output for the users of the technology platform represents in general very good publications, in total around 100 papers.

Grade: Good.

Societal impact

The platform constitutes an important component in many research projects, and as such is expected to contribute to developments to improve human health, our environment and to provide for commercial applications.

Recommendations

The leadership is recommended to work together with different research funding bodies to secure the long-term funding for this facility. Different charge models could be tested. The possibility to complement the facility with PET/CT for small animals could be explored.

Proteomics Unit (PROBE)

Description

This is a small national technology platform within the RCN's FUGE-program, which in addition to providing fee-for-service proteomics services consist of 1 researcher who heads the unit and a 20% professor and highly specialized and skilled technical staff. The main research is focused on biomarkers for Multiple Sclerosis. A certain level of bioinformatics support is also included.

General comments

The unit has experienced problems to keep staff as proteomics/bioinformatics are expanding research fields. It is actively involved in training via MSc and PhD programmes and organizations of courses.

In summary, this platform constitutes a well functioning, widely used national infrastructure and the provision of specific technologies should be wide spread e.g. in relation to the Biotechnology Centre in Oslo.

Grade: Good.

Societal impact

This is an important facility for both health, biological and translational research purposes.

Recommendations

The long-term funding for this facility should be secured. This is particularly challenging in a technological fast moving field as proteomics. The down-stream bioinformatics component should also be considered and developed further. Different charge models could be tested.

The Gade Institute, Faculty of Medicine and Dentistry

Description

The Gade Institute has been affected by several administrative and physical reorganizations during the last eight years. In 2003, the Faculty of Medicine of UoB was reorganized from 30 to 7 institutes. In this process, two sections (Microbiology/ Immunology and Pathology) were merged into one institute. When the two Faculties of Medicine and Dentistry were fused in 2008, the two areas oral microbiology and oral pathology were added to this institute. In 2009, the research groups of Microbiology/Immunology were co-localized in new laboratory facilities within Haukeland University Hospital. Three persons today lead the Gade Institute: a head of institute, a head of research and a head of teaching activities. The two latter each leads a council for these activities. The institute has a common administration with Department of Surgical Sciences.

The research has since the last couple of years been divided into three thematic programmes: Infection, Inflammation and Cancer. Each of the areas has a leader chosen for three years. While project responsibility rests on the scientific leaders of individual projects, the three research area leaders' mandate is to stimulate the research groups to reach set goals, to create joint initiatives and goals within the theme, to apply for external funding, and to cooperate internally and externally. The department has access to several technology platforms, such as an animal facility, proteomics, bioinformatics, imaging and flow cytometry.

An overall strategy adapted to the recent (2010) policy and guidelines of the Faculty of Medicine and Dentistry has been formulated by the institute. This research strategy includes priority on translational research, strengthening of core facilities, a new imaging platform at Section for Pathology, increased collaborations and more support to apply for and financially handle external funding.

There are about 60 researchers (24 professors, 7 associate professors, 20 researchers, 11 postdocs) involved in the evaluation of the Gade Institute. Almost a third of the professors are females. There were 48 PhD students registered at the time of submission of the self-assessment reports. Between 4 and 7 students defended their PhD thesis each year in the period 2007-2009.

The external grants have almost doubled since 2007, and now comprise roughly half of the R&D funding at the institute. This is mainly the result of a considerable increase in grants from RCN, but also of new international grants. The EU funding, even if modest by international standards, represents quite a high proportion of the funding compared to other units in this national evaluation.

Follow-up on previous evaluation:

It is clear that both the faculty and institute have gone through major reorganizations with the goal to strengthen the research, well in line with the recommendations in the previous evaluation. This appears to have taken some efforts and energy, but there is clearly an ambition to focus more by creating fewer and larger units, and, at the level of this institute, defining three different research areas with appointed leaders for each. Together with the recent relocalization of research groups into one new laboratory building, this appears to have contributed to create energy and optimism for future development of the institute. There are however many challenges. There are still some small research groups and areas where the critical mass is absent. For certain areas, it appears that loss of key personal due to retirement represent an upcoming problem, since it is not clear that there are financial means to secure positions for the development of the research area. It appears important to develop a strategy to deal with recruitment, of professors/senior scientists as well as junior scientists with the potential to become new group leaders.

The combination of the research areas inflammation, infection and cancer should give ample opportunities for a strong integrative milieu to train PhD students, methodologically and intellectually. However it is not clear how well that integration has progressed throughout the reorganization processes, and the overall number of PhD thesis defences per year is not impressive. It may be possible, with available resources, to strengthen the training milieu and the production of PhD degrees. Perhaps the recent very positive development with respect to funding may contribute to stimulate this. It is not clear whether the administrative support (now shared between two institutes) is sufficient (in terms of number of staff and perhaps also of competence) to assist in the processes of writing national and international applications and handling grants.

Infection

Description

Infection is one of three programs at the Gade Institute. The infection program is led by one professor chosen among the group leaders in this research area. Three of the diseases covered by the research – tuberculosis, influenza and HIV – are within the general theme "global infectious diseases", prioritized by the institute leadership since 2003 as a niche area to focus on. The research is organized into autonomous groups, each led by an individual scientist: Translational and applied research in Tuberculosis (TB), Human Immunodeficiency Virus (HIV) and Influenza respectively; Proteomic TB research; Oral microbiology. The projects range from very basic to highly translational, including vaccine trials. There is synergistic overlap between these research groups, manifested in different projects.

There are altogether 8 professors, about 10 postdocs scientists and at least 142 PhD students conducting research in these groups. The infection groups are located in modern facilities in the New Laboratory Building of the hospital, with easy access to clinical departments, animal house, P3 laboratories, proteomics (initiated and led as a FUGE

platform by the proteomic TB group), imaging, sequencing, microarrays and bioinformatics, and flow cytometry platforms.

The Infection group´s research is well placed within priority research areas at the national and international level. This has contributed to a considerable boost in the amount of external grants in the last few years. Several of the autonomous groups have been very successful in the competition for grants from RCN, regional health authorities, EU and other grants. The focus on global infectious diseases is well illustrated by a large number of national and international collaborations that researchers of the institute engage in.

General comments on organization and strategy

The leadership presents a clear SWOT analysis, where the basic and clinical competences, international networks and increased external funding of the infection groups (of which the majority has female group leaders) are identified as major strengths. It is clear that there has been a very positive development as a consequence of reorganization both at the faculty and departmental level, since 2003. All this, together with the new localization in a modern laboratory building well integrated into the hospital, creates the opportunity for continued positive development.

There are also several remaining challenges. The department leadership presents limited administrative support for handling of international grants as a weakness and area for improvement in its future strategy. This appears especially vulnerable for a department with this type of focus in the research. The evaluation panel noted that the department shares its administration with another department, and poses the question whether the problem of international grant administration should perhaps be dealt with at a higher level, by establishing specialized competence serving several departments of the faculty. Furthermore, the increased external funding has mainly been generated by three of the autonomous groups, while two have a less impressive record, partly also reflected in the number of scientists engaged in the activities. For one of them, the HIV group, the upcoming retirement of the group leader creates uncertainty. The institute leadership has identified dependence on few senior scientific members to perform a variety of tasks as a weakness, but it appears unclear how they will deal with the issue when this is more or less an acute situation in one area of research. Will it be closed down, or can increased focus of co-infection (HIV-TB) studies provide a solution?

This type of situation can be avoided with a clear strategy to recruit and support young talented scientists to become group leaders in the future. Even if most of the other group leaders are young professors, it takes time to develop new scientific leadership, and it will therefore be important to implement a long term strategy for recruitment and career development at The Gade Institute.

With respect to PhD training, a program with this level of international collaborations, funding and scientific competence can probably raise its ambitions for training of future scientists. The evaluation panel realizes and understands that this has probably not been the priority during the reorganization and consolidation phase of the last years. However, with the new localization close to the hospital, and together with groups working in areas that fit in well for synergy with infection (inflammation and cancer), time may be ripe to prioritize this issue.

Scientific quality

The unit reports 174 publications in 2005-2010. There are several strong papers in the best specialized journals, but also many which are of lower to medium quality.

Grade: Good.

Societal impact

The focus of research on global infectious diseases implemented by the institute leadership has generated activities with high societal impact. This is manifested not only in good research and increased external grants, but also through the direct involvement of department staff in vaccine programs and health advisory positions at the national and international level. In addition, dental caries and periodontal diseases, the research areas of oral microbiology, are very frequent in the general population.

Recommendations

The leadership is recommended to continue its successful strategy to focus and integrate the research on global infectious diseases. The ambitions to participate in international collaborations and apply for international funding should be strongly supported, and it should be considered whether the latter may perhaps best be achieved by creating a specialized unit at the faculty level that can serve several departments with administrative competence. The institute should prioritize to develop a strategic program for recruitment and career development at all levels, including PhD students, young scientists to become future group leaders and senior scientists. The scientific milieu comprising also inflammation and pathology/cancer should be exploited to develop cross-disciplinary projects and training.

Uni Research AS, University of Bergen

As this level 1 unit contains only a single level 2 unit evaluated by Panel 3, the panel has only made level 2 comments:

Sars International Centre for Marine Molecular Biology (Uni Sars Centre)

Description

The Sars Centre for Marine Molecular Biology is a relatively young institute created in 1997 after an initiative from the Research Council of Norway (RCN), the Ministry of Research and Education, and the University of Bergen (UiB). Sars is organised into eight research groups and two associate groups each working on different aspects of development and evolution of marine organisms. The group leaders are employed for six years with the opportunity for an extension of an additional four years, a very attractive model which could be used in many other contexts in Norway.

General comments

The Sars Centre constitutes formally an EMBL node and the EMBL node status is critically important for the development of Sars. There are several project-specific interactions and collaborations with EMBL. An external Scientific Advisory Committee is in place. Sars is physically embedded within the university and there are many

collaborative projects with the university, including the bioinformatics unit, a joint graduate programme and open seminars.

The scientific profile is basic research exploring a diverse repertoire of marine model organisms. At first the repertoire of model organisms would appear exhaustive to an organisation the size of Sars. However, much expertise is shared between the groups, which contribute to the critical mass across topics.

The calls for group leaders are very broad; the purpose is to get the best possible group leaders. The only restriction is that they should work on marine animal development. This creates a dynamic development of Sars. The panel was somewhat surprised that only 10% of the funding came from competitive grants.

The increased flexibility of the organization which is associated with its status out-side the university under Uni Research is regarded as a significant advantage by the management and should, if possible, be maintained.

Scientific quality

The scientific output of the unit is overall very impressive although somewhat variable between groups.

Grade: Excellent.

Societal impact

The research groups have focused on basic aspects of organism development. In the current environment this is appropriate since Norway is building a reputation in the science of marine organisms. However, for the future the research could have significant social impact in fields of the adaption of marine life to climate change. There are possibilities to develop new model systems with relevance to important national and global issues.

Recommendations

The centre should produce a clearer long-term strategy including a long term funding scheme. The status as an EMBL node is seen as critical to maintaining the strong reputation of the centre and ensuring that the centre can continue to recruit top scientists. The centre should explore possibilities to develop research programs with impact in the area of the effects of climate change on marine animals.

There is strong capacity in the centre to train PhD students in a scientific environment of high standard, but this potential appears to be underused. Opportunities should be explored or developed to increase the student intake into the centre. This may also provide a mechanism to achieve greater engagement in the centre by Norwegian scientists.

The Centre has a good scientific profile but the public and political profile is not strong. The panel was also concern that the centre had not been able to achieve greater interest and participation by the Norwegian research community. The centre should explore avenues to “market” the Centre more effectively, particularly in Norway.

University of Oslo

Department of Molecular Biosciences, Faculty of Mathematics and Natural Sciences

Description

IMBV is organized into four programs (three of which are part of this panel) in all including 19 faculty members, 8 associated faculty, 23 technicians, 7 administrative employees, 35 PhD students, 18 postdocs/researchers, and ~40 masters students each year. The department is very active in terms of external collaboration and participates in a number of research networks: ProtStruc, GREC, GLYCONOR, (BIFF), MURES, and MERG. The department also is part of three centers of excellence: CIR, CMBN, CCB.

The panel felt there were two key issues facing the department:

1. The department has an unusual management structure. A representative governing board meets four times a year and has to approve all structural and strategic decisions. It hence has power over the Department head (who is also the chair of the board). So far it has not been a problem to get plans passed by the board. The Management group is a good structure but the main role of the board appears to be to provide a conduit into the University management system. The overall structure is complicated with a wide range of collaborative centres and four emerging top-tier groups. The chair does not see this complexity as a big problem, although there potentially could be conflicts of interest.

2. In the self-assessment the weaknesses listed are all related to factors outside the departmental organization. There appears to be little effort to accept responsibility for tackling these weaknesses internally. The net reduction in staff has likely stopped; it was caused by a reduction in base funding and the only way to reverse it is was to get more external funding. Some reporting is done by the administration.

The department management has been slow to identify thematic areas and build focus and strength across the organisation. There is a need for stronger leadership to define research areas and linkages. Management will need to be clear on the research groups and which collaborations that should be developed and it should place emphasis on building these strengths. This should include exploring alternative funding sources; in particular applying for EU funds. It appeared that there was lack of knowledge and support in applying for external funding sources; access to a proactive grants office is clearly required. It was argued that the research activities in the department did not necessarily match EU calls. However they could apply under alternative schemes, such as Marie Curie or ERC, where there is greater opportunity for defining the scope oneself.

As part of the development of key areas and themes, the Department should ensure that all necessary capabilities are available in-house or through collaborations. The decision to rely on external support for bioinformatics was noted but this will need to be carefully evaluated over time to ensure that the research groups, particularly the protein group, receive adequate support.

Recruitment of several staff over the next 5 to 10 years provides an opportunity for restructuring of thematic research groups across departments. This should be coupled with careful mentoring of currently poorly performing staff. The problems associated with the lack of tenure track system for academics and the high cost of PhD students was raised. These factors have limited the ability of the institute to make full use of their post-graduate teaching capabilities.

It would be beneficial if a stronger community spirit could be built within the Department. Although the Department holds joint department meetings and seminars these are not as well attended as desired. Similarly greater emphasis could be placed on internal collaborations, for example through funding for joint PhD projects.

Follow-up on previous evaluation

This department was established through a merger of sections of the Biology Department and the Biochemistry Department. The previous evaluation ranked the departments at good to very good and very good to outstanding, respectively. The previous panel also noted that there had been prior attempts to merge the two departments. The new structure addresses this concern. The evaluation also recommended increasing focus and improving collaboration between groups. This remains an issue for the department.

The Cell Biology Programme

Description

The cell biology programme is divided into four research teams and an electron microscopy (EM) unit, each headed by a professor. Additionally three professors at the Norwegian Radium Hospital are associated with the programme. The four teams have a total of 4 senior researchers, 4 postdocs, 12 PhD students and 7.5 technicians. The research performed in the teams is focused on intracellular vesicular transport mechanisms, post-translational modifications, immunological defense mechanisms and electron microscopy.

General comments

This has been a strong and very productive group. However, the group has struggled to broaden its funding base and this has weakened the ability to create flexibility. There are structural issues within the department and the research framework in Norway that have hindered the growth of this unit. However, the research leaders have not made full use of their strengths. In particular, interactions and collaborations between the different research groups in the group have not developed as anticipated and the groups have been unable to attract EU and other funding at a reasonable level.

Scientific quality

This unit contains some outstanding research teams that have been highly productive. However, it also contains some who have not performed well and have only few resources.

Grade: Good.

Societal impact

The four research groups in this unit are working on intracellular vesicular transport pathways, protein modification and immunological defence mechanisms. These are all important areas both as basic research and in terms of translational potential. The groups are also actively involved in teaching both undergraduate and postgraduate levels.

Recommendations

While it is noted that the groups have extensive collaborations with other researchers in Norway, Europe and elsewhere, they should explore opportunities to develop joint research projects within the unit and with other members of the department. This will help them build capability and cohesion. The researchers should also place far greater emphasis on seeking external funding from the EU and other international sources.

The Programme for proteomics, protein structure and function

Description

The programme is divided into four research teams, all working on aspects of structure-function analysis of various, primarily bacterial, proteins. Each group is headed by a professor. In total these groups consist of (in addition to the four professors) 5 senior researchers, 7 postdocs, 9 PhD students and 3 technicians.

General comments

The key issues facing this unit are the maintenance of existing equipment platforms, the purchase of new equipment and specific know-how. Declining staff numbers has exacerbated these problems with some of the key experts being hired on short-term contracts. The panel also felt that the group will need to clarify its approach to accessing and securing the advanced bioinformatics support that will be necessary to maintain strength in protein analysis.

The group has become involved in many collaborations with other universities in Norway in joint efforts trying to improve access to expensive equipment but this has not resulting in significant new funding for this group.

The panel noted that there have been protracted discussions and negotiations around the development of a new national high-field NMR facility. Several groups, in addition to the UiO Protein Group, expressed frustration that this issue has remained unresolved and has hindered and slowed down protein research in Norway.

Scientific quality

The scientific capabilities of this unit are limited by difficulties in accessing some key infrastructure and in maintaining stable technical support. The broad focus, diverse activities and large number of collaborative projects have also hampered some groups from achieving strong scientific performance.

Grade: Good.

Societal impact

The research groups within the Protein Programme tackle a wide range of biological problems and systems. They have particular expertise with bacterial proteins and provide an important skill and resource base for other groups.

Recommendations

The key concern for the Protein group has been the maintenance of equipment and facilities and accessing funds of equipment upgrades. There is an opportunity to extend formal collaboration within UiO. External collaborations with other institutions and industry may help securing funds to support bioinformatics and advanced instrumentation and infrastructure. The group could also apply for equipment in collaboration with departments using similar equipment for different projects. The department should also consider working to establish a biophysics core facility within the university.

The number of research topics should be consolidated into fewer priorities.

The Programme for genomics, gene regulation and gene function

Description

The Gene Program is an association of research groups with related interests in gene regulation, but with different departmental and scientific backgrounds, experiences and perspectives. Faculty in the gene programme belonged to different departments prior to 2004, but since 2004 when the department was established all members of the Gene Program are now based in Department of Molecular Biosciences. The programme consists of seven research groups, six headed by tenured faculty members and one by an externally funded associate professor. In addition 3 senior researchers, 9 post docs 17 PhD students and 4 technicians are part of the programme. This is indeed a very diverse unit; diverse both in terms of the research areas and in the size and productivity of the individual groups. Cohesion within the unit is further complicated by the involvement of members in a range of broader research initiatives.

General comments

Given the research strength of some of the groups, the difficulties in attracting funding indicate lack of effort, expertise or support in relation to grant applications.

Scientific quality

This unit contains some very strong research groups that have been highly productive. The score represents an average from across a very diverse set of projects and capabilities.

Grade: Good.

Societal impact

The individual groups address a diverse set of biological problems. Although the research effort is focused on basic science, this unit provides key capabilities within the university.

Recommendations

This unit would benefit from the development of a more focused and structured research strategy within the department. In particular, the department should prioritise the various research groupings they host. This would help them place efforts and resources in developing the program in directions which are most likely to grow and become successful. The strategy should include greater involvement and support for applications for funding to the EU and other international sources. Greater effort should be made by management to address the low performance by some groups.

Institute of Basic Medical Sciences, Faculty of Medicine

Description

The Institute of Basic Medical Sciences (IMB) carries out preclinical and masters level teaching and research across seven core research themes, Cell and Molecular Biology, Organ physiology, Immunobiology, Neuroscience, Behavioural research, Nutrition science, Biostatistics, epidemiology and modelling of biological systems, with a total of 22 research units (groups). Some of these groups are affiliated to national or Nordic Centres of Excellence (CofE), though the two level units reviewed by panel 3 (Cell and molecular biology and Immunobiology) are not involved in a CofE. The organisational structure is streamlined, with the head of IMB working closely with a head of administration and a head of technical support as well as the seven theme leads. Each theme leader has a good level of autonomy and the level 1 management committee has a degree of freedom to influence the development of the groups within their theme, through allocation of resources (consumables funds and technical support). The variable size of some of the research groups at level 2 and their scientific quality was acknowledged as an issue by the theme leads and the dominant approach to overcome this was to try and encourage the smaller groupings to work closely with larger more productive groupings, though with limited success to date. The funding level is approximately 50% from the university and 50% from external grant income, with a notable fall in EU funding from 2007-2009. Increasing EU funding was a target at level 1, but not apparently at level 2 as the theme leads felt there was no obvious incentive for them. The evaluation panel rated the overall research activity of both of the two level 2 units assessed as very good, though the quality within these units was not uniform.

Students receive broad training and there is particularly good industrial relevance as the Cell and Molecular Biology theme has links to several spin out companies. Instrumentation is sometimes under used due to researchers not being competent and relying on technicians, this should be addressed perhaps by better training for PhD students or more investment in retraining of the existing technical staff. Mobility of students and postdocs is variable and the attitude towards international interaction was variable amongst the themes. Mobility was quite good in the CMB theme, with many spending periods abroad, also almost one third of PhDs or postdocs are non-Norwegian. Mobility was less good in the immunobiology theme and lack of funding for visits abroad was one of the issues.

There exist very good national and international collaborations for the larger groups, less so for the smaller ones. The immunobiology grouping attempted to gain CofE funding

with other Oslo partners and has links internationally too via EU funding. The CMB group being larger is also better linked in internationally via the activity of the larger groups, with many papers joint with researchers across Europe and also in the US and Asia.

The research in the Cell and Molecular Biology unit has had very good societal impact, with further potential for impact in the future. The research in this unit has led to the setting up of spin out companies, thus having health and economic benefits. The research in the area of cardiovascular disease CVD and stem cell biology is potentially of high health benefit and would be good topics for public dissemination. The research of the Immunobiology group in relation to Rheumatoid Arthritis and Multiple Sclerosis will also have impact potentially in health terms, but the immediate impact of the very basic research of the NK cell grouping is less obvious.

Follow-up on previous evaluation

The IMB has undergone a major restructuring as a result of the last evaluation, organising its groups into themes, co-locating to a single building and pursuing involvement in national and Nordic centres of excellence and technology platforms. IMB also strategically removed one area – anthropology. IMB now carries out research across the seven core research themes mentioned above. Finance and administration have also been reorganised: the institute is co-ordinated by the head working with the seven theme leaders as well as a head of technical staff and head of admin, giving a tight knit structure but also central reporting and decision making. Research leadership is very much at the theme level and the individual groups have a certain level of autonomy. Some of the themes with research groups consisting of only one scientist may benefit from cross-collaboration with other groups with similar interests. Central funds are available for consumables, PhD students and to some extent for equipment, though awareness of these funds was not present in all level 2 units. Funding is increasing gradually but not much more than inflation. EU funding has fallen dramatically in recent years.

The age profile of the unit is skewed towards older PIs and this is due to low staff turnover. The unit needs to address this and try to hire new younger faculty. The smaller groups in the CMB unit should consider either fusing (for example the autophagy and apoptosis groups would appear to have some common interests) or working more closely with the larger groupings to improve their competitiveness. The unit should attempt to increase its EU funding.

Immunobiology

Description

The Immunobiology group is focussed and well integrated working on two areas: NK cells and Autoimmunity and with 15% of their papers across the two groups. The group consists of 6 PIs (one emeritus), 7 postdoctoral researchers, 10 PhD/MD-PhDs and 4 technicians.

General comments

The NK cell group is well established and among the world leading in studies of these cells and their receptors in the rat. However, their use of the rat as a model system may limit interaction with other immunologists who tend to work in mice or humans where

more reagents an/or experimental tools are available. The autoimmune research in MS and T cell migration work is internationally well recognised. The group applied for a CofE but was not successful and the panel felt that it was a missed opportunity that they did not work with the grouping that was successful. The panel also felt that both groups should move to increase their translational work. What is the strategy for getting funding, in particular from the EU and other sources? They have some but not much EU funding, and found it very demanding to apply for EU money. This was clearly a weakness. Another weakness was the bioinformatics situation. No strategy was in place and the group found it difficult to handle this via the national platform.

Scientific quality

The groups are publishing very well with many significant papers in higher impact journals. Overall the quality was assessed as very good.

Grade: Very Good.

Societal impact

The department has impact on society through its basic research activities and their translational potential, in addition to a substantial teaching effort.

Recommendations

The panel recommends that the exclusive focus on rat models in some of the projects is reconsidered. A better strategy for attracting international funding should be established. Similarly, in the case of the general area of bioinformatics support, a strategy needs to be created.

Cell and Molecular Biology

Description

The Cell and Molecular Biology unit is a rather large research grouping with 11 PIs, 16 postdoctoral researchers, 27 PhD students and 12 technicians having a broad interest spanning from biochemistry through physiology to immunology. 40% of the staff are female PIs and the group is very international. Only 5% of papers are across the separate groups, so they largely function independently.

General comments

The units have undergone major reorganization, where the development of thematic research units has forced people to work together and increase productivity. However, 95% of the publications are not across groups and the notion that it often is easier to collaborate with external partners remains. Joint seminars have been organized both within units and between, but the attendance is poor.

As in other cases in Norway the level of EU funding was quite low. The university has set up an EU office to help with the legal matters around applying. There is a push from the top of the university to obtain more such funding. However, there is not really a strategy for how to secure that there is substantial incentive further down in the system. Whereas there is money to purchase expensive infrastructure equipment, but there is no central money to repair and maintain it. The PI expressed a concern in relation to bioinformatics.

The national platform does not really have the flexibility to deal with individual problems in specific groups, and the bioinformatics analysis is seen as a bottleneck.

Scientific quality

One concern is that the paper output is highly variable – from 55 to 5 for the different PIs in a 5 year period. This is mainly because half of groups are single PI led or consisting only of two to three individuals, making it a real struggle to be competitive. The theme lead is aiming to encourage some of the smaller groups to link with the larger groups, whilst still maintaining their identity. Despite these issues the scientific quality was judged to be very good overall.

Grade: Very Good.

Societal impact

The department has impact on society through its basic research activities in addition to a substantial teaching effort.

Recommendations

The panel recommends that the department is consolidated into fewer, productive groups with critical mass. Less productive single PI groups should be discontinued. Such a consolidation will also provide a better training environment for young researchers. In order to increase the level of EU funding a concerted effort with the university is needed. However, it is paramount that a model of the local incentive is established.

The Biotechnology Centre of Oslo/Centre for Molecular Medicine Norway

General comments

These are institutions which in part have been established since the previous assessment and have been completely revamped following a complete turnover of staff in 2002. The organization has been developed in a unique set up in Norway. Young PIs are recruited internationally with a high profile and are offered posts along the model of EMBL, that is 5 years initially and then a renewal for additional years subject to satisfactory performance against a set of criteria. The concept is excellent and could be a blueprint for other initiatives in Norway to overcome the problems associated with recruiting young staff against a widely ageing research staff population across the rest of the university sector. The panel concluded that this programme has serious merits and it is important that it is seen as a way forward. Staff recruitment for the Centre for Molecular Medicine implementing a "bench to bedside" concept is still ongoing.

While the general structure or the organisation was viewed very positively, it was clear that the scientific scope of what was being covered at the Biotechnology Centre and the Centre for Molecular Medicine was far too wide. It also appeared that the mentorship for the young scientists (particularly in terms of management of research teams) was not in evidence. Some of the difficulty in getting top quality publications appeared to be related to high staff turnover. Two of the tenure-track posts were very much "super tech" types relying on individuals providing a service and there was insufficient support for the

individuals to develop their own lines of research concurrently. Too wide a service base was being asked of them without appropriate mentoring.

The units were considered under three separate scientific headings. The sums allocated to the units seemed inadequate for the broad scope of science being tackled. The technology platform posts were perhaps trying to cover too wide an area and one of the young PIs with responsibility for setting up bioinformatics structure appears to have struggled to provide both a service and to carry out original research. Bioinformatics research for whole genome analysis requires major input from biologists and the biology positions in the Biotechnology Centre were not necessarily geared in to provide the biological input required for a fully ground breaking bioinformatics initiative.

Integration of research infrastructure with existing strengths e.g. through the FUGE bioinformatics support might in retrospect have been a more productive way forward. The proteomics platform had provided a much better interaction between support and innovative research. The comments of the young PI however indicated that in order to provide the broad base of proteomics support required by the unit it might well have benefitted from additional infrastructure support.

The most recent appointee is in structural biology providing a focus from neurobiology and cell biology to molecular studies. There was also high-throughput screening within the competencies and again there was some concern in relation to the scope of the activity when taking the level of core resources into account. Whilst there is activity to bring in more external funding, it is a large call to expect young investigators to compete very effectively whilst getting laboratories and groups up and running. It was felt that there was too much reliance on local support and that international mentors, including the EMBL infrastructure, could be tapped into to provide advice to both the overall governance of the centre as well as the support for individual scientists to develop their careers.

There is a prestigious internal Scientific Advisory Board but some disquiet was expressed in relation to members of the advisory panel remaining in place for a second period of four years. It was felt that the SAB members should be replaced in rotation at maximum every three to four years to maintain impartiality.

Cancer Biology and DNA Repair

Description

The Cancer Biology and DNA Repair team consist of three units with a number of group leaders who have all been recruited through international calls. The group leaders are of different nationality including Norwegian, and one group leader repatriated from the UK. There are also 3 post-docs. All staff are under 45 years old. The structure of the Biotechnology Centre and its units has been highlighted in the level 1 description. Within the Cancer Biology and DNA Repair unit there is a spread of research activity e.g. the development of a C. elegans model is described very briefly and external funding has been obtained.

The recruitment of staff has been from very prestigious cancer research groups which provide an excellent source of ready made collaborations. The recruitment of group leaders has been staggered starting in 2005, continuing to 2009. All staff appear to have

joint appointments with the University of Oslo. The three group leaders are experts in protein kinase C, prostate cancer and DNA repair genetics, respectively. The postdoctoral scientists are non-Norwegian, are all female and the age span is slightly younger but overlapping with the group leaders. None of the group leaders or postdocs is clinically qualified and this could be important in relation to establishing a research presence in a major clinical condition. There are 9 PhD students currently being supervised in the unit, while one group leader in addition supervises 3 students in Cambridge where he moved from.

General comments

With a relatively small team the spread of activity may need to be given careful consideration as should the promotion of interaction with clinicians in the University Hospital in the cancer area. An example is the development of a cancer model with C. elegans, which is restricted to one group leader. The use of model systems is highly susceptible to "fashion" and a strategic decision needs to be taken in relation to the future direction of the unit in developing areas where only one group leader is involved.

There does not appear to be a highly cooperative culture amongst the three group leaders. With the duration of funding, the need to reapply for renewal of posts and the narrow age range of the group leaders, and postdocs, it is envisaged that the environment is likely to be very competitive internally. Support locally in addition to the existing collaborations of the group leaders would be regarded as extremely important. The sharing of methodologies and infrastructure across the groups would also be seen as an important ethos to encourage. The expectations of this young team are high and it is important that the team are facilitated through a management structure to allow them to deliver of their best. Synergies across the technologies available from the three PIs should be identified and exploited to their mutual benefit. This also applies to the other units in the institute.

Scientific quality

The group leaders have impressive CV's although there is a variation in the publication rate of the different group leaders. The unit staff has published 116 peer reviewed papers in the past ten years although there has been a lag time in the commencement of publishing after becoming established in the unit. The funding situation is that the group leaders are given support, but that after 7-8 years they will be expected to raise substantial funds themselves and there is clear evidence in the case. This is occurring by establishing networks as evidenced by examination of corresponding esteem indicators.

Grade: Very Good.

Societal impact

The area of cancer research is extremely important and relevant to the area of human health. It is essential to have world-class research in this area for a developed country. The team is of global standing.

Recommendations

The area is ripe for investment. The focus may be too wide and it may be that this should be considered in relation to this unit and the signalling unit. Funding is good but the ambitions for the research are very far reaching and more investment together with a real strategic focus is required in order to fully exploit the talents and investments, which are

being made. A serious link with clinical colleagues locally and nationally is required to give full support to the excellent group leaders who have been recruited. The future plans in pharmacogenomics for example seem to be asking too much of the team. The biobank material availability is a great bonus. The use of the EMBL infrastructure to support the management needs of the group leaders must be used fully to derive the maximum benefit from this investment. The employment of young staff is a real winner in terms of the age distribution and its consequences elsewhere in Norway. Therefore it is essential to support the venture fully and to have realistic objectives for the team. The area where most new medicines have been developed is in the antibody area, but this is not really being explored. Availability of suitably qualified technical staff has also been raised as an important consideration.

Mapping Structure and Function of Supramolecular Complexes and Signal Networks

Description

The unit which is the biggest of the units in the Biotechnology Centre consists of a group leader /centre director, three Group Leaders, one of which is not formally part of the review, 6 senior researcher/researchers, and 8 postdocs. Two of the senior researchers also have project manager titles. Four of the research staff have moved on since December 2009 and staff turnover has been commented on. The group leaders are all under 46 years old and the director is also a Norwegian professor of Medicine at the University of Oslo. He has been the Director of the Centre for Molecular Medicine since its inception and is the driving force behind the further development of the funding model. The other group leaders are international and are all male. There are 8 PhD students being supervised by the group leaders. Postdocs are also supervising students and the age distribution is also similar. Many of the postdocs are female. The distinction between group leaders and postdocs is not very clear from the CV's as many of the postdocs are also supervising PhD students and are publishing independently.

The unit activities include proteomic analysis, biochemistry, structure/function studies, immunology, cell biology and bioinformatics with focus on cell signaling and supramolecular complexes. The remit of the unit is also to establish a bioinformatics platform to support the other groups in the Biotechnology Centre with cell signaling as a theme for research around which the bioinformatics platform is focused.

General comments

The bioinformatics platform technology required to support the range of research both in this unit and in the other units of the Biotechnology Centre is a major undertaking. There has clearly been a conflict between establishing an independent research effort in the area and establishing the broad scope technological platforms required in relation to macromolecular interactions.

Scientific quality

There have been 100 publications from this unit, many in very high ranking or good quality journals. Some of the contributions are excellent and others less so, giving an overall grade of very good.

Grade: Very Good.

Societal impact

The work underpins the Centre for Biotechnology and it importance in training graduate students. The work supports the projects in cancer and neuroscience in the other units of the centre.

Recommendations

It would be good to see more synergy and joint publications amongst the members of this essentially technological team and the other units. This unit needs its aims redefined in terms of the support it offers to the other units. There is a need for a technological base and certainly for bioinformatics analyses. However, the need to carry out technological advances in the context of an overall scientific/clinical goal is very important. It is not possible to be totally self-sufficient and many technological aspects could be established as part of collaboration. The proteomics analysis is very important and would be an excellent platform to facilitate the prostate cancer effort or the C. elegans research for example.

Neurobiology

Description

This unit consists of 2 group leaders. Hiring of group leaders has been ongoing in the 2005-2010 period. One is an expert in synaptic transmission of amino acid transporters and a second was appointed more recently in 2009 and is interested in glial cells specifically aquaporins as molecules of relevance in the blood brain barrier. In this group multi-photon imaging techniques have been established. More recently a new group leader has been recruited and works on membrane ion pumps, which are highly relevant to neurobiology, cardiology and kidney disease. This group leader belongs to another unit although his work is also relevant to neurobiology.This group leader is not a formal part of the review process. All group leaders are male and are under 46 years old. There is one senior researcher who is female, two postdocs and one researcher of whom one is male. There are currently 8 PhD students being supervised. The team is international.

General comments

There is a spread of scientific activity across this group and the same theme in relation to inter-group collaboration is applicable. The development of imaging as a platform technology has taken time with excellent images being produced. There has been a high turnover of post-doctoral staff in this unit.

Scientific quality

The group leaders have excellent CV's and both group leaders being evaluated have published in top tier journals. However, setting up the imaging has taken a lot of time and this has affected productivity for some personnel. There is evidence of international esteem.

Grade: Very Good.

Societal impact

The area of neurobiology is extremely important in countries where life expectancy is such that an ageing population with its associated neurological problems can be assisted. The group is carrying out fundamental research but should be encouraged to develop

closer links with the clinical neurology department to provide a societal context for their research.

Recommendations

The unit is making progress but appears to be working as separate groups and in view of the small size of the unit it is important that a critical mass develops. The new group leader is in a different area again and it is hoped that there will be strong encouragement to use the imaging techniques by all three group leaders to develop a true critical mass as a research group. This would be an excellent resource for Norway and put the team in a position to compete seriously internationally in this important area. Funding should be focused to allow synergies between this unit and the other units of the Biotechnology Centre to develop.

Division of Diagnostics and Intervention, Faculty of Medicine, University of Oslo and Oslo University Hospital

General comments

Division of Diagnostics and Intervention (DDI) is part of the Institute of Clinical Medicine, one out of three Institutes of the Faculty of Medicine at UiO. DDI is a large unit of 2,200 employees in eight different departments, most of which are localized at three or four different sites of the university hospital system. The division has been created in a recent merger of different hospitals, where their disciplines of laboratory medicine including pathology, as well as radiology and intervention medicine, have been integrated into one administrative unit. It is lead by a Head of Division holding joint position with the hospital and the university, reporting to the Head of the Institute of Clinical Medicine (UiO) and the hospital director (OUH). The division is divided into eight departments, four of which are evaluated below by panel 3 as level 2 units. The eight Department Heads form the Division Research Board, lead by a Division Head of Research. Most key leader positions are joint appointments by UiO and OUH. The division hosts five centers of excellence (in Immune Regulation, Molecular Inflammation and Immunology, Molecular Biology and Neuroscience, Research-Based Innovation, Stem Cell Research).

Close to 50% of the research is funded by external grants. EU and other international grants make up one tenth of the external grants, which is rather low. There are 60 professors, 62 postdoctoral fellows and 85 PhD students, and an additional 35 scientists with PhD degrees. There are several technology platforms and core facilities (e.g. transgenic animals, structural biology and bioinformatics, protein mass spectrometry, advanced imaging and robotics).

Follow-up on previous evaluation

Overall DDI presents as an excellent research environment for integrated basic and clinical research, with several very strong research groups and centers, technology platforms and publication record. The units were not represented in the same organizational context in the previous evaluation, and it its therefore difficult to follow this up at the division level. It is however clear that the hospital and medical faculty have gone through a major reorganization where one of the goals clearly is in line with the recommendations in the previous evaluation: to focus research via consolidation of research groups and implementation of a stronger scientific leadership structure. The unit has impressed in the self-assessment as well as in the discussions with the evaluation panel. There is a strong ambition here, and an a solid base formed by the centers of excellence, by many strong research groups, well established internal as well as external collaborations, and a well motivated and clear joint leadership anchored in the University as well as in the Hospital. There are also several challenges, e.g. that each department is localized in three or four different sites, and that many small research groups or physician scientists work with only loose association to environments that form a critical mass. Other areas for improvement, which the leadership seem well aware of and are already dealing with, relate to low transparency concerning how internal resources are distributed to research activities and how these funds may be used to recruit young scientists or new group leaders in a career development program. Most recruitment is now at the postdoc level, without any clear follow up for tenure track positions. There is a newly built facility to store biobank samples, but it appears important now to develop the management on how samples are stored and used. The general funding is strong, although the ambition of such a strong research environment should be to increase external funding to more than 50%. This might be possible through a higher proportion of international (including EU) grants – even if this proportion is today high compared to most other institutions in Norway, it is low compared to many international institutions.

Department of Medical Genetics, Division of Diagnostics and Intervention

Description

The department is organized in four sections, and most full time researchers belong to one of them, "Research and Development". The research is divided into two main subjects: 1) Molecular genetics (including Genetics of rare disorders, Genetics of common disorders, Epigenetics of immune mediated disorders and Molecular Cancer Research 2) Clinical genetics and epidemiology (including Cancer genetics and epidemiology and Clinical Genetics). The full time researchers work mainly in Molecular genetics, while the research in Clinical genetics and epidemiology is performed by physicians and genetic counsellors who also engage in clinical duties. The department runs two core facilities, in High throughput DNA sequencing (national core facility) and in Linkage analysis. Because the department covers the medical genetics in a population of 2.8 million Norwegians it has access to the largest collection of patients with genetic disorders in Norway In 2010, there were 11 scientists of whom close to half were consultant physicians, 9 postdoctoral fellows and 10 PhD students. There are 3-6 dissertations every year. There are widespread national and international collaborations. There has been a major reorganization since 2004, due to a difficult situation in the preceding years following conflicts and a legal dispute at one of the hospitals departments. There was only limited activity and funding during 2002-2003.

General comments

The department leadership presents a clear SWOT analysis, where the increased importance of genetics, the department´s position between research and clinical diagnostics, its collaborative networks, its state of the art technologies and access to unique patient material form a base for future development. The leadership also appears to have several strategies in place to develop the department and handle some of the weaknesses. This includes the formation of larger research groups through follow up and dialogue with scientists representing too low critical mass. It also includes a program to recruit and stimulate at the senior postdoctoral level to support new future group leaders. Five such positions have been launched during the last year.

Overall the difficult situation 2002-2003 has been dealt with in a remarkable way, and the strategic decision 2006 to position the department within high throughput DNA sequencing as a key technology has contributed considerably to this. There has been a very positive development in scientific activity, reflected in the numbers of publications, dissertations as well as the level of external funding. There is however still variable group sizes and uneven distribution of publications among the researchers. It is also important to focus more on research fields initiated and led by researchers at the department, even if it is reasonable, in a department dealing with clinical genetics, to have also projects where the department collaborates as a provider of specialized technology.

The department needs to implement a strategy for bioinformatics, which appears to be a bottleneck in many situations. This is an area where training and strategic recruitments are needed. Furthermore, there is no consensus regarding the optimal organization – should bioinformaticians form their own critical mass and milieu, or should they be integrated in strong biology groups?

Scientific quality

The unit reports 308 publications in 2005-2010. There are many strong papers in the best specialized journals, and several articles in the top general journals.

Grade: Very Good to Excellent.

Societal impact

The orientation of the research towards human genetics impacts on society in many different ways. Improved knowledge on rare genetic diseases can result in improved diagnosis, care and genetic counselling. Research on the genetics of common disorders can provide new insights into pathogenesis and pave the development for novel prevention or treatment strategies.

Recommendations

The leadership is recommended to continue its strategy to consolidate the research groups, to focus the research into strong areas, to recruit talented, new group leaders, to exploit the opportunities related to competence in DNA sequencing and access to a large biobanks, and to develop a strategy for the integration of bioinformatics competence. The solution for the latter problem may be approached also in a national perspective, as discussed elsewhere in this report.

Department of Microbiology

Description

The department comprises 10 research groups conducting research in three main areas 1) Genome stability and gene regulation, 2) Developmental biology and stem cell biology. 3) Microbial pathology, epidemiology and diagnostics. These three areas form an integrated environment based on common methodologies such as bioinformatics, molecular genetics (prokaryotic and eukaryotic), protein purification, protein 3D structure, mutant analysis, imaging, stem cell and transgenic technologies. The Department contributes about half of the groups in the Norwegian Center of Excellence for Molecular Biology and Neuroscience (CMBN, formed 2002) and also a part (and the directorship) of a Norwegian Center of Innovation Research on Cancer Stem Cells (CAST, formed 2007). The department also runs two regional technology platforms, on transgenic animals and Structural biology and bioinformatics. The department has mentored 20 postdoctoral fellows and 22 PhD students (20 additional in progress 2011) over the past five years. The external funding has increased by a factor of three since the year 2000, and now represents about 75% of the total budget. During the same period, the scientific staff has increased from about 40 to 100 persons. There are well established collaborations internally (32 papers with authors from two or more MIK groups since 2005), as well as the national and international level.

General comments

The department has several excellent research groups, a solid funding base and an excellent local scientific network manifested for example in the CMBN and CAST centers. The strategy to integrate research interests and technologies in order to improve research quality has been successful, as evident from publication records and external funding. The hospital merger, which slows down the research work due to administrative tasks, and the lack of co-localization of the department´s groups represents challenges.

Three new research groups led by young investigators have been formed during the past five years, and five senior postdocs/PhDs are supported by group leaders to become independent researchers. Nevertheless, it is still somewhat unclear whether there is an explicit, transparent strategy for recruitment of young promising PIs and whether there are clear goals set and followed up for postdocs with ambitions to become independent group leaders.

There is a plan to integrate the CMBN and CAST centers into the core funding when the external funding. A part of the strategy is based on increased EU funding, which has increased, but is still not impressive by international standards.

Scientific quality

The unit reports 260 publications in 2005-2010. There are many strong papers in the best specialized journals, and several articles in the top general journals.

Grade: Excellent.

Societal impact

The research areas of the department are highly relevant for today´s disease panorama (e g degenerative and infectious diseases) and the future development in medicine (e g stem cell based regenerative medicine).

Recommendations

The leadership is recommended to continue its so far very successful strategy to stimulate integrated research interests and technology platforms. The program to support senior postdocs to become independent researchers should be extended beyond one year, with clear goals and follow up strategies communicated to the potential future PIs. Smaller research groups should be given ample opportunities to associate to the intellectual and methodological milieu of the established research groups and centers. The ambitions for international (including EU) funding should be raised, and this may be stimulated by support resources organized at a higher (Division, Institute or Faculty) level.

Department of Immunology

Description

In the reorganization of the hospital and university structure, this department has been formed by a merger of the Institute of Immunology at Rikshospitalet and Department of Immunology at Ullevål University Hospital, including the Blood Bank of Oslo. The department comprises nine research groups, headed either by a university professor or a senior researcher/senior consultant at the hospital. These groups conduct research in three main areas 1) Molecular and Cellular Immunology 2) Functional Immunogenetics 3) Complement and Innate Immunity. The research environment is integrated with several common technology platforms, regular common IMM project seminars/journal clubs for all the trainees and also seminars by internal or internationally invited scientists. The research is also integrated with the two other core tasks of the department, clinical immunology/blood bank services and teaching or immunology and transfusion medicine. The Department hosts and contributes about half of the groups in the Norwegian Center of Excellence for Immune Regulation (CIR, formed 2007). The department also runs two FUGE funded core facilities in proteomics, the mass spectrometry oriented Proteomic Core Facility (PCF) and an antibody array analysis laboratory. A total of approximately 100 scientists are active at IMM, and more than 30% come from countries other than Norway. There are 5 professors and 20 additional PhD´s (senior scientists or postdoctoral fellows). The yearly average number of PhD students undergoing training is 13, and 34 students have defended their thesis 2005-2010. The funding has increased significantly during the last 5 year period, and includes an unusually strong support from hospital funds, a recent prestigious ERC grant to one of the PIs, and several other EU funded projects where IMM PIs participate. There are well established collaborations internally, as well as at the national and international level.

General comments

All research groups at IMM are very active, and some of them represent excellent science competing at the highest international level. The leadership has apparently been successful in their ambition to integrate at several different levels, e g the consolidation of research into three main areas, the IMM common program with regular meeting for trainees, and a concerted action with clinical activities and a strong support for research from the hospital. The move of one of the "external" CIR groups to facilities within IMM (and conversely, the move of one group from IMM to a center at another department where several other groups conduct similar research) indicates an active leadership working to strengthen the research environment. The department thus seem to have handled the reorganization and merger very well, even if the leadership points to remaining problems: one research group is still not fully integrated, there is a lack of

space to recruit new groups, and the merger has caused an increased administrative work load.

The formation and funding of CIR has obviously contributed strongly to the integration and development of the department. A recent ERC grant to one of the PIs and the declared status of CIR as a FOCIS (Federation of Clinical Immunological Societies) Center of Excellence illustrate the international recognition of activities at CIR/IMM. Several other PIs at IMM have won national or international prizes during the last five years. It is important that the momentum created by CIR continues to influence the overall milieu, not only at IMM, but also other immunology-oriented research at the university.

Several young scientists have been recruited in the recent years, but like in many other departments under evaluation, it is unclear whether there is an explicit, transparent strategy for recruitment of new promising PIs. This is particularly important in excellent scientific milieus with a strong funding base like IMM, which could set examples for the Norwegian system as a whole. If most of the recruitment is at the postdoctoral level, are there clear goals set and followed up for those with ambitions to become independent group leaders? Is recruitment ever conducted at a higher level, e.g. for junior or even senior PI positions?

Scientific quality

The unit reports an impressive record of 538 publications in 2005-2010, with many strong papers in the top specialized journals, and many articles also in the top general journals.

Grade: Excellent.

Societal impact

The research areas of the department are highly relevant for modern medicine and its basic as well as clinical science has a direct impact in the health care system of today and tomorrow (e.g. improved methods to diagnose and treat autoimmune diseases, transplantation procedures). It should also be noted that many of the PhD´s trained in the department go on to become clinical specialists and researchers in relevant areas.

Recommendations

The leadership is recommended to continue its so far very successful strategy to focus and integrate the research. IMM provides an excellent milieu for the development of new groups, and it is therefore important to work at the department, division as well as at the top university and hospital levels to solve issues like insufficient space and lack of structured programs for recruitment and follow up of new junior PI/group leaders. The success of some groups to obtain international (including ERC and EU) funding should be used to stimulate and instruct other researchers to apply successfully to these sources. Similarly, the scientific and visiting scientist programs of CIR should be used to stimulate immunology research in general at the university and hospital.

Department of Medical Biochemistry

Description

The department´s research activities covers three main areas with biomarker diversity and validation as a common denominator. Each research area has a main location at one of the three previous hospital departments that have merged into this department: 1) Inflammation, coagulation and monocyte biology (Ullevål); 2) Metabolic disorders and part of Genome stability and gene regulation research area reported above in Department of Microbiology (Rikshospitalet); 3) Tumor markers (Radiumhospitalet). Each of them roughly corresponds to one of the three units of the Research and Development section of the department. Diabetes, osteoporosis, Neisseria infections and various forms of cancer are examples of diseases covered by the research. The department plans to strengthen research in inborn errors of metabolism within the framework of an expansion of the newborn screening program. The department runs two core facilities, for Flow cytometry and Affymetrix microarray analyses. Research activities are of two types, those initiated and led by PIs in the department, and collaborative projects led by PIs in other, mainly clinical departments, and where DMB participates as an indispensable partner in its capacity to provide expertise in sampling and analysis of biological fluids. In 2010, there were 4 professors, 5 senior scientists/postdocs and 9 PhD students conducting research at the department. Several scientists and consultants associated with the department also engage in the clinical routine diagnostic work. Eleven students have defended for the PhD degree 2005-2009. The PhD students are mainly MD´s in specialist training or bioengineers with MSc degrees. The Department reports a large number of internal collaborations within UiO and OUH, and also some external, including a few international, collaborations. External funding is available through the regional health authority, The Norwegian Cancer Society and participation in three EU-projects. There is also funding through royalty incomes from the development of reagents (mainly monoclonal antibodies).

General comments

The department leadership presents a SWOT analysis where the methodological competence in analytical biochemistry and assay validation are strengths, to be used in research initiated by their own PIs, but also in collaboration with many other clinics/departments. These collaborative projects appear highly relevant, and their value would perhaps be even more evident at higher levels of evaluation (division or even encompassing the whole hospital). The department is indeed in an interesting position as it can integrate its competence with many clinical specialties. It is however, as the department leadership points out, important to find a reasonable balance between the department's own research and the expertise provided in collaborations with others. The evaluation panel agrees, and suggests that if this balance is to be changed, it would be appropriate to increase the proportion of activities of research initiated within the department. It also seems important to conduct discussions at higher levels to ensure that the funding obtained through clinical collaborations is adequate and in part can be used for long term development of the department, e.g. in development on front line technology and a recruitment program. All of these measures could stimulate the recruitment of new young scientists, and in the long term, methodological developments that would eventually pay off also for collaborative projects and the university/hospital as a whole. The tuning of this balance is even more important considering that the workload of clinical routine samples seems to limit the time and efforts that can be put into research. The merger of several units into one department provides a broad and strong

methodological platform – the challenge now is to integrate the activities to become a stimulating, interactive research milieu, by common programs for the trainees, seminars etc. The geographical spread of the different units does not make this task easier, even if it extends the clinical networks. It is also important to devise a strategy to recruit new young scientists as new future PIs, as emphasized in the evaluation of other units within the division.

Scientific quality

The unit reports 239 publications in 2005-2010. There are several papers in the best specialized journals but there is variability.

Grade: Good.

Societal impact

The research on diabetes, osteoporosis and different forms of is of high relevance in a society where the proportion of older patients is increasing steadily. In addition, the department engages in a variety of translational projects with other departments, directly relevant for different diseases in modern medicine.

Recommendations

The leadership is recommended to continue a strategy based on two types of research projects, those initiated and led internally and those initiated by clinical collaborators. In the long term, it appears important to shift the balance towards a somewhat higher proportion of internally initiated projects, and also to ensure that research funding from clinical collaborations can be channelled into programs for development of the department. In the latter context, it should be a high priority to develop strategies for 1) further integration of the different units into an intellectual milieu, where also small research groups and promising young scientists can be stimulated and supported; 2) recruitment of new group leaders;3) development and optimal usage of front line technologies in analytical biochemistry, also including the formation and maintenance of biobanks.

Norwegian University of Science and Technology (NTNU)

Department of Biology, Faculty of Natural Sciences and Technology

General recommendations

The department of Biology (IBI) was established in 2002 and restructured in 2009. It is organized into three sections and four facilities situated elsewhere. It aims to be an internationally leading university department within the focus areas (1) Ecology, ethology and evolution, (2) Physiology, environmental toxicology and biotechnology, and (3) Marine sciences. Within area 2, one level 2 unit was evaluated here (Molecular and systems biology).

The department in total has 24 professors, 9 associated professors, 3 adjunct professors, 17 research scientists, 13 postdocs, 26 technicians, and 54 PhD students. The department has a strategic plan (2007-2013). Six positions have to be replaced until 2012, five more up to 2015 which will be used to create strong research groups with focused areas and increased collaboration between groups. Presently, there is a large individual and group variation in research production and funding activity. There are a number of small groups not belonging to the core areas, which are difficult to integrate.

There is a low degree of internal collaboration towards common research goals, while there are good collaborations to outside NTNU. There are no incentives or strategies to push internal collaborations. Joint seminars run only within the groups but not across the whole department. Hiring was focused on the core areas, but has been very slow, sometimes taking up to two years. A new procedure has been made to speed this up, but this has not been tested yet. To improve the gender balance there has been targeted recruitment of women, i.e. advertise positions specifically earmarked for female applicants. There is a start-up package associated with each new group leader position. Basic funding is provided on the basis of publications and number of students. One patent counts as much as one paper.

Follow-up on previous evaluation

IBI has put major efforts into incorporating the previous RCN evaluation (2000) into strategic plans. As described above, three departments were merged into one allowing IBI to develop sections. Several research groups are now above the critical mass level. This is a continuing process, and IBI's strategy is to take advantage of replacement positions to build up academically strong, viable and sustainable research groups.

Molecular and Systems Biology

Description

The unit consists of three independent groups: (1) Molecular genetics and genomics of plants and marine algae. The group hosts the Norwegian Arabidopsis Research Center, the FUGE-BTAC center, and participates in running the FUGE-NorMIC node; (2) Systems biology group; and (3) Lipid signalling. The organization of the research is

structured along the highly diverse biological and technological aims that are being pursued. Here the systems biology approach is being pursued as the connecting element, where joint project initiatives are launched combining systems biology approaches with biological data integration in the plant/algae or animal fields. Strategic choices and project management are handled at by the different PIs, or PI teams independently.

General comments

The molecular and systems biology unit is small and plays only a minor role within a department that has a clear ecological/evolutionary focus. Although successful as single groups, all three groups have a very diverse research focus and do not form a coherent and solid general unit. The combination of the three groups under one roof has historic reasons. There has hardly been any collaboration between the three groups although there is a tendency towards improvement due to the newly installed systems biology group that seems to bridge some of the gaps, although this is not reflected in joint publications yet.

It seems to be difficult to recruit PhDs to Trondheim. NTNU is supposedly very attractive, but the specific department has problems because small groups are not so attractive at a time where infrastructure and large-scale efforts are key in many subareas of biology. The unit has a program for training technicians in new technologies.

Among NTNU and on the national level, there are – in addition to the FUGE-center/node – numerous collaborative activities. The Lipid signalling group has extensive national/international industrial links and has made an EU-application together with the bioinformatics groups.

Scientific quality

(1) The molecular genetics and genomics group studies plants and marine algae. The group is strongly involved in service tasks within the Norwegian Arabidopsis Research Center, the FUGE-BTAC and FUGE-NorMIC node. The major research focus is directed to study plant and algae defence mechanisms (plant immunity). More recently, also marine algae became research objects with focuses on global carbon fluxes (CO2), bioprospecting and energy production. The group is actively publishing with good visibility, and all positions with exception of the group leader come from external funding. There is a plan to focus on synthetic biology which would involve several groups, also from other parts of the faculty. There are now shared PhD students between the plant group and the systems biology/bioinformatics group.

(2) The Systems biology group was established in 2008 and has become integrated into ongoing projects at the department and elsewhere. The research is focused on the general area of semantic systems biology (web technologies and modelling).

(3) The lipid signalling group applies its research to study inflammatory mechanisms of chronic diseases and to identify novel drug targets. The research has recently become reoriented to include also nutrigenomics. The group has strong industry links and holds a number of patents.

Overall, the research panel ranked the research performed at the unit "Molecular and systems biology" as Good.

Grade: Good.

Societal impact

Studying plant defence/immunity mechanisms is internationally of great importance. The novel field of genomics of marine algae has great potential both for basic research and economically for a country like Norway with its numerous seafarming activities. The study of mechanisms of chronic disease and nutrition-based diseases is of high societal relevance as well.

Recommendations

In total there is a high scientific quality, productivity, and commercialization activity, a good collaboration within NTNU and industry. Research is financed through a high proportion of external funding. The unit should utilize new positions to create bridges to other research groups at the department and within the unit. The focus on marine algae is highly promising and will give the unit a unique position nationally and internationally. The same is true for the recent combination of research in lipid signalling with mechanisms of nutrition-based diseases.

The continued relatively small group size and the diverse research focus may hinder recruitment of highly qualified research personnel. A general problem seems to be that university does not compensate researchers for innovation activities with reduced teaching load or funding. Consolidation in relation to the number of topics studied should be initiated.

Department of Biotechnology, Faculty of Natural Sciences and Technology

Description

This university department is structured into four research groups, who work within five research areas, namely analysis and management of microbial communities, microbial molecular biology and bioprocess technology, biopolymers and biomaterials, food chemistry, and Systems-, Synthetic- and Structural Biology. The research groups of the department consist of one or several research teams. Each research team typically consist of one professor, researchers, post-doc fellows and PhD-candidates.

SINTEF is an independent non-commercial research organization doing contract research. There is close scientific collaboration between the Departments of Biotechnology at NTNU and SINTEF, and the two departments are physically integrated which is why they are evaluated together. Together they cover the broad spectrum from basic genetics to bioprocessing. There is synergy between the two departments with a system of sharing where exchange and sharing of facilities rather than mutual billing is used. The interaction between the two teams demonstrated clearly their collaborative capability.

Follow-up on previous evaluation

Based on the previous evaluation report a national committee came with a number of recommendations in the report in 2000?. These have addressed issues relating to introducing more bioinformatics, building on strengths in alginates and altogether improving quality of research at the molecular level together with engaging with new sources of funding. The recommendations from the previous international committee and

national committee have been implemented in relation to collaboration and engaging with bioinformatics and genetics. The situation with regard to recruitment of younger staff is not greatly improved, as has been the case widely across all institutions with few exceptions.

Microbial Biotechnology

Description

The University department is structured into four research groups, working within five research areas, namely analysis and management of microbial communities, microbial molecular biology and bioprocess technology, biopolymers and biomaterials, food chemistry, and Systems-, Synthetic- and Structural Biology.

There is a strong interaction with SINTEF Materials and Chemistry Department of Biotechnology and it was clear that there is excellent synergy with the two arms contributing to the research. They make excellent use of the FUGE technology platforms and have international collaborations to support proteomics and flow cytometry. The combination allows research themes to be developed but SINTEF provides scale up opportunities for bioprocessing. There has been major investment in infrastructure both funded by RCN and by industrial funding. The research activities under recombinant gene expression aim to develop molecular tools to facilitate industrial scale overexpression of proteins.

Systems biology has been bolstered by the recruitment of a professorial appointment within the past year and has two types of activities – theoretical and also wet lab. There is a strong network of international collaborations and the theoretical computational work has a strong focus on protein networks. The experimental work is focused on metabolic networks linked with the biopolymer alginate and is funded by European projects with one being coordinated by the group. The other work is focused on antibiotic production metabolic networks in Streptomyces coelicolor and is coordinated elsewhere. The team provides expertise in large scale culturing and performs metabolomic analyses. There are other projects related to stress response ongoing.

Metabolic engineering, biosynthetic engineering and synthetic biology encompasses transgenic technologies for the synthesis of alginates, specific carbohydrates as well as small soluble molecule production such as specific amino acids. These are key components required for many industrial production systems. Antibiotic production and introduction of novel approaches to introducing variations in antibiotics is also an exciting activity which has been the focus of a spin-out. The synergies between the systems biology and synthetic biology are particularly interesting.

Bioprospecting is a further area related to identification of novel molecules which could be exploited and produced on a large scale through genome mining of novel strains and species. These studies are related to extensive metagenome analyses to identify novel sequences from microbial communities. A particular highlight of this research is the understanding of the link between supply of nutrients and the diversity of the ecosystem. It is particularly relevant for example for fish farming.

There are 5 research team leaders in the NTNU Department of Biotechnology where the microbial biotechnology activities are primarily based.. Within SINTEF there are three

main group leaders and the research activities focussed there are Biomedicine, bioprocessing and systems biology along with recombinant expression and metabolic engineering and these are supported by analytical and high throughput screening technology platforms.

Whilst there are two staff members who are in their 40s the majority of the senior staff are over 55. There are a few staff who are not Norwegian, but the profile is overall a national research effort. All senior staff at SINTEF are male while the research director of the head of the institute of the university is female. There are relatively few PhD students (28) listed linked to the CV's submitted. There also appears to be a small number of master students graduating.

General comments

The research teams at both SINTEF and at the NTNU Department of Biotechnology are extremely professional and are carrying out exciting and ground breaking work. They interaction between the two centres of organisation is highly fruitful in terms of the scope from theoretical research to industrial scale processes. The groups are very aware in terms of commercial activities and are highly productive across a wide area. Whilst many of the staff are Norwegian there is a very strong thread of internationalism through collaboration and publication internationally.

The bioprocessing facility is an outstanding resource. The age range of the staff once again raises important questions for national policy in retention of key staff. The issue, which is raised, is the policy nationally related to genetic engineering to increase biopolymer production. The team is in an outstanding position internationally to exploit their strengths.

The aliginate work and the recombinant protein work represent impressive strengths for applied research and for industrial use. Microbial biotechnology has big industrial potential. The team is involved in an application for center of excellence.

Scientific quality

The team has state of the art infrastructure and has been able to combine applications and basic science. They are highly active in patenting, industry collaboration and spin-offs as well as publishing. They are part of many flexible networks locally and internationally and have been involved in securing competitive funding. The 110 publications from the team include publications in very specialist applied journals, but also include high impact papers in J. Medicinal Chemistry and internationally reputed journals such as J. Bacteriology.

Grade: Excellent.

Societal impact

Protein production activities have resulted in a local spin-out company and this production of biological agents is very important for therapeutic development. The work on antibiotic pathways has immense importance in the light of development of antibiotic resistance and the bio-mining in relation to novel metabolic pathways has serious potential for novel materials as well as therapeutic agents. This is extremely important for the national economy and also for global health.

Recommendations

The group has a common problem in relation to the age of staff. In some areas the human resources are subcritical, e.g. systems biology and synthetic biology. It is important that the outstanding level of innovation/patenting and real industrial results are given credit that corresponds to their stated importance. It is important that this unique association of university and industrial research cross fertilisation is supported.

The recruitment of younger staff within the current enthusiastic organisation should be seen as a priority along with the support to allow this group of true professional researchers to train young people through PhD studentships and postdoc fellowships. This needs to be coupled with a genuine career structure for young staff to promote recruitment of high-quality postdocs and PhD candidates.

A theme which has emerged from several groups is administrative support to assist with interactions with industry and in patenting, although this group has done a good job. The inclusion of systems biology into the forthcoming Biotek 2012 program would be important.

Biopolymers

Description

This Unit has been considered together with the microbial biotechnology unit mentioned above. The areas of research specifically covered by the biopolymers unit fall under the headings of polysaccharide engineering and the alginate/chitosan work are at the forefront internationally. The biopolymer research also includes protein structures and protein NMR. The team is well aware of the need to look for applications and the move into tissue engineering through collaboration is a very effective strategy.

Scientific quality

There are 132 publications submitted for the Biopolymers assessment many in top tier journals. Overall the research output is impressive.

Grade: Excellent.

Societal impact

The unit is important in terms of economic benefit as well as the possibilities for health care in terms of dressings and wound healing as well as tissue engineering possibilities. The distance from basic research to applications is very short in the general area of biopolymer research. Understanding polymer properties often have very direct impact on use.

Recommendations

The team is highly worthy of continued support. The importance of creating a culture which will encourage top quality students with an interest in industrial applications to train in this area is particularly important. Capturing royalty income is important in this area and support to facilitate this seems crucial.

Department of Laboratory Medicine, Children's and Women's Health, Faculty of Medicine

General comments

The department is one of five departments at the Faculty of Medicine and is closely co-localized with the St. Olav's Hospital. The University and the Hospital have separate areas in new buildings and the organisation of the sections of Laboratory Medicine and of Children's Health and Women's Health (LBK) into one Department appears to arise from these areas being located closely geographically rather than being a result of close scientific integration. The department is primarily localised in the laboratory centre where 60% of the area is owned by the University. The department is organized into four sections based on medical disciplines and a fifth technical section. The technical section is not scientifically driven, but is to provide a forum for technical staff involved in research rather than diagnosis to feel integrated into the departmental structure. The research is focused on molecular medicine/medical technology, biobank and registry research, and translational research.

The University has no responsibility for diagnostics. However, in the time that shared employees work for the Hospital, they perform diagnostic work. Hence, the department has the issue that in addition to research and teaching there is a responsibility for diagnostics. There has been a history of a less than enthusiastic focus on research. The move to new space may facilitate change, but there is uncertainty also as new space is built, which might involve further re-organisation – as yet unknown, although the new building will be completed in 2012. The strategic question which appears unresolved is whether the current ad-hoc grouping of subjects will continue once the new building is completed. There is a feeling that some of the small groups could be incorporated into other larger departments in St. Olav's Hospital where there are synergies e.g. the Myeloma and haematology section. Incorporation of smaller groups within the existing LBK was also considered to be a useful possibility. There are areas of strategic importance which need to be addressed when the Head of the Faculty is replaced next year.

Staff are clinicians who are also carrying out research and have 100% contract with the university and then 20% with the hospital. There are other staff who have their posts the other way round. The strategic aim is to divide posts 50/50 between the hospital and research. An important aspect of this unit is the fact that three of the four professors submitted are over 60 years old. Reorganization will have to be seriously considered when the three professors over 60 years old retire, or before. Plans are being made for how to replace older staff when they retire but the issue of prioritization of scientific areas for recruitment has not been addressed. International recruitment is generally not an option because medical positions require fluency in a Scandinavian language. There was little appetite for international recruitment since it was stated that the need for Norwegian speakers in a clinical setting was paramount. There are lots of young people to recruit for the medical positions, however, the problem is that the hospital does not allow MD PhDs to have sufficient time for research. The problem of recruiting non- MDs relates to being able to meet teaching needs, though in many European countries (e.g. UK) it is now common practice for non-clinical academics to play a significant role in medical education. Also it is seen that there is a need to form bigger research groups and to have more recruitment of postdocs.

Follow-up on previous evaluation

The previous evaluation pointed at several important areas for improvement, including the need for a strategy to attract external grants, for focusing and recruitment of new scientists to senior faculty positions, and for improvement of international cooperation. It also pointed at vulnerability due to few key individuals. The department has worked consistently at trying to facilitate the establishment of collaboration networks and larger research groups. This approach has worked well for several areas, whereas others still have relatively little scientific activity.

Tumor Biology Research Group

Description

At the staff level the group consists of 1 professor and 3 associate professors. The group is part of the Department section for Anatomy/Pathology/Forensic Medicine. The members of in the Tumor Biology Research Group have a substantial degree of autonomy in the running of their projects. The Tumor Biology Research Group is closely integrated in the running of two research infrastructure units, i.e. the Regional Research Biobank and the Electron Microscopy (EM) Lab.

General comments

This small group is responsible for heavy research infrastructure: the regional research biobank and the electron microscopy lab. The unit wants to increase collaboration with other biobanks. There are problems on the computing side however as material is collected by hospitals and hence it is all run on hospital computer systems giving compatibility problems. Better integration of biobank and hospital computer systems is therefore needed.

The biological imaging facility (EM lab) is aiming for tight collaboration with the more technical imaging facilities. The two EM facilities at the faculty should certainly be better integrated. Equipment has been transferred between departments due to lack of funding for positions where the microscopes were located. Microscopes are currently not used efficiently, and to do so would require additional technical support. Balancing teaching and research is difficult for staff members in this unit. The team stated that there were excellent interactions with the bioinformatics team at the hospital even if there are technical problems in data exchange.

Close collaboration with the university hospital and several other departments at NTNU are real strengths. Good availability of patient samples for research emanating from a simplified system for approval based on broad consent is also a positive resource. However, a small group of people has responsibility for the infrastructure and as they are often seen as a service they mostly publish as co-authors. All three researchers are over 60 years old.

National and international interest in improved methods for tissue handling, preservation, storage, and retrieval represent an opportunity for development of this unit and closer collaboration with the hospital department of pathology could result in novel, joint research projects. However, hospital pathologists are burdened with backlogs of routine diagnostic work. A planned core facility may result in more time and resources for the group’s own research.

The focus for the next few years is recruitment, establishment of efficient core facilities for research infrastructure, and dissemination of findings regarding biobank-related methods. The ethical approval process has taken years to get into place in order to allow people to give broad consent, but the researchers have not done much so far to specifically publicise this expertise to other biobanks, other than discussion at conferences and seminars. It was uncertain to what extent there had been time to exploit the existence of the biobank material and to what extent it was a collection waiting for a use.

The integration of the biobank with bioinformatics is done on a project-by-project basis in collaboration with the FUGE bioinformatics platform node in Trondheim but requires integration with the hospital computing system for extraction and integration of clinical data. The methods being developed for biobank sample storage appear to have excellent opportunity for exploitation. The biobank is currently funded through the local health organizations.

The EM facility appears to be underexploited and is provided as a service but is not used for income generation.

Scientific quality

The group has published well and the citation index is very good but the originality of the work was very much at the lower end and does not contribute significantly internationally to prostate research.

Grade: Fair.

Recommendations

It is felt that integration with the stronger cancer groups in the hospital following retirements would be an advantage. It would be important to ensure dissemination of expertise in biobank sample procurement and storage across other biobanks in Norway.

The incorporation of the EM facilities would seem to be feasible since it was stated that they are not being used efficiently. Retraining of technicians was not discussed, and is possibly an aspect that could be improved. As a general comment, the organisation of biobanks across Norway is an area, which appears to need coordination, but the panel did not receive sufficient information in this general area (as mentioned in the General Recommendations).

Department of Cancer Research and Molecular Medicine, Faculty of Medicine

Description

The Department of Cancer Research and Molecular Medicine carries out preclinical teaching and research across four core research themes: Gastroenterology, Immunology and hematological cancer, Opioids, symptom management and palliation and DNA repair and genome stability and also provides advice for clinical trials. There is good multidisciplinarity in the department. The two level 2 units reviewed by panel 3 were Immunology and hematological cancer and DNA repair and genome stability. The department is one of five in the faculty of medicine and is represented at the faculty level

by the head of department. Current department structure has been in place for eight years and resulted from the merger of several smaller units but further evolution may be required – to the panel it was unclear why the tumour biology research group was not part of this department and why opioids was not part of the neuroscience department. The research strategy is to build around successful PIs rather than to intervene and develop new areas, which indeed has improved scientific quality and output, but may mean they are less able to respond to changes in national or international funding trends. Gender balance is not optimal (75% male PIs). The operational management group meets every two weeks but does not directly control the research strategy and does not appear to have much budget flexibility, despite 60% of the total funding coming from external sources. Overall funding has been increasing steadily, though EU funding has fallen dramatically in recent years. Scientific quality overall is high, with a citation index of 130 and a good level of international collaboration (USA and UK dominate). The unit has good translational activity as a result of the integration of basic and clinical science (for example their APIM small molecule inhibitor).The evaluation panel rated the overall research activity of both of the level 2 units assessed as very good and there is an ambition to gain further Centres of Excellence which reflects the good ambitions of this unit. The upcoming retirement of senior staff needs to be planned strategically to ensure the quality of the department continues.

Follow-up on previous evaluation

The department has undergone a restructuring as a result of the last evaluation, organising its groups into four themes gastroenterology, immunology and hematological cancer, opioids, symptom management and palliation and DNA repair and genome stability with larger functional units. The department also supports technology platforms, specifically the FUGE funded Bioinformatics platform, though capability in structural biology is lacking. The department head reports to the faculty Dean and most control over budget and allocation of resources appears to be at the faculty level. Research leadership is very much at the theme level and the individual groups have a certain level of autonomy, though direction and progress is discussed at the regular operational group meetings. The two level 2 units assessed had a very good level of interaction with each other, particularly through their B cell work, but seem less well integrated with the other units in the department. Both units are progressive and translational in their research and outlook. Both themes are well funded with plenty of national and international collaborations. Notably their EU funding has fallen drastically in recent years despite their apparent networking abilities. However, they are applying for ERC grants and also to the Jebsen foundation so this could potentially improve.

DNA Repair and Genome Stability

Description

The DNA repair and genome stability unit has two subgroups: DNA damage and repair theme as well as a bioinformatics platform. The DNA damage and repair group has focus on early steps in adaptive immunity, DNA damage response, cancer therapy, and interactomics of DNA repair. The second group in the unit is a bioinformatics group interested in gene regulation by transcription factors, ncRNAs, and epigenetics.

General comments

The research is generally well focused, with an emphasis on the base excision repair pathway (BER) but with a developing interest in epigenetics. The BER work strong and has been applied to several fields, most notably somatic hypermutation in B cells and multiple myeloma as well as classic responses to DNA damaging agents. There is also potential for translation through a yeast knockout library approach to identify novel drugs for use in cancer. One problem is the lack of technical support in this grouping, which makes the two PIs also heavily committed to FUGE platforms. Internal funds should be distributed to give better technical support. This makes continuity a major concern.

The department has a good number of PhD students and a good spread of nationalities at the PhD level. For MD students most are Norwegian, but this is understandable. Mobility of postdocs could be improved by exchanges to some of their collaborators abroad, but no firm strategy is in place.

Scientific quality

The output of this grouping is very good in quantity and quality and translational activity is also good. The publication record includes several publications in top journals. Overall, the panel ranked the research performed at the unit "DNA Repair and Genome Stability" as Very Good.

Grade: Very Good.

Societal impact

There is very good potential for societal impact in terms of new drug therapies and economic development through interactions with SMEs. Some of the work has led to generation of peptides that can potentiate anti-cancer drug effects and the group is indeed working with an SME to develop this further and there are patents associated with this work. The DNA repair unit has also had outputs, which benefit the scientific community, in that they have developed bioinformatics analysis tools. Only brief details were given of activity in relation to dissemination of outputs to the general public.

Recommendations

The general level of research collaboration is quite good, but the level of EU funded collaboration should be much stronger. This is important for both subgroups in the unit and they have not been sufficiently proactive to become part of such collaborations. It is also recommended that a clearer strategy is made for how the core facility and service efforts link to the research aims. Striving for external funding for service activities may not be the best way forward, unless these activities fit the overall research strategy for the unit. This is for example a problem for the bioinformatics subgroup, which must accept service requests, which may not always fit with what the bioinformatics group would actually like to do research-wise. There is a need for the bioinformatics cores to be able to prioritize their areas. A recent grant together with a biobank could link the bioinformatics better to clinical research and sequencing efforts. The application for a DNA repair center of excellence is very positive.

Immunology and Hematological Cancer

Description

The research groups at the Immunology and haematological cancer (IHC) unit perform basic- and translational research on inflammatory responses and hematological cancers. The IHC unit has two main themes, inflammation and myeloma. The former has four subthemes and the latter has two and has good involvement in biobanking. The IHC is thus organized into six research activities with a principal investigator being responsible for progress and obtaining funding. The PIs are responsible for their own personnel and budget.

General comments

For inflammation pattern recognition receptors (PRR) is the main activity and the link to the mycobacteria grouping is a logical one. The allergy group is only one person and has an environmental focus and thus seems less well integrated. The "Human reproduction" group is located at another site again not an obvious partner in this grouping. It is not clear why this grouping is not part of the laboratory medicine and women's health department.

The department has a good number of PhD students and a good spread of nationalities at PhD level. For MD students most are Norwegian, but this is understandable. Mobility of postdocs could be improved by exchanges to some of their collaborators abroad, but no firm strategy is in place.

Scientific quality

Despite apparent disparity the group holds joint seminars and the scientific output quality is very good led by the innate immunity and myeloma groups. Overall, the panel ranked the research performed at the unit "Immunology and Hematological Cancer" as Very Good.

Grade: Very Good.

Societal impact

There is very good potential for societal impact in terms of new drug therapies and economic development through interactions with SMEs. In the inflammation group a therapeutic antibody has been developed and thus there is potential for therapeutic and commercial translation. The myeloma group acts as a national referral centre for the disease and thus contributes to health care and research in this way.

Recommendations

The unit should consider whether the different subgroups fit into the overall research strategy. The allergy theme seems poorly integrated and small and could perhaps fit better with a public health unit. The reproduction group also does not fit that well and seems in general to have a lower output quality – it could potentially be better in a clinical medicine theme. Better support for clinical trials is needed to improve translational activity, though NTNU says it has such a unit (ACF). Increased international collaborations would benefit the myeloma group. Increased EU interactions would in general broaden the funding base and improve mobility of students and postdoctoral fellows. The unit needs to develop a strategy to cover support for technology platforms for when FUGE funding finishes.

University of Tromsø

Norwegian College of Fishery Science, Faculty of Bioscience, Fisheries and Economics

Description

The Norwegian College of Fishery Science (NCFS) was established in 1972. Since 1988, NCFS was re-established and organized as a faculty at the University of Tromsø. In the reorganizations at University of Tromsø (2008-2009), the faculty of NCFS was split into three departments, including the current NCFS department. At present NCFS incorporates all biotechnology related research (bio-prospecting, fish immunology and vaccinology, and seafood science) and social sciences within resource management and resource economics.. Of the various sections in NCFS, only Marine Biotechnology will be evaluated by Panel 3 at level 2.

Research at NCFS is rooted on basic science and scientific traditions with translational science applications to marine recourses and innovation within fisheries, aquaculture and biotech industry. With additional obligations in teaching and scientific advising to governing authorities, staff are struggling to maintain a sufficiently strong focus on scientific research.

NCFS has a total of 27 professors and associate professors as permanent employees, plus 22 research fellows, 8 postdocs and 33 PhD students as temporary employees.

External funding has clearly increased over the years 2007-2009, with grants close to 50% of total income in 2009. At the same time institutional/university funding for instruments and equipment has dropped to a very low level. The self-evaluation nevertheless states that the department still has all necessary equipment for its basic research activities. It also has access to more expensive equipment at other UiT departments (e.g. EM, DNA sequencers, mass spectrometers), and Marbank (a national marine biobank), Marbio (a screening platform for bioactive molecules) and MabCent (CRI – centre for research based innovation). NCFS also uses the Aquaculture Research Station and Fish Health Laboratory in Kårvika, 40 minutes from Tromsø. NCFS also has access to ocean going research vessels to collect marine organisms.

Follow-up on previous evaluation

The NCFS department is the result of reorganizations at the University of Tromsø in 2008-2009. The increased focus of NCFS on marine research topics appears to be the main positive effect of the reorganization. Apparently, the reorganization of research and education is still dragging on into 2011. University of Tromsø and its Faculty BFE should make it a priority to complete this reorganization as soon as possible.

NCFS has experienced a period with financial difficulties (2008-2009). However, the financial situation has improved (2010) due to the reorganization, changes in internal priorities as well as increased external funding, and is presently promising for the coming years. External funding has clearly increased over the years 2007-2009, especially with grants from the Research Council of Norway. Although the self evaluation mentions participation in various EU projects and international collaborations, there is no evidence

for involvement in larger size EU collaborative research projects. Funding from the EU Framework programs and other international sources appears poor, even dropping to zero level in 2009. It thus appears a matter of urgency for NCFS management to more strongly stimulate international participation in research collaborations.

The policy for allocation of funding to the departments, research groups and scientists is based on an incentive model. Funds are allocated according to study points produced, PhD dissertations, publication rates and external national and international funding. The work time available for experimental research is under pressure because of teaching obligations and scientific advice to governing authorities. NCFS is fully aware of this and has implemented incentive systems to encourage research, including time registration, and research sabbaticals. This is very positive. The departments at BFE have no boards, but planning within education and research are delegated to leaders of educational program committees and research group leaders under control by the department heads.

The main recommendation given in the previous research evaluation was to focus on fewer research projects and to build these up such that they rank internationally. Most of this has been implemented by strategic moves at the department level, e.g. formation of research groups, prioritizing investments in new technology, implementing economic incentive systems at individual level, encouragement to international collaborations, recruitment of personnel internationally at all level of scientific positions. These moves have resulted in increased access to external funding and have almost tripled temporary employment of research fellows, postdocs and PhD students. Research output (publications) has increased coherently during this period. International collaboration appears to lag behind, however (see above).

Overall, the unit made a good impression in the discussion with the evaluation panel. The quality of research is good, leading at the national level, but its international impact and network should be strengthened in the years ahead.

Most of the NCFS scientific staff at (associate) professor level are above 50 years of age, with 6 out of 16 professors above 60 years of age. In view of this age profile among scientific staff, an active recruitment policy appears required in the very near future. NCFS does well with 6 out of 8 postdocs and 21 out of 33 PhD students externally funded. Among total NCFS staff close to 50% are male and 50% female. However, this ratio is strongly out of balance when comparing PhD students and the permanent scientific staff. Despite the overall gender balance an active gender policy thus appears required in order to increase the number of female staff scientists. Although NCFS states a clear ambition to recruit high profile international scientists, only a relative low number of international scientists have been appointed as permanent scientific staff. However, the number of foreigners among temporary scientific staff is increasing. The panel was surprised by the statement “We do not know any policy for recruitment at the institution” (p. 13), in the self-assessment. This clearly requires attention.

As stated in the self-evaluation, some research groups/teams actively encourage recruits to participate in the process of writing applications for research grants. However, more should be done to prepare students and postdocs for a career as an independent researcher or a research leader and to encourage them to get their training in different research laboratories.

In general, NCFS could be more active in training staff, PhD students and postdocs, offering courses in project organization, how to lead meetings, write proposals and publications, make oral presentations, and stimulate them to participate actively in national and international conferences.

Marine Biotechnology

Description

The Marine Biotechnology research group within NCFS is organized into two research teams: Marine Bioprospecting and Seafood Science. The 8 (associate) professors, 3 postdocs and 11 PhD students have backgrounds in microbiology, immunology, chemistry, biochemistry, enzymology, protein chemistry, molecular genetics, nutrition both in humans and fish. The group is engaged in widespread regional and national collaborations, NCFS/Marine Biotechnology is a central participant and knowledge source for development of marine industry.

General comments

MCFS/Marine Biotechnology uses various incentives to stimulate the number of publications and external grants. This appears to be successful and the annual numbers of publications in international peer review journals, and external grants, are clearly increasing.

The extent of international collaborations are emphasized in the self-evaluation, but the limited number, or absence, of international grants in fact indicates that this in practice most likely is limited to networking instead of sizeable research projects.

In the evaluation period a more active recruitment of female scientists was possible, and the Marine Biotechnology has been awarded prizes for gender equality both by the University of Tromsø and by the Ministry of Education and Research (2007).

Scientific quality

The Marine Biotechnology group has a strong focus on marine bio-prospecting, seafood and human health, and development of new concepts of fish vaccines for disease prophylaxis in the aquaculture industry. The research group reports 96 papers over the years 2005-2010. The citation impact (field) is high. Among the members of staff in permanent academic positions, the number of publications during the five latest years varies from zero to 37, which is unacceptable in view of the emphasis on research impact. The scientific quality of the group is graded as good to very good.

Grade: Good to Very Good.

Societal impact

The Marine Biotechnology evaluation unit has strong societal relevance, both regional and national, performing innovative research with applied aspects in close collaboration with companies. The region of Tromsø has the ambition to be an international centre for biomarine research and innovation, in line with its location and natural assets. This long term strategy already has given birth to a number of new companies involved in the marine value chain, from processing raw materials to biotech based commercial products.

Recommendations

The previous evaluation found the research to be too scattered. In view of the limited number of staff, research is still spread out thinly over many disciplines. The leadership of Marine Biotechnology is recommended to continue with a further focussing of research activities. This is urgently required, also to achieve in depth impact in research, to enhance scientific impact and internationalization.

The departments within NCFS are surprisingly loosely organized, without boards for decision making on research and education. This may work out alright in a small department, at least as long as a positive collegial atmosphere exists between the head of department and research group leaders. The panel recommends adopting a stricter decision-making structure.

The NCFS department and Marine Biology group are recommended to continue the existing local collaboration with NOFIMA and to establish active collaboration with the Sars International Center for Marine Molecular Biology (Bergen).

The age distribution of senior members of staff is worrying and requires active recruiting of young scientists.

The panel was impressed by the very positive attitude of the members of the evaluation unit interviewed, and stimulates NCFS/Marine Biotechnology to maintain this in future activities.

Institute of Medical Biology, Faculty of Health Sciences

Description

The department is relatively large (180 employees) and comprises 25 professors, 13 assistant professors, 14 professor (II), 25 postdocs, 36 PhD students and 53 technical and admin staff. It is run by an Executive Committee and this committee plus the research group leaders constitute the scientific advisory board. Staff on average spend 50% of their time on teaching and 50% on research, but the department head can modify this in individual cases.

The scientific strategy is to focus on basic biology problems related to major societal diseases (e.g. cancer, thrombosis, immunological defects) since clinical medicine will depend more and more on molecular biology and genomics. This strategy has to be underpinned by state-of-the-art technology platforms. In line with this, three FUGE funded core facilities have been established in the department: Electron microscopy, Bioimaging and Proteomics.

External funding increased to 51% in 2009, but this partly reflected a decrease in internal funding in previous years. The external funding is mainly from the RCN and other national sources e.g. Norway Cancer Society and some from industry. Some funding for translational research is obtained from HelseNord. EU funding is low.

25% of PhDs and 60% of postdoc positions are externally funded. 50% of PhDs/postdocs are recruited from abroad. UiT encourages stays abroad for PhDs and postdocs, but the

uptake is low. In 2009 15 PhDs graduated. PhDs are 60% female, but female representation in top positions is low. It is the UiT policy to increase this proportion to 30% by 2013 (currently 24%) and mentoring has been given to three promising female scientists with good prospects of promotion to professor. This is very positive.

Follow-up on previous evaluation

In the 2000 RCN report there was strong criticism of the Department for underperformance, lack of focus and poor organisation, but, apparently due to internal inertia, not until after another review in 2008 did real changes occur. Finally in 2009 the Department was re-organised into 12 research groups (each with 2-5 staff), five being reviewed by Panel 3 (RNA and transcriptome, Host-microbe interaction, immunology, molecular cancer and molecular pathology). The Protein group was transferred to the Faculty of Science and Technology in 2009. Appointment of some staff dedicated to administration of teaching courses has reduced the admin load on research scientists and is seen as a good development.

Overall the re-organisation of the Department has had a positive impact through definition of a scientific strategy, establishment of more focussed research groups with critical mass (although still not optimal with some small, less productive groups remaining), establishment of technology platforms, better organisation of teaching (some staff now dedicated to administration of courses), better internal communication (e.g. weekly departmental seminar, communication unit) and administrative support for grant applications. However, recruitment of good quality PhD students (especially those with medical backgrounds) and postdocs is perceived to be a problem perhaps exacerbated by the geographical position and lack of visibility. To address the latter issue a new website has been launched to attract research candidates. The low number of postdocs is also a consequence of lack of funding by the university for these positions and stiff competition for external funds. The gender policy of the UiT is proactive and the department has identified three promising female scientists whose career development will be facilitated.

It is important that the momentum of the reorganisation is not lost and there is a continual effort to strive towards enhancing the position of the Department as a center for fundamental and translational research. Enhanced collaboration between clinicians and researchers can perhaps bring in more funding for both translational and fundamental research. Some units, notably Host-Microbe interactions, are still very broad, which is perhaps advantageous for interdisciplinary studies, but the correct balance with critical mass and focus has to be found. In the near future several retirements will give scope for reinforcing strong areas with new recruitments. The establishment of core facilities with FUGE funding has been very positive and a funding solution needs to be found for maintaining these facilitates as state of the art in the future.

Immunology

Description

The Immunology unit is one of 10 new research groups in the re-organised Institute of Medical Biology and comprises 4 professors. The unit is closely integrated with the Department of Laboratory Medicine at the University Hospital of North Norway (UNN) with which it shares integrated laboratory facilities at UNN. This integration reflects the unit's research strategy of a close linkage between basic and clinical research to achieve translational impact.

General comments

The main research focus of the unit is on platelet immunology, in particular FNAIT (fetal and neonatel alloimmune thrombocytopenia) which causes 3-5 mortalities and 5-15 brain injuries per year in Norway. Studies of the cellular immune response to FNIAT have led to new strategies to deal with the disease, notably in susceptible pregnant women. A second focus is on tumour biology and inflammation (childhood cancers and neuroblastoma) which is carried out in collaboration with the Karolinska University Hospital in Sweden. Integration with the Department of Laboratory Medicine gives excellent access to state-of-the-art equipment and access to patient material (which is however rare). The unit has a good network of local, national and international collaborations, including exchange visits. However, there are very few senior scientists in the unit, making it difficult to effectively follow up new exciting research findings in competition with other international groups in the field.

Scientific quality

The research on FNAIT is forefront with several new concepts and high profile papers (Blood 2007, 2009). A significant number of manuscripts are pending including a report on a proof of principle trial of the new treatment in a murine model of FNIAT.

Grade: Very Good.

Societal impact

The unit runs the national reference laboratory for advanced platelet immunology. Studies of the cellular immune responses to FNIAT and a large screening study in collaboration with Oslo University Hospital have led to new strategies to treat FNAIT based on administration of specific antibodies to susceptible patients. A start-up company called Prophylix Pharma AS has been created to organise clinical trials and three patents are in preparation. Information on the research is distributed to doctors.

Recommendation

This is an active and successful group in the focused area of platelet immunology and FNIAT, but it suffers from its small size and despite the favourable laboratory environment, exchange between researchers and clinicians appears to be limited. Careful organisation is clearly required to compensate for small group size by maximising local, national and international collaborations. There is a minority activity on tumour biology but it is not clear how this group fits in with the platelet focus or whether it might be better placed elsewhere in order to better focus on the main activity.

Molecular Cancer

Description

The group consists of 1 professor who is also the group leader, 1 assistant professor, 1 researcher, 2 external postdocs, and 7 PhDs. The group leader decides on which projects to focus on and allocates resources. In addition there is 1 visiting professor from California who has helped establish courses on molecular and clinical aspects of cancer. The focus of the unit is selective autophagy and cell signalling.

General comments

The group is internationally recognized group due to the discovery of selective autophagy substrates and cargo receptors. It is well organized with a stable core with many years of research experience and it has a large repertoire of methods and techniques. The group took the initiative to set up the FUGE funded Tromsø Bioimaging and Proteomics platforms. The unit has a good network of productive collaborations, although there is a clear need to improve bioinformatics skills and develop collaborative projects with researchers in structural biology. Recruitment of undergraduate students to the faculty's programme in medical biology has been poor making it difficult to recruit PhDs and medically trained researchers into the group.

Scientific quality

The basic research in selective autophagy, cell signalling and regulation of transcription is of a very high standard. The group produced world-leading papers in autophagy on the selective cargo receptors p62/SQSTM1 and NBR1 in 2005 and 2007, including a highly cited 'hot paper'. Recognition at the international level is also indicated by invitations to high profile meetings on autophagy. Expression vectors that report autophagy activity are widely distributed, including to pharmaceutical companies, which is another good sign. Connection of autophagy to several human diseases is now being explored. A patent application for fluorescent transgenes of p62/SQSTM1 in flies for drug testing for neurodegenerative diseases has now been produced. Overall, the panel ranked the research performed at the unit "Molecular Cancer" as Very Good.

Grade: Very Good.

Societal impact

Although fundamental in nature, the research of the unit is likely to have an impact on understanding of disease since there is increasing evidence that autophagy plays an important role in protein aggregation diseases such as Alzheimer's and Parkinson's.

Recommendation

There is now an urgent need for new state-of-the-art instrumentation in the Bioimaging and Proteomics platforms (notably confocal microscopy and mass-spectroscopy equipment). Despite its good results, the group apparently suffers from chronic underfunding which has notably prevented the in house establishment of relevant model organisms; this is very unfortunate. The panel recommends that the unit develops a strategy for making maximal use of all local, national and international funding opportunities. Additionally recruitment at the PhD and postdoc levels seems to be difficult for diverse reasons. To counter this, the unit has been actively involved in revising teaching programmes and establishing an international Master in Medical Biology. Furtherance of these efforts is encouraged.

Molecular Pathology

Description

This is a small but focused group with four faculty members (3 professors and one senior scientist, 50% male, 50% female). In addition there are several PhD students (the majority are women) but few if any postdocs. One of the professors also does diagnostics in pathology. The group is generally well-funded with adequate access to core technologies.

The unit felt that their strengths lay in hypothesis-driven and penetrating research, with ongoing collaboration with clinicians locally and in Oslo, Copenhagen and Milano – a positive aspect to the grouping. The latter was also in response to their perceived lack of scientists with the relevant competence in the local milieu. The grouping is thus one that has a strong international network of scientists giving rise to future collaboration and possibilities for moving into new scientific areas. Exploitation of the discovery of a hitherto unknown disease mechanism may help to develop the reputation of the group further.

The group considered that a threat to their success was the lack of guarantees for replacement of PhD students, leaving ongoing research projects at risk. There are very limited possibilities of the institute/faculty to offer permanent jobs to key members of the group, something seen at many other institutes. Recruitment of young researchers, especially those medically trained, is problematic. Mobility outside Norway for married female PhD students is also felt to be difficult. In general a lack of resources and positions to attract young staff to rejuvenate the group is seen as a hindrance.

Scientific quality

The focus is on basic and translational studies of systemic lupus erythematosus and lupus nephritis and the group contains leading figures in the field. The unit has shown that disease progression is due to an unusual exposure to undigested apoptotic and necrotic chromatin fragments caused by shut-down of renal Dnase1. The fragments are targeted by anti-chromatin antibodies (both anti dsDNA and anti-proteins). This is world leading research in this field which has changed the paradigm about the mechanism of the disease. The unit produces 6-8 publications per year in well recognised journals (IF 5-10).

Grade: Good.

Societal impact

The research on lupus erythematosus opens new pathways to specifically treat the disease which effects 1 in 1000 women world-wide.

Recommendation

The Molecular Pathology group is performing high quality translational research and merits support. Like many other groups it finds difficulty in attracting medical students to do research and it would benefit from more flexibility in the recruitment of young scientists, notably postdocs.

RNA and Transcriptomics

Description

The group consists of 3 faculty members, 1 senior researcher, 2 technicians, 5 PhDs, 3 Master students. The unit consists of motivated group members willing to work as a team. This is a well equipped laboratory for RNA biology and deep sequencing analysis. Strong local, national and international research collaborations exist. However, there is limited access to long-term resources and external funding giving rise to low predictability for future development. The group finds it difficult to recruit good scientists from other universities and research institutions.

General comments

To overcome the current problems the group aims to establish new frontline research technology and collaborations within translational medicine. This should also improve their research focus. Strong local, national and international research collaborations, for example with Bodø University have established the first SOLiD4 deep sequencing facility. Also, active collaborations exist with the national high-throughput sequencing platform in Oslo, the CNRS Strasbourg and Copenhagen for 3D modelling and RNA structure probing.

Scientific quality

The research focus is on RNA structure, function and evolution as well as transcriptomics and genomics. The group has performed high profile work on the structure and function of complex catalytic RNA branching ribozymes. Basic research on the GIR1 ribozyme has led to designed ribozymes for gene therapy applications including a patent and out-licensing.

Priorities now include miRNA profiling, whole transcriptome and whole genome sequencing, in particular discovery and profiling of miRNAs in human cells and diseases, notably cancer cell lines and tumours. The aim is to establish miRNA disease markers as well as functional aspects of gene regulation by miRNAs. The group is also involved with transcriptomes and genomes of marine animals e.g. cod fish and coral animals.

The group publishes about 5 papers a year in good quality journals.

Grade: Good.

Societal impact

There is potentially a very important link between deep-sequencing, miRNA profiling and clinical diagnostics. Studies of marine animals are of importance in drug discovery and marine bioprospecting.

Recommendations

The move towards establishing deep sequencing and development of associated projects with medical relevance should be supported. However, this will probably require a significant strengthening in staff and facilities (notably appropriate specialized expertise in bioinformatics) in order to have critical mass and be competitive.

Host-microbe interactions

Description

The unit has 6 permanent staff, 4 affiliated professors, 5 postdocs and 12 PhD students, with good age and gender balance. The staff have a broad competence covering medical and oral microbiology, virology, bacterial genetics and eukaryotic cell and molecular biology.

General comments

This is a large group with very diverse interests that used to be a separate department. It is generally well-funded with a significant proportion from external sources including RCN, Norwegian Cancer Society, Helse Nord, NIH and EU FP5 and FP6. Staff have to a large extent complementary competences. They have national surveillance and reference functions with respect to anti-microbial resistance and are undertaking a large population-based research project on host-bacteria-environment interactions. However, diversity in the HMI project portfolio can undermine the adopted research focus and there is a sub-optimal balance between the scientific staff. Further exploitation of local collaborative initiatives could improve the situation. Projects with a translational profile could reveal therapeutic potentials and be of commercial interest.

Limited input of students with new valuable competences and the establishment of sub-groups could both impact in a negative manner the group identity.

All projects have relevant local, national and international collaborators.

Scientific quality

The research has a translational profile and aims to solve clinical problems and improve infection treatment and prevention. Diverse projects covered include: anti-microbial resistance (AMR), spread, persistence, intervention and epidemiology, Staphylcoccus infection, Human polyomaviruses, mitogen-activated protein kinase MK5 and MabCent (marine bio-prospecting for new antimicrobial drugs). The group produces 20-25 publications per year largely in specialised journals although there is not an even production amongst the different staff. The group also undertakes useful dissemination actions to the general public.

Grade: Good.

Societal impact

The infection research has a significant importance to society particularly in relation to the national reference and surveillance center for microbial resistance.

Recommendations

The unit covers a very broad area of host-microbe-drug interactions, involving both bacteria and viruses. Some rationalization and focusing is necessary to build on strengths and avoid fragmentation. Some staff do not take part in the defined projects of the group. The large size of the group is both a strength and a threat because there is no clear focus. It is thus possible that group will need to split in two at some point (e.g. microbiology and virology).

Norwegian University of Life Sciences (UMB)

Department of Animal and Aquacultural Sciences

Description

The department is organized into five research groups and one technical group. The department also includes two research centres. Focus areas of research fall within a broad definition of sustainable food production. The management of the department is supported through three advisory committees covering research, PhD students and education.

The two units under evaluation are very different in structure and operation. The Animal Breeding and Genetics unit has a focussed mission that fits well to the overall mission of the department in animal improvement. In contrast CIGENE is a multi-departmental organisation with activities spanning both animals and plants, but tied together through common technological approaches. The different structures of the two groups complicate resource allocation. However, the department has been successful in attracting good grant income for many of its project and this has ensured good activity based support.

The management of the department is supported through three advisory committees covering research, PhD students and education. These committees have helped to reduce the administrative load on researchers but there appeared to be scope to expand the scope and responsibilities of these groups to help maintain research focus and work to attract additional PhD students to the department. The number of PhD students continues to be well below the capacity of the department.

The diversity of activities in the department has placed pressure on the limited funds available from the university. This has resulted in problems in maintaining and developing new infrastructure for the research programs. The research groups have good links to industry and these links have provided good opportunities for grant funding. However, the mechanism for potential revenue flow back to the department from these commercial activities did not appear well developed.

The industry links could also provide a mechanism for retaining the service of contract staff beyond the four year period. The department has been allowing research staff to remain beyond four years and this may represent a liability in future.

The department has well-established collaborative linkages with industry-based institutes such as NOFIMA. These include joint appointments and enrolment of PhD students. However, the relationship between university and industry institutes is complex. The groups share many collaborative projects but they also compete for funds. This tension reduces the potential for these organisations to work together and share resources and capabilities.

Follow-up on previous evaluation

The activities of this department have expanded since the previous evaluation. Concerns about the poor organisation of the department have been largely addressed through the new structure. The research productivity and focus has also improved considerably. Overall the department has made great advances since the last evaluation.

Animal Breeding and Quantitative Genetics

Description

The group consists of 4 professors, 1 associate professor, 4 researchers and 1 postdoc, in addition to 4 part time professors. The research activities are spread over five topics: Genome selection and use of genomics data in animal breeding, design of breeding schemes, management of genetic diversity, genetics of disease resistance, and biological aspects of animal breeding. Presently 1-2 professors are associated with each of these projects.

General comments

This unit has been highly productive and has established itself as a world leader in the development and application of genomics technologies for practical animal breeding. In consequence they have built strong links to industry and established several important international collaborations.

Scientific quality

The key challenge will to maintain their strong international position and this will involve further development of their breeding platforms. The strategy of placing future emphasis on the design of breeding schemes, improving the utilisation of genetic diversity and building strength around breeding for disease resistance should help ensure the long term viability of this group. Difficulty in attracting students to quantitative genetics studies is a significant impediment to the growth of this group. The problem of attracting high quality students to biometrics and quantitative genetics was identified by several organisations. An active strategy for student recruit will be important.

The research is been very good, but the panel is concerned the strategy for the future is not well developed. Overall, the panel ranked the research performed at the unit "Animal Breeding and Quantitative Genetics" as Very Good.

Grade: Very Good.

Societal impact

The applied nature of the work undertaken by this group and the strong industry support clearly demonstrates the societal relevance of this group. They have already had a significant impact on animal breeding strategies. This work will be translated to improvements in livestock and fish production systems.

Recommendations

The group should become more actively engaged in PhD student recruitment. This could be achieved through greater involvement in teaching or strengthening relationship with the biostatistics group. Several different research organisations highlighted the need for coordination of biometric support and training across Norway. This Animal Breeding

group could take the lead in developing a national approach to building capacity in this important area. The long term strategic direction of the group could be more clearly defined. The proposed recruitment of additional staff will be critical in ensuring the future viability of the group. The relationship with commercial partners and industry focussed institutes, such as NOFIMA, will need to be carefully managed since these organisations are both valuable partner but also potential competitors for some of the grant funding.

Centre for integrative genetics (CIGENE)

Description

This unit has a complicated structure and reporting line. Four different departments support the activities of this unit. Consequently it is not fully represented by the Level 1 evaluation provided above. 3 professors, 4 postdocs and 3 researchers are employed by Department of Animal and Aquacultural Sciences, but the work in CIGENE is carried out in collaboration with professors and researchers from three other departments at UMB. In CIGENE the total staff is 10 professors, 4 associate professors and 15 postdocs/researches. The aim of the center is very broad and covers not only plants and animals but also a diverse set of technologies: "Contribute to the development of a deep causal understanding of complex genetic characters in fish, plants and animals for scientific and commercial exploitation based on a conceptual and methodological integration of nonlinear system dynamics, mathematical statistics, biological theory, biological physics, and genomic and phenotypic data." This breadth can lead to lack of focus and loss of impact of the research. Strong leadership will be critical to the effectiveness of the unit. It is indeed unusual for a unit within a department to have a broader mission than the department itself.

General comments

The future development and directions of the unit will need to be very carefully planned and monitored. The unit does have the advantage of several strong research groups and links to industry. They also have the ability to bring genomics technologies to bear on key species and targets. However, the future activities will require access to critical infrastructure and flexibility in identifying suitable research targets and technologies; for example, the current portfolio of research projects is still too dispersed to allow effective development of system biology approaches. Access to bioinformatics capabilities may also prove a limitation to future developments. The current support for bioinformatics through the FUGE program is likely to change as this funding scheme comes to an end. The bioinformatics demands for the research groups in CIGENE will almost certainly increase over the next few years.

The unit does have extensive linkages and collaborations with other groups. However, these linkages are largely initiated by individual researchers and may not always support the strategic direction of the unit. The commercial relationships, in particular, will require careful management and planning since some partnerships may limit other opportunities for collaboration. Similarly relationships with commercially focused institutes, such as NOFIMA, will require careful planning. As noted above for the Animal Breeding unit, these organisations are both valuable partners but also potential competitors for funding. Strong mentoring and succession planning strategies will be required and these may be problematic given the current tenure restrictions.

Scientific quality

The grade represents an average, but there is large variation between groups with several showing strong performance and great potential to expand. Overall, the panel ranked the research performed at the unit "Centre for integrative genetics" as Good.

Grade: Good.

Societal impact

The research activities of the various groups in the unit cover commercially important plants and animals in addition to model species. The groups are providing important contributions to international projects in several species and this will provide Norwegian researchers with early access to these outcomes.

The capabilities developed within the unit are expected to grow in importance and relevance over the next few years as attitudes to biotechnology change in Norway and Europe.

Recommendations

The breadth of activities in CIGENE presents a significant management and planning challenge. It will be difficult to build excellence in all areas and a degree of focus will be important if the unit is to develop and build an international reputation. This will require the identification and support for a small number of key areas. There are already some areas where the unit has strength and these should be supported. The current organisational structure may not be the best to achieve this development and the relationship of CIGENE to its current host department and the other participating departments may not be optimal for CIGENE future development. A greater degree of independence in managing university funds, setting strategic directions and taking direct responsibility for outcomes would be desirable. The future planning for CIGENE should include a careful consideration of the relative merits of the various partnerships with industry and the industry focussed institutes. These relationships are currently not optimal. Clearer planning is also needed to ensure access to core competencies within the unit in an area where technology is changing rapidly. This includes both physical and intellectual capabilities.

Department of Chemistry, Biotechnology and Food Science (IKBM)

Description

The Department of Chemistry, Biotechnology and Food Science (IKBM) was established in 2003 following a departmental reorganization at the Agricultural University of Norway (NLH). IKBM became a relative large and diverse department with staff members from the former Department of Mathematical Sciences (statistics and bioinformatics), Department of Chemistry and Biotechnology (chemistry, biochemistry and microbiology) and the entire Department of Food Science. In 2005 NLH received university status and changed its name into Norwegian University of Life Sciences (UMB).

IKBM underwent reorganization in 2006-2007 and since then the department has been organized in research groups. The 12 research groups are each headed by a professor with

considerable scientific autonomy, but also clear responsibilities in teaching, research, management and administration. IKBM emphasizes quality and potential when allocating internal resources or when setting priorities in application rounds. IKBM also promotes and supports collaboration between groups by joint PhD projects, shared instrumentation and infrastructure.

Four of the 10 to-be-evaluated groups are presented here as individual "level 2 units": Molecular Microbiology, Laboratory of Microbial Gene Technology and Food Microbiology, Protein Engineering and Proteomics, Integrative neuroscience and sociogenomics. One group (Environmental Microbiology) is partly evaluated here and in Panel 1. The remaining 5 groups are jointly presented as the Food Science Evaluation Unit (FSEU).

IKBM total staff is around 125 employees with an annual budget of nearly 97 million NOK (in 2009), 40% of which comes from external grants. Research is largely funded through grants from national funding agencies.

Since the reorganization in 2006-2007, IKBM is located in two buildings, the old food science building and the new biotechnology building, that are linked by a closed corridor. The IKBM Department appears well-organized and well-managed, with clear responsibilities divided between Head and board of Department, advisory committees for research and teaching (with representatives of all levels of personnel), and heads of research units. Head and board of Department make key strategic research decisions, e.g. allocation of PhD students and investment priorities, after hearing the advisory Committee for Research.

IKBM is a relatively big department with diverse topics of research (chemistry, biotechnology and food science) and teaching. There is no evidence that special attention is given to internal communication in IKBM, no newsletters, website, joint institutional seminar program, visiting lecturers, aiming for closer contacts between all units.

Judging their research topics, ability to attract external funding and publication records, IKBM houses some very competitive and successful research groups (see level 2 evaluation). They publish their scientific results in highly ranked journals. These units also are involved in various (inter)national and industrial collaborations. The research groups are challenged by the Department to further improve performance by adjusting their annual financial budget based on graduated MSc and PhD student numbers, publications, and external projects overheads. Under threats/weaknesses IKBM states 'we do have some underperformers that should become more productive'. This requires attention and action of the UMB/IKBM management.

IKBM has developed a research strategy aiming for 'high quality fundamental and applied research, and external grants for fundamental research, and increased participation in EU projects' based on 5 defined research areas: Basic and applied microbiology, Biochemistry, bioorganic chemistry and analysis, Food production, food quality and bioprocess technology, Cell biology in relation to health, and Bioinformatics and applied statistics. These research areas, however, reflect largely the existing situation. Instead of focusing on these rather traditional fields and disciplines, IKBM should prepare itself to be a strong actor in the emerging research fields of the future. Thus, in what fields IKBM wishes to excel in the (inter)national competition? And how should

this be achieved? Funding in some key (future) research areas is at present very limited in IKBM. An example is Bioinformatics, with only a single faculty position in this important and expanding area of research.

Lack of (receiving internal and successfully scoring external) funding for research is a major complaint (Threats, Weaknesses) in the self-assessment report. Is research at the Department completely dependent on external funding (as stated)? But all permanent staff (involved in research for about 40% of time) and 25 PhD positions are funded by UMB/IKBM itself! Experiencing insufficient funding possibilities in Norway (as stated), it remains unclear why only a few research groups in the Department are successful in obtaining international funding, e.g. relatively large EU-funded research projects in past and current Framework Programmes. 'Some of IKBM's research groups have had great difficulties in attracting funding over several years', which is an undesirable situation. UMB/IKBM should decide whether to terminate such nonviable research groups or, in case they represent core research topics that need to be continued, to recruit young members of staff that are able to attract external funding. The funding situation may be further improved by focusing on fewer research topics with already proven high quality in the Department.

Internally funded permanent staff has been reduced from 35.8 scientific, 20.5 technical, and 10.7 administrative positions in 2003, to 28.8, 18.6, and 8.9 positions in 2010, respectively. This is partly due to IKBM's desire to create more freedom to operate, economically. The average age of members of staff is 58 years. A recruitment plan has been developed and approved by the Department Board in 2009, describing an overall policy for renewal and refocusing of permanent staff in years ahead.

UMB/IKBM internal funding has increased (in 2007-2010: 55-58 million NOK annually). However, costs have increased more than funding, and IKBM experiences a real reduction in 'purchase power', e.g. for research equipment (a point of major concern). IKBM funding from external sources has increased substantially from 2007-2010, from about 25 million NOK to about 39 million NOK annually. In 2010, external funding thus is about 40% of total budget, mostly from the Research Council of Norway (75%) and to a minor extent from international grants (2.5%, including EU funding). IKBM appears to run very few international/EU collaborative research projects with funding for postdocs and PhD students.

Overall, the IKBM representatives made a good impression in the discussions with the evaluation panel. In view of its firm background in Chemistry, Biotechnology and Food Science, IKBM is ideally positioned to make a strong scientific and innovative impact in the health-, food-, biotech-, and biobased economies of the future. IKBM is recommended to develop a more focused approach in research strategy, and when applying for external funding, to ensure success in these competitive areas in the years ahead. Also, for IKBM there is much to be gained from further involvement in larger size international (EU) projects (with funding for postdocs and PhD students).

IKBM currently has about 60 PhD students. PhD students and postdocs are recruited from all over the world. UMB/IKBM employs strict rules for follow-up of PhD students (PhD committee, reporting, seminars and final evaluation). As a result of this, the average time spent on a PhD currently amounts to approximately 3.5 years. A total of 16 PhD students are listed as external It is stated that IKBM provides university supervision but has only

limited involvement in the actual research. This appears a less desirable situation. As seen elsewhere, the career paths for postdocs are rather uncertain, which is a major point of concern.

The interdepartmental Environmental Microbiology group at IKBM (level 1) focuses on fungal microbiology and biocontrol, and natural (anaerobic) fermentation processes. The group leader has an extensive international network and is among IKBM's better cited scientists. The publication record is reasonable, and improving. It remains unclear in the self-assessment how this group contributes to the core research activities in IKBM.

Follow-up on previous evaluation

In response to the outcome of the previous evaluation, IKBM has organized its research in strong research groups with a clear leader and research program/profile. Allocation of internal resources is now firmly based on quality and potential. Collaboration between the groups is stimulated through PhD projects, instrumentation and other infrastructure.

Molecular Microbiology

Description

The Molecular Microbiology research group studies lateral gene transfer by natural transformation in streptococci since the mid-nineties. Lateral gene transfer is a major driving force for bacterial evolution. The group also has elucidated the phenomenon of fratricide, a DNA acquisition mechanism. The unit is relatively small, with 1 professor and 1 senior researcher, plus 2 postdocs and 3 PhD students on grants. The Molecular Microbiology unit reports severe difficulties in raising funds for (larger size) research projects with sufficient running expenses and for buying and maintaining equipment.

General comments

The group is relatively small and all members of the research group study related topics. Exchange of information thus occurs on a daily basis. The group leader makes the strategic decisions after consulting the most experienced researchers and postdocs. The group has a clear strategy for publishing results in leading journals within the microbiological sciences. In the last five years, the group has been entirely depending on the university for funding of PhD students. The group has no long-term strategy for scientific collaboration (as stated) and indeed reports only a limited involvement in (inter)national research collaborations.

Scientific quality

Although relatively small, the group has made significant contributions in research on streptococcal transformation and genetics. Surprisingly, the strong possibilities offered by all omics technologies that have emerged in recent years appear to have left this group unaffected. The group reports 19 papers in international journals over the years 2005-2010. The group has not succeeded in obtaining funding from the EU framework programs, and operates in relative isolation. The quality of the group is graded as good.

Grade: Good.

Societal impact

The research clearly is of societal relevance, especially regarding the elucidation of mechanisms (for control) of lateral gene transfer by natural transformation in streptococci (a major driving force for bacterial evolution), and introduction of the competent state in Streptococcus thermophilus, widely used for the manufacture of yoghurt and cheeses.

Recommendations

In view of the limited size of the group and the problems experienced in external funding, IKBM management may wish to stimulate a stronger association of this unit with other groups that also run molecular microbiology research topics. The group should increase its efforts to obtain larger size type of grants, e.g. from EU framework programs (with funding for PhD students and/or postdocs), and generally also with sufficient resources for running costs.

The group operates in relative isolation and should engage more strongly in (inter)national multidisciplinary research collaborations to improve viability and longer-term stability. In view of its research topics, Molecular Microbiology is suggested to more frequently engage (inter)national companies in fundamental innovative research of strategic relevance.

Laboratory of Microbial Gene Technology and Food Microbiology

Description

The research group was established in 1988 as the Laboratory of Microbial Gene Technology. In 2007 the Food Microbial Group was integrated into LMG. LMG research strongly focuses on bacteriocin synthesis, with emphasis on lactic acid bacteria (LAB). More recently, bacterial genomics and systems biology studies of enterococci have been initiated aiming to investigate and define pathogenic traits in commensal/probiotic Enterococcus faecalis species. Although successful overall, LMG reports severe difficulties in raising funds for (larger size) research projects and for maintaining and acquiring equipment.

General comments

The group is well organized with weekly meetings of all members to discuss research progress, to solve problems, and to plan for future direction. Strong attention is given to education and training of PhD students and postdocs, engaging them in the writing of papers and applications for research grants, and requiring that they present research results at conferences. The group succeeds in timely introducing new technologies (DNA sequencing, DNA microarray analysis, in vivo image analysis). LMG is competitive for research grants and has attracted sufficient external research funding, including various shared-costs EU projects and an ERA grant, resulting in a strong (inter)national network of collaborations.

Scientific quality

The group is internationally well-known for its strong contributions in research on bacteriocin synthesis. Its key and fundamental findings have moved this field forward considerably. The group publishes in good international journals, among the best in microbiology, totaling 67 publications over the years 2005-2010. The group is as such acknowledged by ISI as highly cited in microbiology.

Grade: Very Good.

Societal impact

The fundamental studies of bacteriocin synthesis in LAB, and of pathogenic traits in enterococci, are clearly of societal relevance. The research results in characterization of LAB starter cultures used to produce fermented food and feed, analysis of probiotic strains, and development of new anti-bacterial compounds to combat pathogenic Enterococcus bacteria.

Recommendations

Overall the research group appears to be functioning well, although several points have been raised that clearly deserve attention. It appears that the LMG group lacks administrative support. If true, IKBM management should take action here, also to ensure a smooth transition at the group leader level in the next 2-3 years, allowing a stronger focus on research instead of administration. The evaluation panel recognizes that LMG is suffering from too many small projects with 1 PhD student only, and encourages the unit to put more emphasis on applying for larger grants. This may require association in (inter)national research consortia. In view of its research topics, LMG is stimulated to more frequently engage (inter)national companies in fundamental research of strategic relevance.

Protein Engineering and Proteomics

Description

The Protein Engineering and Proteomics group has a considerable size, but only holds 1 permanent staff position, plus 9-12 postdocs and 6 PhD students. The temporary positions all are funded by external grants, and the group is well-equipped with analytical research instruments. The group studies protein structure/function relationships, with emphasis on (1) enzymology of biomass conversion and (2) proteomics of lactic acid bacteria. Although largely fundamental in nature, the innovative research is of strong industrial interest and is often carried out in close contact with and/or in direct collaboration with companies.

General comments

The group is well-organized, meeting regularly to discuss research progress. Major decisions are made by the group leader in close collaboration with senior staff and after consulting relevant group members. The group has a clear research philosophy and strategy, focusing on core activities, applying for funding in all relevant calls, publishing in international journals of the highest level, also aiming to reach the general public. The unit plays a central role in a large network of (inter)national and local collaborations, also evident from many joint publications. Good teaching and PhD training efforts are evident, with good job opportunities for graduates.

Scientific quality

Although the group holds only a single permanent staff position (the group leader), it makes very significant scientific contributions, including 53 publications in international journals (e.g. papers in Science and Proc Natl Acad Sci USA) over the years 2005-2010. The research topics under study are well-chosen and in competitive fields of strong interest. The group leader is well-recognized internationally. The unit has been successful

in EU framework programs, and also operates as a motor within the department overall. The quality of the group is graded as very good to excellent.

Grade: Very Good to Excellent.

Societal impact

The research topics under study, enzymology of biomass conversion (bioenergy, biomaterials) and proteomics of lactic acid bacteria (delivery vehicles for vaccines, role in human gut microbiome), clearly are of innovative nature with a strong societal relevance, over the years also resulting in various patent applications.

Recommendations

To improve its viability and longer-term stability, IKBM should consider increasing the number of permanent staff positions in the Protein Engineering and Proteomics group. The group is suffering from too many small and short-term research projects (staffed by a single PhD student each) and should therefore increase its efforts to obtain larger size type of grants, e.g. from EU framework programs (with PhD students and/or postdocs), generally also with sufficient resources for running costs. In view of research topics and achievements, the group has the potential to engage in top-notch innovative research of direct interest to companies, without diminishing scientific impact and publication level, similar to the situation existing at various top universities in the USA.

Integrative neuroscience and sociogenomics

Description

This unit was founded in 2005 at the Department of Animal and Aquacultural Sciences, UMB, and moved in 2008 into newly renovated laboratory facilities at IKBM. The group studies evolutionary, genetic, physiological and neural mechanisms influencing behaviour of social animals (honey bees). The work is at the forefront of research that uses social insects as models for behaviour. The head of the group has shared positions in Arizona State University and at IKBM. The group is relatively small, with 1 associate professor,plus 2 postdocs and 4 PhD students..

General comments

The group is well organized with weekly meetings to discuss progress, chaired by the head of group or an experienced research staff member. Also in view of the shared position at Arizona State University and at IKBM, the group head maybe absent for periods of 4-6 weeks, keeping contact via email, phone or skype. This is a less desirable situation in the long term. A full position for the head of the group at IKBM therefore is recommendable.

The group has a highly structured approach in research and publication, resulting in a strong publication record. The group also succeeds in winning scientific and public interest for its work, and is internationally featured by press attention in journals, newspapers, on internet, and on public radio and TV shows.

Scientific quality

Although a relatively small group, its publication record is strong, with a focus on high ranking international journals. The long-term viability of the group is uncertain and depends on a single part time associate professorship.

The group reports 48 papers in relatively high ranking international journals, over the years 2005-2010. In view of the single associate professorship position, this scientific output is high. Also in view of the quality and volume of production, the scientific quality of the group is graded as very good.

Grade: Very Good.

Societal impact

The research clearly is of societal relevance, focusing on sustainable pollination in agriculture (productivity farmland), modelling of food-related behaviour (human health and quality of life: the metabolic syndromes of obesity and diabetes), on neuronal proteins that are of interest to biomedical research on senescence, and suitable for public and private education (on the evolutionary origin of social behaviour).

Recommendations

The shared position of the head of the group at Arizona State University and IKBM offers opportunities for collaborations but also reduces time for research organization and supervision at IKBM. This requires attention of IKBM management.

The long-term viability of the group depends on a single part time associate professorship position. It is recommended to establish a full faculty position for the group leader at IKBM.

Food Science

Description

Food research and education is one of IKBM's cornerstones and a major area of interdisciplinary research. Five research groups are fully involved in this area: Molecular cell biology, Measurement methods, Dairy technology and food quality, Processing of muscle foods: Meat and fish, and Food proteins; and Structure and biological function. Food Science is a multidisciplinary area that comprises biology, chemistry, physics, technology and engineering. Only approximately 30% of the research activities can be classified as biology. Most of the research in this field is applied and closely linked to problems of food quality, processing, technological innovation as well as product innovation, serving the food and pharmaceutical industry and the Food & health authorities (Mattilsynet, Landbruks- og mat- departementet). FSEU provides industry with a toolbox for their own innovatory work. IKBM has established new groups in Molecular Cell Biology (2007) and in Meat Science (2008), which are still developing. IKBM/FSEU has pilot plant facilities for dairy processing and some general food science and cereal technology applications.

General comments

FSEU holds a good position in several areas (dairy technology, meat science, rheology, chemometrics) and has sizeable collaborations with industry. A joint forum,

"Matvitenskap", comprising all members of FSEU, coordinates the strategy for research and education in food science. Regular meetings are held, according to need. Otherwise the organization of food science is fragmented, and the more applied research has become rather dominant, further scattering FSEU research focus and impact. In fact, industry's needs are amongst the most important steering tools for research. A stronger organization and coordination of FSEU research thus is needed, with a healthy basic research programme, able to successfully compete in, and attract (inter)national funding for fundamental innovative research. This should be based on a clear research strategy. There are critical mass issues in several FSEU groups due to limited funding opportunities. FSEU also faces powerful national competition, necessitating choices for future topics, in which it can excel, and investments in infrastructure (instruments) and personnel. FSEU runs joint seminars across the groups with presentations by PhD students, group leaders and external speakers.

Scientific quality

The research infrastructure of FSEU is diverse with some research groups better equipped than others. FSEU is well equipped to analyze the microbiological and chemical composition of food and raw materials and also the rheological properties of foods. Current research in the food related disciplines is of acceptable level. The publication record of FSEU groups has increased in recent years. The FSEU evaluation unit reports 169 papers, mostly in international journals, over the years 2005-2010. Scientific production thus is significant with close to 2 publications per scientist per year, when averaged over the 16-17 researchers. In view of the applied research aspects, there is not always a direct correlation between funding and publication within FSEU. The number of publications per researcher and research unit varies strongly.

Grade: Fair to Good.

Societal impact

FSEU research has clear societal relevance, focusing on food health aspects (characterization of healthy food components, probiotic bacteria, digestion and allergens). The results provide health authorities with the foundation for improved advice on food consumption, but also supply the food industry with increased knowledge of how they can improve their products to meet the increasing market for healthy foods.

Recommendations

FSEU represents a diverse and scattered organization. This had been noted already in the previous evaluation, but has not changed in the past 10 years. During the discussions with the institute representatives the evaluation panel did not get clear answers on this point.

FSEU needs a clear strategy for the future, firmly based on the most recent research developments in fundamental and innovative food sciences, defining research areas and topics where IKBM/FSEU can excel in (inter)national competition.

The age distribution of senior members of staff is worrying, with 12 of the (associate) professors at age 55 or above, and requires active recruiting of young scientists, especially in strategically chosen core research areas and around core topics. The next 5-10 years thus in fact may offer good opportunities for change. FSEU scientific research focus and impact suffers from the more applied type of activities. It was encouraging to see that the relatively new Molecular Cell Biology group has a stronger fundamental research focus. Techniques developed by this group are, or will be, used by the other research groups in more applied food science research projects (as stated).

University of Stavanger

Department of Mathematics and Natural Science, Faculty of Technology and Natural Science

Description

The Department of Mathematics and Natural Science is a multidisciplinary institute which covers a wide range of disciplines (mathematics, statistics, physics, chemistry, environmental engineering and biology), including the general topic of biological chemistry which also in itself spans several fields. The Department of Mathematics and Natural Science is part of the Faculty of Technology and Natural Science. At present, the administration of the department consists of an appointed Head of Department with one secretary. The department is divided into four sections, each coordinated by an elected section head. The Biological Chemistry section is one of these. Each section comprises several research groups of various sizes. The sections and research groups are informal organizational levels. The department head, with the coordinators from each section and representatives from other supportive areas, constitute a management team at the department. This structure of the department has been invariant over the last 20 years, with the exception of the emerging of the section of biological chemistry. In total there is in the order of 30 full-time scientific staff positions associated with the department. Six of these are connected to Biological Chemistry and CORE.

The University of Stavanger was established in 2005, formally transforming the former university college into a university proper. The university college had a strong focus on teaching and less on research. The transformation from university college to university was apparently not combined with a related change in funding model, and this has led to frustration as the resources for research are quite limited. In other words, the upgrade from a university college to a university has essentially not happened. For this reason there is now a need to reduce staff overall, where the university cannot even secure research resources for prioritized areas given that other departments are described as overstaffed. This seems again to be an example of the inflexibility in the Norwegian system, where it is difficult to handle redundant staff. In this case the situation seems to be extreme as a change from college to university should be associated with considerable freedom to reorganize departments and infrastructure.

From the interview and the self-assessment report it appeared that there is a surprising lack of communication between the Dean, the Director of the Faculty of Science and Technology, the Department Head and the leading researchers. Increasing the information flow is in particular of importance as the department is highly multi-disciplinary. The panel felt that strategic decisions should be made on a more informed basis incorporating better the competences and resources within the leading group of PIs.

Follow-up on previous evaluation

The department was not included the previous evaluation of biology. However, the department was covered by previous national evaluations of chemistry. The biological chemistry area was in fact formed in response to the 1997 Weitkamp report. The activities

have also been covered in a recent evaluation of basic chemistry in Norway (Hey-Hawkins report).

Biological Chemistry Group / Centre for Organelle Research

Description

Out of the ~30 full time scientific staff positions associated with the department, six full-time professors are connected to the Section for Biological Chemistry. The section for Biological Chemistry is accordingly divided into six groups each headed by a professor. Most of the researchers in Biological Chemistry also participate in the Center of Organelle Research (CORE) established in 2009. This center is lead by a board, but on the daily basis by a center conductor, who is one of the professors at the department. The center currently comprises five research groups. Organizationally the center is affiliated to the department and faculty, but is located in premises located on another part of campus, nearby other research communities in the culinary field. Establishing this research center has been a priority in the strategy at the university and the faculty. The aim is that CORE provides a cutting-edge, ambitious and dynamic research environment that attracts some of the best scientists and collaborators worldwide. CORE has three missions: Research, Innovation and Education. Around 60% of the research is funded by external grants with EU and other international grants making up a very small part of the total.

General comments

In part the productivity of the section stems from clever use of several Norwegian research infrastructures in addition to infrastructures in the UK and in the US. This is very positive. It also appears that a large number of collaborative efforts with many other groups world-wide in addition to many national collaborations contribute to the overall success of this evaluation unit. A previous recommendation mentioned expanding on the collaborative network and this has indeed been put achieved. A positive aspect is also that the section is highly interdisciplinary incorporating via collaborators mathematical modelling and simulation in the research strategy.

The biological chemistry section reports as a major problem the very limited technical support staff available to the research. While the panel acknowledges that the general level of research support at the department is low it also appears that the section internally by cutting the most marginal research activities could reallocate resources such that the most promising groups are better supported. This would also contribute to solving the general problem of critical mass as the life science environment at Stavanger University overall is not strong. While the age distribution and gender balance for the professors is good, the same seems not to be the case for the postdocs of which some are older than the youngest professors. This is an oddity given the Norwegian system, which limits the postdoc period.

Scientific quality

The research activities of the Biological Chemistry group are related to the cellular processes with special focus on the function and structure of organelles and their impact on metabolism, development, and environmental adaptation. In this general area the unit reports 109 peer-reviewed publications in the 2005-2010 period. The section is overall of very productive and of high quality with many strong papers in excellent journals,

although there also is room for consolidation. It would seem natural to reduce the amount of low impact papers published. Additional focus on high impact papers would definitely strengthen the section further. This also implicates cutting more marginal parts of the research portfolio. The panel evaluated the research activities as Good.

Grade: Good.

Societal impact

The section/CORE represents mostly a basic research effort of high quality. The innovation aspects are not covered in the self-assessment report and seem not to be a priority. The basic research is definitely of high value in the food related area.

Recommendations

Change the publication strategy towards more focus on high impact publications and fewer of low impact. The organelle field has that potential. At the same time the section should consolidate and most likely reduce the number of topics studied.

As the department overall hosts several small and single person groups and identifies this as a weakness reallocation of some of these resources could improve the funding situation for biological chemistry/CORE.

The management structure should be changed such that the professors (group leaders) are included in the decision making process. Decisions are made in a too narrow circle. This seems to be a department-wide problem as there is no faculty forum for the 26 professors to have their voice heard.

By reallocation of internal sectional resources it is recommended that the technical support staff is increased by cutting some of the more marginal research activities.

Norwegian Institute of Public Health

Norwegian Institute of Public Health

Description

The Norwegian Institute of Public Health (NIPH) is a governmental institution under the Ministry of Health and Care Services. NIPH has five scientific divisions: Environmental medicine, Epidemiology, Forensic toxicology and drug abuse research, Infectious disease control and Mental health. Only the Division for Infectious disease control, with the units Infectious disease epidemiology and Microbiology, will be evaluated by Panel 3 at level 2.

NIPH has a staff of about 1000 employees and an annual budget of nearly 1 billion NOK (approximately USD 160 million /125 million EURO). The Ministry of Health and Care Services provides the basic annual budget to cover health surveillance, routine services, and scientifically based advice to the government and society at large. Research is largely funded through grants from national and international funding agencies.

NIPH is continuously challenged to achieve the right balance between research and other obligations such as health surveillance, emergency response, communication, advice and services to the government, health services, mass media and society at large. It is also an emergency institution which must respond on short notice when a health event or crisis such as the H1N1 influenza pandemic or chemical hazards occurs. NIPH aims to respond not only with action but also with 'acute' research to be continuously better prepared for future emergency situations, and contribute real-time scientific knowledge to the national and international community. In view of these additional obligations, NIPH staff are struggling to maintain a sufficiently strong focus on scientific research. There is a clear need to ascertain from the governmental authorities the importance of research for the NIPH advisory and surveillance capacities.

Except for supervision of PhD students, NIPH has no major teaching obligations. Neither does clinical work take place at the institute.

The 188 NIPH researchers above doctoral level include 101 women (54%) and 87 men (46%). Only 50 (27%) are younger than 40 years, while 108 (57%) are between 40 and 60 years of age. There are 24 (13%) postdocs of which 15 are women.

At NIPH management and research is well organized, with the senior management team convening every week to serve as a council for the director general. Nevertheless, existing organizational and regulatory obstacles are mentioned that should be removed to allow more rapid decision-making. Since 2002, the legislation regarding health research, health registries and biobanks has developed rapidly, with increasing requirements regarding timeliness, quality, confidentiality, ethical standards, and cost-effectiveness. In parallel, the research activities at the institute have grown considerably, and there is a need for an organizational structure that can respond to these new challenges. The evaluation panel appreciates that NIPH has decided to reorganize its internal and external service and support functions, and the infrastructure for health registries, cohorts, and

biobanking (to be finalized in 2011). A main aim of the reorganization process should be to improve support for research.

The scientific division and department directors are challenged to combine their strategic roles with direct involvement in research as principal investigators and scientific collaborators. The research strategy of each division is discussed and needs to be approved by the institutional leadership. Research activities apparently are organized differently in each division. There is much to be gained by organizing this in a more uniform way, by encouraging cross-divisional collaborations in research, stimulating exchange of technologies, etc.

NIPH has responsibility for 10 of the 15 mandatory national health registries, and several large population based cohorts with biobanks with data from the whole population and samples from a large proportion of the population. This impressive dataset allows large longitudinal cohort studies that require long-term basic funding from the Ministry of Health and Care Services, including support for the research infrastructure.

NIPH funding from external sources has increased substantially since 2002, from about 30 million NOK to about 120 million NOK annually. Although most of the ongoing research thus is funded by external grants, external funding remains relatively low, around 15% of total budget, and is mostly from the Research Council of Norway (40%) and to a minor extent from international grants (10%, including EU funding). There is no evidence for involvement in larger size international/EU collaborative research projects with postdocs and PhD students. It thus is a matter of urgency for NIPH management to more strongly stimulate international participation in research collaborations.

NIPH is continuously challenged to achieve the right balance between research and other obligations such as health surveillance, emergency response, communication, advice and services to the government, health services, mass media and society at large. Personnel in the institute experience that the work time available for experimental research is under pressure. NIPH clearly recognizes (see above) the strong relevance of remaining up to date in scientific knowledge, experimental research and most modern technologies. The evaluation panel therefore recommends that NIPH coordinates and organizes research activities more strictly, and invests more into modern techniques such as sequencing of infectious agents during outbreaks. The evaluation panel supports the recently developed joint institutional research strategy, stimulating collaborations at all levels, and fostering interdisciplinary research.

Overall, the NIPH unit made a good impression in the discussion with the evaluation panel. A main point of discussion is how to ensure that research is in focus and does not become a secondary task. Strategic choices for research areas therefore should be made as soon as possible. The institute management could introduce incentives to ensure that research happens, and that research organization and planning becomes more formal. The government should understand and accept that it is important for NIPH to do in depth research using modern technologies, in order to be able to give good advice. Also the international network of research collaborations (with PhD students and postdocs) should be strengthened in the years ahead. Also, for an institute such as NIPH there is much to be gained from further discussions and exchanges of personnel with related EU and global institutions.

NIPH does not have a unified plan for training and career paths for researchers; this requires attention of the management. NIPH could be more active in training staff, PhD students and postdocs, offering courses in project organization, how to lead meetings, write proposals and publications, make oral presentations, and stimulate them to participate actively in national and international conferences.

Follow-up on previous evaluation

The institute received excellent evaluations by the previous Research Council of Norway international evaluation panels, and has followed up the recommendations by integrating them in the research strategies and action plans that have governed their research since 2000-2003.

Division of Infectious disease control: Infectious disease epidemiology and Microbiology

Description

Within the Division of Infectious Disease Control, microbiological research is performed in the Departments of Bacteriology and Immunology, Food-borne Infections and Virology, which will is evaluated as one unit. These departments have been heavily affected by several reorganizations in the past decade, resulting in improved communication, broadening of the scope of research and a relatively close collaboration. Most of the (research) work focuses on microbiological reference activities, to monitor infectious diseases, resulting in evidence-based advices to the authorities and general population. Molecular methods are developed to analyze spread of pathogens, their virulence determinants and antibiotic resistance. Together the three departments have a staff of approximately 115 individuals, with 28 academic staff at the PhD level performing research at least 20 % of their time.

The Department of Infectious Disease Epidemiology conducts descriptive studies of infectious diseases, mainly tuberculosis, HIV infection, sexually transmissible infections, food- and waterborne diseases, influenza, nosocomial and rotavirus infections, using the institute's reference laboratories, to link information about patients and the infectious agent. This Department is also evaluated by panel 5.

General comments

NIPH and the Division of Infectious Disease Control appear well-organized. It hosts national reference laboratories for various viruses and bacteria and possesses unique diagnostic biobanks of samples from patients as well as viral and bacterial isolates collected over the years, rendering an excellent basis for research. It is evident however that the ongoing research lacks focus. The Division of Infectious Disease Control is in the process of developing its own research strategy to coincide with the newly developed overall research strategy of the NIPH. Decision-making about the topics of research should be a matter of some urgency.

The extent of the ongoing international collaborations is emphasized several times in the self-evaluation, with grants from the Wellcome Trust, NIH, Gates Foundation. The limited external funding, especially the low number of international grants, in fact suggests that international collaborations are largely limited to networking activities, instead of sizeable research projects.

Scientific quality

This NIPH Division of Infectious Disease Control hosts a good research infrastructure, has large collections of viral and bacterial strains, biobanks and equipment for genetic analyses. It has active involvement and leaderships in various global health research projects. The evaluation unit reports 282 papers, mostly in international journals, over the years 2005-2010. Scientific production thus is significant with close to 2 publications per scientist per year for, when averaged on the 28 researchers. The publication volume is nearly equivalent in the three Microbiology departments, although there is a large variation in the production of individual researchers. This requires the attention of NIPH management. The citation impact (field) is good. Since the productivity and impact did show some variation between groups and investigators the scientific quality of the unit is graded as good to very good.

Grade: Good to Very Good.

Societal impact

The Division of Infectious Disease Control and its microbiological and epidemiological units have strong societal relevance, providing tools to combat infectious diseases. The microbiological unit is a structure in alert, providing laboratory services and advice to health authorities and other sectors of the community. Much of the research is related to these roles.

Recommendations

Scientific research still suffers from the more service related activities in the institute. The NIPH management should as a matter of some urgency implement the new research strategy in the various divisions. It might be useful to install extra incentives to stimulate research and publications, obtaining external grants, engage in (inter)national collaborations, including use of time sheets to ensure sufficient focus on research.

Interactions between NIPH and the FUGE platforms appear minimal at present. NIPH should be interested in expanding its bioinformatics expertise in particular, conceivably via FUGE but also combined with in house expertise.

The overall scientific attitude and atmosphere in NIPH could be stimulated by organizing more regular division/departmental seminar and research progress meetings. This might involve invited (inter)national speakers, and colleagues from local universities, but definitely also the in house staff, postdocs and PhD students involved in scientific research.

In view of the declining confidence, communication with the general public needs to be maintained at least at the present level. It is recommended to make this a clear priority.

In several places the self evaluation states that staff in particular units is at a critical minimum. Each unit however has 20-35 employees. This point could not be clarified during the interview. NIPH management should look into this situation.

The age distribution of senior members of staff in microbiology is worrying and requires active recruiting of young scientists.

The panel was impressed by the positive and energetic attitude of the members of the evaluation unit interviewed, and stimulates NIPH to maintain this in future activities.

Norwegian Institute for Agricultural and Environmental Research (BIOFORSK)

Norwegian Institute for Agricultural and Environmental Research

Description

BIOFORSK belongs to the Institutes Sector (Ministry of Agriculture and Food). It is an artificial construction that was formed in 2006, consisting of seven research divisions that are located at 12 different places all over Norway. This highly decentralized organization presents inconsistencies in organizational structure counteracting the administrative benefits. Research strategy is driven by market demands and customer needs as well as by "research for policy support". BIOFORSK has a unique competence in food and agriculture, and management of environment and natural resources thus working along global trends (food, climate, and alternative energy).

Education and teaching is not part of BIOFORSK's responsibilities, however several researchers are involved in teaching and supervision of PhD students. Performance indicators are not only publications but also the societal impact (i.e. immediate usefulness) of research. Some of thee important criteria are the amount of budget obtained from the private sector and funding from international sources. The majority of funding comes from short-term contracts from industry. This is often in the form of collaborations where company research is performed at BIOFORSK. These arrangements do not give a large degree of predictability of funding. All permanent positions are externally funded which put a constant pressure to maintain funding even to pay for positions that are required by law. This is a huge challenge. In general, there is not much money in agricultural research as compared to other applied research fields.

BIOFORSK in total has personnel of 459, among them about 200 researchers and about 200 technicians. Only 15 PhD students and 5 postdocs were present between 2007 and 2009. Within the Division for Plant Health and Plant Protection, one level 2 unit was evaluated by Panel 3 (Section Genetics and Biotechnology).

Follow-up of previous evaluation

BIOFORSK has put efforts into renovating research facilities, investing in advanced equipment, installed mechanisms to facilitate sabbaticals for senior scientists, and set up scholarships for its PhD student in order to stimulate international collaboration.

Genetics and Biotechnology

Description

The Section is responsible for research in genetics and biotechnology not only related to plant health but related to all topics of BIOFORSK. The majority – but not all – members of the section are located in Ås. The section consists of 5 researchers, 2 postdocs, 3 PhD students and 3 technicians. Compared to other units, the members of this section are relatively young (under 50). The section has no gender problem.

The laboratories were renovated in 2004, most research equipment is modern, and there is access to large equipment at other institutions. However, it is difficult to renew infrastructure at sufficient rate.

General comments

Although three of the seven permanent staff members are located elsewhere, there is close collaboration and the section seems to function as a unit. Video conferencing is used a tool to include the staff located in different locations. There are weekly group meetings, and twice a year all researchers, Master and PhD students present their ongoing work.

There are too many small projects (many of them are short-term ones), and the research unit would prefer to work together on fewer projects instead. It is the task of the unit to fulfil many different roles, yet given its small size the unit should focus to become stronger. However, with so few people spread over so many diverse projects it is a problem to maintain competence. Bioinformatics is a bottleneck and needs to be strengthened. PhD students are associated with a university where they have a supervisor. PhD students are able to focus on a single project. BIOFORSK has the policy to send PhD students abroad as part of their PhD program. In addition, there is training in soft skills (publication writing, presentation of results) and participation in national and international conferences. There is extensive collaboration with research institutions and companies in Norway and abroad including exchange of researchers. The unit focuses on strong international groups leading to strengthening its own core expertise. However, EU funding is very low and there are no concrete measures been taken to improve. With respect to NOFIMA there is some contact, but not to a large extend.

Scientific quality

The section is the leading unit in Norway in the fields of molecular plant pathology including genetic transformation of non-model plants. It covers fields like molecular diagnostics, mycotoxin-producing fungi (Fusarium), plant-pathogen interaction, plant genetics, genetic transformation, vaccine production, genetic diversity and bioinformatics. One highlight was their participation in sequencing the Strawberry genome, published in Nature Genetics. However, there is a dilemma between too many projects needed for funding (also the permanent positions need 100% external funding) and focusing on projects covering the core expertise of the unit. The section tries to give support priority to strong projects that make visible impacts. The location at Ås gives a twofold advantage: close connection to other research sections of BIOFORSK and direct contact with plant producers, thus making them more aware of the research needs of the end-users. The publishing performance is below Norwegian average and the monetary incentive to encourage publishing is not really attractive. Overall, the research panel ranked the research performed at the unit "Genetics and Biotechnology" as fair.

Grade: Fair.

Societal impact

The BIOFORSK unit is in a unique position and its research has high societal impact. Studying plant pathology and developing of tools for molecular diagnostics is internationally of great importance and addresses economically important issues. The unit has strong commercial activities.

Recommendations

Research is financed through a high proportion of external funding. However, the funding structure does not fit with the general tasks (including policy support and advice) that the unit is set to carry out. Since also permanent positions have to be financed by external money, the unit is under strong pressure to generate money, which in the agricultural area is mostly on a short-term basis. There is thus insufficient long-term funding for strategic development. This funding structure of BIOFORSK counteracts our recommendation to be more focused, as there are too many small projects on highly different topics in this unit. There are also too few internationally funded projects. Unless the unit finds a research field in which they can be leading in, they become short-term supporters of Norwegian agriculture with no long-term strategy. We recommend building a network with other groups in Europe to have access to expertise elsewhere, and focus on a few core topics. The orientation towards Europe is also based on our impression that plant biotechnology has no priority in Norway although plants – and not only the marine sector – are of utmost economic importance for the country. We strongly recommend strengthening bioinformatics at BIOFORSK in general.

Norwegian Institute of Food, Fisheries and Aquaculture Research (NOFIMA)

Norwegian Institute of Food, Fisheries and Aquaculture Research

Description

NOFIMA belongs to the Institutes Sector (Ministry of Fisheries and Coastal Affairs). Its task is to provide research solutions throughout the value chain for aquaculture, fisheries and food industry both in basic as well as applied research. NOFIMA is an artificial construction that underwent several rounds of reorganisation since 2005, consisting of four and later three institutes that will merge in 2011 to one company. There was only little governmental support to finance the merger, and basic funding promised for long-term research has not materialized.

NOFIMA combines research institutes in the fields of food, fisheries and aquaculture that are in six different locations all over Norway. This highly decentralized organization results in management inconsistencies. However, harmonization is anticipated by merger under the roof of one company. Research is organized in projects, and the strategy is driven by market demands and customer needs.

NOFIMA has a clear management structure and regularly revises its research strategies. Performance indicators are not only publications but also the societal impact of research. Important criteria are the amount of budget obtained from the private sector and the value-generation in industry. 85% of the budget comes from external funding with the majority from contracts with industry. These arrangements do not give a large degree of predictability of funding. All permanent positions are externally funded which imposes constant pressure to maintain funding. On top of this, the fragmented grant structure and ever increasing administrative burden drains time from research. Of all the institutions evaluated in Panel 3, NOFIMA has the highest success in funding from the EU (over 50 projects), which is very impressive.

NOFIMA in total has 490 personnel, where 444are targeted by the evaluation in panel 3, among them about 220 researchers and about 220 technicians. 39 PhD students and 17 postdocs were present in 2009. There is no gender problem in NOFIMA. 778 papers were published in the reporting period with a citation index of 113 which is good for a non-university institute. Four level 2 units were evaluated here belonging to NOFIMA MARINE (Breeding and genetics) and NOFIMA FOOD (Raw materials and process, Food and health, Food safety and quality).

The research is largely supported through external funding which runs mostly on a short-term basis. There is insufficient long-term funding to allow serious long-term strategic development. The research units would prefer to work together on smaller number of larger projects. The researchers feel that little financial support is available to basic research generally, but particularly for research within the Institute Sector. This has further compromised long-term strategic research.

Under the current research funding system, institutes, such as NOFIMA, are competing with Universities for the same funds. However, the research priorities, management structure and industry interactions are very different for the two types of organisations. Both groups currently feel disadvantaged.

The discussions with NOFIMA staff also indicated problems in dealing with funding from different sources, so called “green” money and “blue” money. The use and value of these funds could be enhanced if there were greater flexibility in moving funds between sources and in encouraging cross-ministry funding of projects.

Follow-up of previous evaluation

NOFIMA's most obvious change introduced since the evaluation in 2000 was the focus on strategic areas with the consequence that the number of focus areas decreased. However, the number of project they are managing remains high. There is a strong increase in EU-funded projects (from 4 to 25) and a successful general strategy to involve SMEs into EU projects.

Breeding and genetics

Description

The unit is responsible for developing and applying genetic tools to aquaculture breeding using quantitative and molecular genetic tools including ‘omics technologies. The unit has a size of 21 scientific staff, among them 16 researchers, 1 postdoc, 4 PhD students. The unit is comparatively young and has no gender problem.

General comments

PhD students are able to focus on a single project. NOFIMA has the policy to send PhD students abroad as part of their PhD program. In addition, PhD students participate in national and international conferences. There is a close teaching collaboration with UMB. The numerous international projects also lead to (international) recruitments. There is extensive collaboration with research institutions and companies in Norway and abroad including the EU. These collaborations also lead to exchange of researchers.

Scientific quality

The section is the leading unit in Norway in the fields of applied genetics/genomics and breeding in aquaculture. The unit has a long research tradition and made contributions of utmost importance to genetic improvement of stocks throughout Norway and to many countries worldwide. Their research covers the areas of fish health combing quantitative and molecular tools, marker-assisted selection, SNPs, introgression programs, RNA-sequencing, novel algorithms and statistical models. A highlight was the publication of the first genetic linkage maps for salmon and cod. However, there is a dilemma between too many projects needed for funding and focusing on projects covering the core expertise of the unit. The publishing performance is above Norwegian average; however the citation analysis is poor because the unit submits manuscripts to specialized journals only, without considering higher-ranking journals. Overall, the research panel ranked the research performed at the unit "Breeding and genetics" as Very Good.

Grade: Very Good.

Societal impact

The Breeding and genetics unit is in a unique position in Norway and its research has great societal impact and addresses economically important issues. There is a close link between basic and applied research is close and the unit's contributions are of very high economic importance for Norway.

Recommendations

In total there is an excellent scientific quality, very good publication output, very high commercialization activity, and an extensive collaboration with research institutions and industry within Norway and abroad including the EU. The panel recommends that the unit increases the national and international visibility of its high research potential (although marketing of long-term genetics projects is not an easy task). The panel also recommends to submit papers to higher-ranking journals, including implementing incentives for such a strategy.

Raw materials and process

Description

The unit combines personnel from three locations all over Norway. The unit has 44 scientific staff, among them 28 researchers, 3 postdoc, 13 PhD students.

General comments

Video conferencing is regularly used to bridge the geographic distances. The unit has no age or gender problem. PhD students are sent abroad as part of their PhD program and participate in national and international conferences. The numerous international projects also lead to (international) recruitments. There is extensive collaboration with research institutions and companies in Norway and abroad including the EU. These collaborations also lead to exchange of researchers.

Scientific quality

The unit has a long research tradition in food technology. However, the research focus changed during the last years from classic food/wet chemical analyses to proteomics, molecular and high-throughput analyses mainly using biospectroscopy. There is an increased focus on influence of genetic and environmental factors on food quality. Their research covers the areas of fish, meat and cereal raw materials, raw material quality, production and processing, rapid data analysis, advanced biospectroscopy and multivariant statistics and modelling. However, there is a dilemma between too many projects needed for funding and focusing on projects covering the core expertise of the unit. The publishing performance is average, but with a poor citation analysis. Overall, the research panel ranked the research performed at the unit "Raw materials and process" as Good.

Grade: Good.

Societal impact

The research activities of the unit have high societal impact and address economically important issues. There is very high commercial activity and a tight link between basic and applied research.

Recommendations

In total there is a good scientific quality, a moderate publication output, very high commercialization activity, and an extensive collaboration with research institutions and industry within Norway and abroad including the EU. We recommend that the unit pays attention that personnel does not fall below a critical mass, e.g. in the area of statistics. Likewise measures should be taken to attract skilled research personnel in statistics and engineering. There is a strong need for upgrading of the spectroscopic platform.

Food and health

Description

The unit combines personnel from three departments in two geographical locations. The unit has 36 scientific staff, among them 24 researchers, 2 postdoc, 10 PhD students. The unit has no age nor gender problem.

General comments

The research programs focusing on food and health were established in 2005. For consumer and food there is in-house competence, for health research there is cooperation with relevant institutions, but an own competence is also built up. The numerous international projects also lead to (international) recruitments. There is extensive collaboration with research institutions and companies in Norway and abroad including the EU. These collaborations also lead to exchange of researchers. PhD students are sent abroad as part of their PhD program and participate in national and international conferences.

Scientific quality

The unit focuses on food, consumer and the effect of food on health, and it integrates also the overlapping areas between these three main topics. The unit has a very good expertise in food chemistry and analytical methods and in consumer and sensory science. Within the program lines (dietary fibre, fruits and vegetables, bioactive lipids, sensory perception, seafood) test systems and assays were established to study the bioactivity of these materials. Research also goes into food-related lifestyle diseases. The publishing performance is average and focuses on lower-ranking journals. Overall, the panel ranked the research performed at the unit "Food and health" as Fair to Good.

Grade: Fair to Good.

Societal impact

The Food and health unit has high societal impact and addresses important issues as the effect of food on health is of great importance. Public health costs rise tremendously and by simple means such as improving diet and food products, costs may be reduced.

Recommendations

In total there is a fair to good scientific quality, a moderate publication output, very high commercialization activity, and an extensive collaboration with research institutions and industry within Norway and abroad including the EU.

The panel appreciates the activities to integrate the research lines of food and health that have previously been two almost separate fields in Norway, but we see problems as there

are no funding links bridging the gap between ministries thus preventing long-term strategic research. We recommend that the unit takes measures to overcome the existing barriers in research culture that derive from the merger of institutes. There is a strong need for upgrading of high-resolution chromatographic equipment, GCMS and NMR. We also recommend to submit papers to higher-ranking journals.

Food safety and quality

Description

The unit is localized in Stavanger, Tromsø and at the Ås campus and has 33 scientific staff, among them 19 researchers, 4 postdoc, 10 PhD students. The unit has no age nor gender problem.

General comments

The research focuses on methods relevant for the food industry, like analyses of bacterial communities and biofilms, packaging, preservation technologies and (seafood) processing. For doing so, method platforms were established. The numerous international projects also lead to (international) recruitment. There is extensive collaboration with research institutions and companies in Norway and abroad, including the EU. These collaborations have also lead to exchange of researchers. PhD students are sent abroad as part of their PhD program and participate in national and international conferences.

Scientific quality

The unit focuses on research necessary to produce and present food free of contaminants and on methods/tools to identify risk factors and contaminants. Competence for controlling and improving shelf life of products and minimizing waste are also of central interest. The unit has a very good expertise in the use of omics technologies and DNA diagnostics for analyses and documentation. Sustainable food packaging research, including seafood, forms another project line. There is a dilemma between the need for many projects to obtain funding and the wish to focus on projects related to the core expertise of the unit. The publishing performance is average and focuses on lower-ranking, applied journals. Overall, the panel ranked the research performed at the unit "Food safety and quality" as Fair to Good.

Grade: Fair to Good.

Societal impact

The Food safety and quality unit has high societal impact and addresses important issues as contaminant-free food is of great importance. The link between basic and applied research is close, and there is very high commercialization activity.

Recommendations

We appreciate the activities of the unit to convince Norwegian food industry to invest into food safety research. There is a need for upgrading analytical equipment. We also recommend that research is submitted to higher-ranking journals than what is presently done.

SINTEF Fisheries and Aquaculture AS

SINTEF Fisheries and Aquaculture AS

Description

The SINTEF Group is a large and independent, non-profit research organization. It is organized around 6 research areas, including SINTEF Marine. SINTEF Fisheries and Aquaculture AS is one of the two research institutes under SINTEF Marine. It was established as an independent research institute in 1999. SINTEF Fisheries and Aquaculture is a contract based research institute and performs technological research for the marine sector.

Close to 40% of the research is funded by industrial and commercial partners. Only 8% of the funding involves basic grants. The institute has various EU-networking and mobility grants, but financially this funding appears relatively low, and there is no evidence for involvement in larger size EU collaborative research projects.

The staff of the institute has increased from about 25 employees in 1999 until a total of 112 in 2009. Among the total staff, 37% is female and 63% male. Close to 80% of the employees are involved in research. Of these, 18 researchers with a doctoral degree (or equivalent) are involved in biological research. Only 5 of these are evaluated here at level 2, not organized in a joint department but representing "biochemical and biotechnological" research activities within SINTEF Fisheries and Aquaculture. The low number of researchers in this field makes it vulnerable for changes in staff.

SINTEF Fisheries and Aquaculture aims to contribute in developing sustainable technologies for utilization of marine biological resources. It has close collaborations with the industrial sector, stating as an opportunity that this makes it easy to get ideas from the industry sector. Rather, as a research institute SINTEF should aim to be an interesting partner providing new technologies based on most recent scientific developments and insights.

The biological research at the institute is done in close cooperation with NTNU (Norwegian University of Science and Technology), and with other (inter)national institutes and universities. Such collaborations with strong research units in biology are crucial for its survival and success, also in view of the low amount or basic funding of the institute. The basic grants are used for strategic development of competence in specific areas. It is stated that the high fraction of projects with industrial and commercial partners limits the publishing activity. This is an undesirable situation: a big research institute should be able to publish interesting scientific data after properly protecting these (i.e. by patenting). SINTEF Fisheries and Aquaculture in fact recognizes that a high publication rate in international journals is an important strategy, increasing visibility and standing. During the last 5 years different supports for increasing the publication rate have been implemented, including a monetary incentive to encourage publishing. This may have stimulated the publication rate, but is not an attractive measure overall, apparently also increasing the number of authors listed per paper. Otherwise there is no clear publication strategy apparent (quantity versus quality?).

The research facilities of the institute (SINTEF Sealab) consist of seawater laboratories for performing biological experiments with marine organisms, for processing of marine raw materials, plus biological, biochemical and microbiological laboratories, and numerical and ICT laboratories. In 2009, a full-scale research centre for floating aquaculture technology (ACE) was opened at the coast of Central Norway. This research infrastructure offers unique and well functioning laboratories for performing high quality research for the fishery and aquaculture clients. However, much of the analytical equipment is relatively old, and a large need is apparent for new instruments.

The self-evaluation states that the institute is a leading European technological research institute for fishing and aquaculture sector. It has remained unclear how this has been evaluated, and what comparison has been made with other institutes. The institute covers a large number of research areas. SINTEF Fisheries and Aquaculture does not appear to have a strategy to guarantee a proper position in this research sector in the future. Clear choices and investments in infrastructure and knowledge are needed to remain an attractive research partner.

SINTEF is active in training staff, offering courses in project organization, how to lead meetings, write proposals and publications, make oral presentations, etc. Young scientists are stimulated to write research proposals. PhD students are associated with a university where they have a supervisor. Care should be taken that PhD students are able to focus on a single project, that they are not negatively affected by disputes about IP rights, and that they are trained in soft skills (publication writing, presentation of results) and participate in national and international conferences.

Follow-up on previous evaluation

No previous evaluation was available. The unit was started in 1999.

Fisheries and Aquaculture (Biochemistry and Biotechnology)

Description

There are 5 scientists in this section, distributed over 2 departments. The section has no common policy, is not organized as an independent group and has no own strategy. The section reports 55 papers over the years 2005-2010.

The scientists are involved in an international inter-calibration of environmental metabolomic analyses, providing access to a network with strong expertise groups. The strong cooperation with other SINTEF institutions and NTNU is positive for this research field. A new focus has been initiated on systems biology, an own strategic funded project.

Scientific quality and grading

Overall, the research panel ranked the individual scientists in the section Biochemistry and Biotechnology as fair to good with respect to research performed and publication output. A proper organization for the section under evaluation is completely lacking, however. The scientific environment therefore is evaluated as fair.

Grade: Fair.

Societal impact

The research area of this section is highly relevant combining science and technology for developing new solutions for the aquaculture industry that secure fish welfare, future operations and environmental challenges.

Recommendation

SINTEF Fisheries and Aquaculture executes research in Biochemistry and Biotechnology in different departments without a common strategy. This scattered approach dilutes efforts. To make a meaningful contribution in these fields, the leadership should make strategic choices allowing a more focussed approach.

List of abbreviations

BCCS	Bergen Centre for Computational Science
BER	Base excision repair
CBU	Computational Biology Unit
CAST	Norwegian Centre of Innovation Research on Cancer Stem Cells
CIGENE	Centre for integrative genetics
CIR	Center of Excellence for Immune Regulation
CMBN	Centre of Excellence for molecular Biology and Neuroscience
CofE	Center of Excellence
CRI	Centre for research based innovation
ELIXIR	European Life Sciences Infrastructure for Biological Information
EMBL	The European Molecular Biology Laboratory
EU	European Commision
FOCIS	Federation of Clinical Immunological Societies
FTE	Full Time employees
FUGE	Functional genomics (RCN research program)
IBI NTNU	Department of Biology, Faculty of Natural Sciences and Technology,
IKBM	Department of Chemistry, Biotechnology and Food Science (IKBM), Norwegian University of Life Sciences (UMB)
IMB	Institute of Basic Medical Sciences
IMM	Department of Immunology
IPR	Intellectual property rights
LBK	Laboratory Medicine, Children's and Women's Health, Faculty of Medicine, Norwegian University of Science and Technology (NTNU) and St. Olavs Hospital
NIH	National Institute of Health

NTNU	Norwegian University of Science and Technology
PCF	Proteomic Core Facility
PI	Principal Investigator
RCN	Research Council of Norway
SAB	Scientific Advisory Board
SME	Small and Medium Enterprises
TTO	Technology Transfer Office
UHO	University Hospital Oslo
UiO	Universitetet i Oslo,University of Oslo
UMB	Norwegian University of Life Sciences

Appendix A. Mandate

Evaluation of research in biology, medicine and health in Norway 2010 - 2011

Mandate for the evaluation

The Research Council of Norway (RCN) is given the task by the Ministry of Education and Research to perform subject-specific evaluations. The Division for Science has decided to evaluate research activities in biology, medicine and health and psychology in Norwegian universities, university hospitals, relevant research institutes and relevant university colleges.

Evaluations have previously been performed within these subjects/fields, in biology in 2000 and medicine and health in 2003.

1. The objective of the evaluation

The main focus of the evaluation should be the scientific quality of Norwegian research within biology, medicine and health and psychology in Norwegian universities, university hospitals, relevant research institutes and relevant university colleges.

The evaluation will reinforce the role of the RCN as advisor to the Norwegian Government and relevant ministries. The evaluation will give knowledge, advice and recommendations on biological, medical and health related research and give the institutions as well as the RCN and relevant ministries a better basis for determining future priorities within and between fields of research.

Specifically, the evaluation will:

- provide a critical review of the strengths and weaknesses of the above fields, both nationally and at the level of individual research groups and academic departments. The scientific quality of the research will be reviewed in an international context.
- assess to what degree the previous evaluations have been used by the institutions in their strategic planning
- discuss to what degree the research units perform research in accordance with the strategy of their institution
- identify the research units which have achieved a high international level in their research, or have the potential to reach such a level
- identify areas of research that need to be strengthened in order to ensure that Norway in the future possesses necessary competence in areas of national importance. A key aspect is to enable the RCN to assess the situation regarding recruitment within the scientific fields
- discuss to what extent the research meets the demand for interdisciplinary research and future societal challenges

2. Organization and methods

International evaluation panels will be appointed for the following fields:

- Botany-, zoology- and ecology- related disciplines
- Physiology related disciplines including corresponding translational research
- Molecular biology, including corresponding translational research
- Clinical research, including corresponding translational research (two panels)
- Public health and health-related research
- Psychology and Psychiatry

Self-assessments including information about the organization and resources, as well as future plans, will be provided by the research units. In addition the panels will be provided with bibliometric analysis. Representatives from the involved units will be invited to meet the panels for presentations and discussions.

Each of the evaluation panels will write a report with evaluations of the different research units as well as specific recommendations. These reports will be sent to the research units for factual control. In order to provide general recommendations at a national level for research within these fields, Joint Committees will be established comprising members from each of the different evaluation panels/research areas.

Specific criteria for inclusion and exclusion – see attachment.

3. Tasks of the evaluation panels

The panels are requested to

- Evaluate research activities with respect to scientific quality, national and international collaboration. Scientific quality should be the main focus
- Evaluate how the research is organized and managed.
- Submit a report with specific recommendations for the future development of research within biology/medicine/health/psychology in Norway, including means of improvement when required.

Aspects to be assessed in the panel reports:

3.1 National level

- Strengths and weaknesses
- Research cooperation nationally and internationally
- Recruitment and mobility
- General resource situation regarding funding and infrastructure
- Cooperation with other sectors of society (e.g. industry)

3.2 Institutional level

To be defined as the institution as such, or as a university department, or a research institute. Depending on the size of the institution level 3.2. and level 3.3. may be merged. In case of two levels, level 3.2 focus on organisation and strategy, level 3.3. on research quality and production. The Research Council of Norway

- Organisation, research leadership and strategy
  - Including follow up of recommendations given in previous evaluation/s
- Resource situation
  - Funding, staffing, infrastructure and the balance between resources and research activities
- Scientific quality
  - Including the description of a publication strategy
- Training, mobility and career path
  - Recruitment and policies for recruitment
  - Policy for mobility and career path
  - Policy for gender and age balance in academic positions
- Research collaboration
  - Collaboration and networking activities at national and international level including interdisciplinary and multidisciplinary research activities, as well as translational research (from basic to applied research or vice-versa)

3.3 Research units

- Organisation, research leadership and strategy
  - Including resource situation (staff and funding) and research infrastructure
- Research activities
  - Scientific quality and production
- Training, mobility and career path
  - Recruitment and policies for recruitment
  - Policy for mobility and career path
  - Gender and age balance in academic positions
- Research collaboration
  - Collaboration and networking activities at national and international level including interdisciplinary and multidisciplinary research activities, as well as translational research (from basic to applied research or vice-versa)

4. Time schedule

Panel meetings will take place in Oslo March-June 2011
Deadline for submitting draft panel reports August 2011
Deadline for submitting final reports October 2011
Deadline for joint reports November 2011

5. Miscellaneous

Other important aspects of Norwegian biological, medical and health related research that ought to be given consideration.

Delimitation and organisation

The panels are asked to base their evaluation on self-assessments from the research units, factual information, bibliometric analysis and hearing meetings.

Starting point for the present evaluation will be the research performed at the institutions in question. The university departments and several institutes in the institute sector are too large to be evaluated as one single research unit. In order to give an overview of the research the evaluation will be carried out as follows:

Departments at the universities and university colleges and institutes in the institute sector (named institution)

1. The institution – level 1 – describes its organisation and research strategy in a written document as well as factual information including funding, number of permanent and preliminary positions etc.

2. The level below the institutions (section, group, program etc.) is the unit that will be evaluated and which prepare the self-assessment for the research – level 2.

In some institutions the level 2 units might be placed in different panels. If so the institute structure and strategy will present their activities to all relevant panels. Large evaluations units within level 2 belonging to different panels may split in different evaluation units or will be evaluated in a panel covering the main content of their research.

The units to be evaluated at level 2 need to be units already established. However it is important that the evaluation units to be evaluated have a certain minimum size. If the research performed within two or more evaluation units belong together thematically, it may be an advantage to prepare a joint self-assessment making it clear that the self-assessment describes the research in two or more groups. Level 2 units with minor scientific activities and production, are to be described on level 1, the general description of the institute.

Research at the university hospitals

The research performed in the university hospitals is often part in integrated research units between the university and the hospital. It will normally neither be practical, nor natural to separate the self-assessment from these units. It is preferable that these integrated units give a joint self-assessment and a joint oral presentation at the hearing meetings. The universities are asked to take the main responsibility for the self-assessment when the research unit is led by a researcher who has his/her main position at the university. The same is asked from the university hospital when the research unit is led by a researcher who has his/her main position at the hospital.

(Final version 15.9.2010 3/4)

Appendix B. Criteria for grading

Grades and definitions for the scientific quality

Excellent	Research at the international front position: undertaking original research of international interest, publishing in internationally leading journals. High productivity.
Very good	Research with high degree of originality, but nonetheless falls short of the highest standards of excellence. A publication profile with a high degree of publications in internationally leading journals. High productivity and very relevant to international research within its sub-field. .
Good	Research at a good international level with publications in internationally and nationally recognized journals. Research of relevance both to national and international research development.
Fair	Research that only partly meets good international standard, international publication profile is modest. Mainly national publications. Limited contribution to research
Weak	Research of insufficient quality and the publication profile is meagre: few international publications. No original research and little relevance to the field.

Appendix C. Letter to the institutions

Forskningsrådet

	Vår ref.	Oslo,
Vår saksbehandler/tlf. Berit Nygaard, +47 22037174	201002437 **Deres ref.**	21. juni 2010

Fagevaluering av biologi, medisin og helsefag, inklusive psykologi

invitasjon til informasjonsmøte og invitasjon til å plassere forskningsenhetene i evalueringspaneler

Det vises til tidligere informasjon om fagevalueringen i brev av 25.2.2010, samt våre nettsider om evalueringen; www.forskningsradet.no/biomedhelseevaluering

Informasjonsmøte

Vi inviterer til informasjonsmøte på Gardermoen, Radisson Blu Airport Hotel

tirsdag 24. august kl 10.30 – 15.00

Informasjonsmøtet er primært for representanter for ledelsen ved involverte fakulteter og institutter i UoH-sektoren og instituttsektoren.

Hensikten med møtet er å informere om evalueringen med fokus på organiseringen, mandatet for evalueringspanelene, egenvurderingene og faktainformasjon, tidsplan med mer. Program for møtet og lenke til påmelding legges på www.forskningsradet.no/biomedhelseevaluering i løpet av uke 26.

Påmeldingsfrist er mandag 16. august, og det er mulig å melde seg på allerede nå https://web.questback.com/norgesforskningsrd/kyl3fa8ebo/ . På våre nettsider vil vi i uke 32 legge utkast til faktaark og mal for egenvurdering. Kommentarer til disse dokumentene kan gis på informasjonsmøtet.

Dialog og tilbakemelding

Vi inviterer med dette institusjon/institutt til å plassere sine evalueringsenheter i de ulike panelene, se definisjon i vedlegg 3, Avgrensning og organisering. For å være sikre på at vi har etablert hensiktsmessige paneler og at vi får en noenlunde jevn fordeling av evalueringsenheter i panelene, ber vi om en tilbakemelding fra alle institusjoner/institutter med forslag til plassering av evalueringsenhetene for den enkelte institusjon/institutt så snart som mulig og senest ***fredag 27. august.*** Tilbakemelding til evalbiohelse@forskningsradet.no. Ta gjerne kontakt underveis ved behov.

Vi ber også om å få oppgitt en kontaktperson ved hver institusjon/institutt. Det vil blant annet være behov for dialog i etterkant av fristen slik at sammenlignbare forskningsfelt ved de forskjellige institusjonene, så langt mulig, plasseres i samme panel.

Panelinndeling

Det planlegges en inndeling i syv paneler (se vedlegg 4). Panelinndelingen er basert på Norsk inndeling av vitenskapsdisipliner (vedtatt av Universitets- og høgskolerådet i 1994) for klassifisering av forskning. I arbeidet med å rekruttere eksperter til fagpanelene er følgende kriterier lagt til grunn:

- Det enkelte panel skal dekke disiplinene innenfor panelet
- Det tilstrebes å finne eksperter med bred kompetanse som kan dekke flere områder
- Det vurderes om det er mulig å få med ett medlem i hvert panel som deltok i forrige evaluering for å bidra til kontinuitet
- Det tilstrebes at hvert panel har minst 40 % av begge kjønn
- Det tilstrebes en viss spredning i alder blant medlemmene

Det er lagt strenge habilitetsregler til grunn ved utnevning av panelmedlemmene.

Mandat for evalueringen

Mandatet for evalueringen følger vedlagt, vedlegg 3.

Utvidet tidsramme

Det har tidligere vært gitt tentativ tidsramme for evalueringen. Tidsrammen har nå blitt noe utvidet. Dette medfører at høringsmøtene blir forskjøvet til perioden 20. mars -10. juni, kun ukene uten helligdager. Den utvidede tidsrammen gir noe mer tid til dialog med miljøene og arbeidet med egenvurderingen, samt bedre tid til ferdigstillelse av rapportene. Evalueringen vil være avsluttet i løpet av 2011. Se tidsplanen i vedlegg 5.

Avgrensning og organisering

Hovedfokuset i evalueringen skal være vitenskapelig kvalitet i forskningen. Evalueringen er på gruppenivå, ikke enkeltforskernivå. Evalueringen vil bli gjennomført av fagfeller i paneler sammensatt av meritterte utenlandske forskere (”peer review”) og alt materialet i evalueringen skal være på engelsk.

Evalueringen omfatter mange ulike institusjoner og antallet forskere er stort. Forskningsrådet har satt en grense for minstestørrelse for institusjon/institutt som inviteres til å delta i evalueringen. Det angitte antallet vitenskapelig ansatte gjelder innenfor hvert fagområde, dvs. innenfor biologi eller medisin og helsefag. Noen forskergrupper/forskere har deltatt i nylig gjennomførte fagevalueringer, disse skal ikke evalueres på nytt.

Kontaktpersoner i Forskningsrådet

Spørsmål i tilknytning til evalueringen kan rettes til:

- Prosjektleder Berit Nygaard, telefon 22037174, bn@forskningsradet.no

- Prosessleder Malena Bakkevold, telefon 95750533, post@malena.no

Hvert av panelene har en egen fagrådgiver, se vedlegg 4 med oversikten over panelene.

Parallelle evalueringer som berører flere av forskningsmiljøene

Formålet med fagevalueringer er å foreta en kritisk gjennomgang av forskningen med hensyn til kvalitet relatert til internasjonalt nivå, styrker og svakheter, rammebetingelser for forskningen og rekrutteringssituasjonen. I tillegg innhentes råd om hva som skal til for å styrke forskningen og hvilke prioriteringer som peker seg ut. De to første evalueringene nevnt nedenfor evaluerer spesielle satsinger i Forskningsrådets regi og overlapper bare delvis med fagevalueringen.

Evaluering av FUGE

Det er en pågående evaluering av FUGE (funksjonell genomforskning) for å se på merverdien av programmet, og bla å få innspill til det videre arbeidet med satsing på bioteknologi.

Midveisevaluering av SFF-II

Formålet med evalueringen er å bedømme de vitenskapelige resultatene sentrene har oppnådd og å gi en vurdering av planene sentrene har utarbeidet for forskningen i siste 5-årsperiode.

Evalueringen finner sted i 2010 – 2011.

Midtveisevaluering av SFI

Evalueringen skal vurdere de forskningsresultater som er oppnådd og om virksomheten i senteret underbygger senterets mål. Evalueringen skal videre gi en vurdering av planene for virksomheten i den mulige siste 3-årsperioden. Evalueringen gjennomføres høsten 2010.

Evaluering av idrettsvitenskap (sports sciences)

Parallelt med fagevalueringen vil det bli gjennomført en felles nordisk evaluering av idrettsvitenskap 2010-2011. Evalueringen blir administrativt ledet av Finlands Akademi. Forskningsrådet ønsker at relevante norske miljøer skal delta i denne evalueringen, og vi vil sende ut separat informasjon om dette. Finlands Akademi avholder et informasjonsseminar om evalueringen 17. august, kl 12.00 – 15.30 i Helsinki.

Evaluering av deler av instituttsektoren

Fiskeri- og kystdepartementet (FKD) og Landbruks- og matdepartementet (LMD) har initiert evalueringer av deler av sin instituttsektor – se vedlegg 1

Med vennlig hilsen

Norges forskningsråd

Hilde Jerkø (sign.)	Mari Nes (sign.)
Avdelingsdirektør	Avdelingsdirektør
Divisjon for vitenskap	Divisjon for vitenskap

Vedlegg 1

Institusjonene som omfattes av fagevalueringen

Universitetene

Alle instituttene ved de medisinske fakultetene omfattes av evalueringen. Når det gjelder biologi og psykologi (bortsett fra ved UiB og UiT) vil evalueringen omfatte institutter og naturvitenskapelige museer som er deler av naturvitenskapelige og samfunnsvitenskapelige fakulteter.

Helseforetakene

Alle helseforetakene med universitetsfunksjon omfattes av evalueringen. I tillegg kommer Diakonhjemmet. For integrerte forskergrupper mellom universitetsinstitutter og helseforetak se vedlegg 2 Avgrensing og organisering. Når det gjelder øvrige helseforetak ber vi om at de regionale helseforetakene vurderer om det er andre helseforetak som faller innenfor rammene for evalueringen. Vi vil gjerne ha en dialog om disse med de regionale helseforetakene.

Instituttsektoren

For instituttsektoren generelt kan det ved enkelte institutter være at nivå 1 og nivå 2 er sammenfallende – se vedlegg 2 Avgrensning og organisering.

Forskningsrådet er kjent med at Fiskeri- og kystdepartementet (FKD) parallelt med fagevalueringen vil evaluere Havforskningsinstituttet. Havforskningsinstituttet ønsker å være en del av fagevalueringen og FKD ønsker å benytte seg av det innsamlede materialet som delinnspill til sin evaluering og i tillegg benytte panelets delrapport om instituttet fra fagevalueringen.

Landbruks- og matdepartementet (LMD) har bedt Forskningsrådet om å evaluere bla Bioforsk, Norsk institutt for skog og landskap og Veterinærinstituttet i løpet av 2010. Rapporten for denne evalueringen skal være ferdig 1. desember 2010 for å kunne være en del av grunnlaget for en ny melding til Stortinget om landbruks- og matpolitikken. Disse tre instituttene inviteres også til å delta i fagevalueringen av biologi, medisin og helsefag. Som vi skrev i vårt brev i februar er skillet mellom grunnleggende og anvendt forskning nå mindre fremtredende og det er økt samarbeid på tvers av forskningsart både innenfor biologiske fag og medisin og helsefag. Det er derfor ønskelig å evaluere hele forskningsfeltet innenfor de ulike fagområdene og institusjonene samtidig. Forskningsrådet ser det som viktig at også instituttsektoren deltar i denne brede fagevalueringen. Vi regner med at det materialet som ferdigstilles til evaluering av vitenskapelig kvalitet i LMD's evaluering vil kunne være et viktig grunnlag for materialet til fagevalueringen.

Høyskolene

Som i instituttsektoren kan det være at ved enkelte høyskoler er nivå 1 og nivå 2 sammenfallende.

Vedlegg 2

Avgrensning og organisering

Panelene skal basere sin evaluering på egenvurdering fra forskningsmiljøene, faktainformasjon, bibliometrisk analyse og møter med forskningsmiljøene.

Evalueringen vil ta utgangspunkt i instituttene og den forskningen som foregår der. Universitetsinstituttene og flere institutter i instituttsektoren er imidlertid for store og sammensatte enheter til at instituttet kan være evalueringsenheten. For at evalueringen skal gi oversikt over forskningen i *faget* gjennomføres evalueringen etter følgende modell:

Institutter i UoH-sektoren og instituttsektoren

1. Instituttet beskriver organisering og strategi for forskningen ved instituttet og gir faktainformasjon (finansiering, antall ansatte og stipendiater med mer) (nivå 1)
2. Nivået under instituttet (instituttgruppe, avdeling m.m.) *er den enheten som evalueres* og disse lager egenvurdering for forskningen (nivå 2)

Nivå 2 har ulike benevnelser ved de forskjellige institusjonene (instituttgrupper, seksjon, avdeling, forskergruppe, tematiske program m.m.). Ved enkelte institutter vil det være slik at enheter på nivå 2 hører hjemme i forskjellige paneler. I de tilfellene vil instituttbeskrivelsen følge til alle panelene. Robuste/store undergrupper på nivået under nivå 2 som *kan* høre hjemme i forskjellige paneler, plasseres der hvor hovedtyngden av forskningen hører hjemme (mestprinsippet).

Enhetene som skal evalueres på nivå 2 skal være etablerte enheter, ikke konstruerte grupper for denne evalueringen. Det er viktig at enhetene ikke er for små. Dersom instituttene ser at forskningen i forskergrupper/evalueringsenheter tematisk hører sammen, kan det være en fordel at disse forskergruppene lager en samlet egenvurdering hvor det framgår at det er en fremstilling av forskningen i flere grupper. Evalueringsenheter/forskergrupper på nivå 2 som har liten vitenskapelig aktivitet og produksjon, beskrives i instituttets (nivå 1) generelle omtale i egenvurderingen.

Minstestørrelse på institusjon/institutt som inviteres til å delta i evalueringen er:

UoH-sektoren, inklusive helseforetak med universitetsklinikkfunksjon

1) Minst 5 vitenskapelig ansatte (professor I, førsteamanuensis I) innenfor hvert fagområde (biologi, medisin og helsefag) eller

2) Minst 5 fast ansatte forskere/klinikere med doktorgradskompetanse som har 40 % eller mer av sin stilling definert som forskning

Andre helseforetak

Minst 5 fast ansatte forskere/klinikere med doktorgradskompetanse som har 40 % eller mer av sin stilling definert som forskning

Instituttsektoren

Minst 5 fast ansatte forskere med doktorgradskompetanse som har 40 % eller mer av sin stilling definert som forskning innenfor hvert fagområde (biologi, medisin og helsefag).

Forskning ved universitetssykehusene

Ved universitetssykehusene er det i svært stor grad integrerte forskergrupper/enheter mellom universitetsinstituttene og helseforetaket. Det vil normalt verken være hensiktsmessig eller naturlig å skille egenvurderingen og presentasjonen av disse enhetene. Det er ønskelig at integrerte enheter mellom universitet og helseforetak gir en felles egenvurdering og en felles presentasjon.

Vi ber om at universitetet tar hovedansvar for egenvurdering og eventuell presentasjon når forskergruppen/enheten ledes av en som har hovedstilling ved universitetet, mens helseforetaket tar hovedansvar for egenvurdering og eventuell presentasjonen når enheten ledes av en som har hovedstilling eller hele stillingen ved helseforetaket.

Kriterier for eksklusjon

- Nylig evaluert i annen fagevaluering (eks sosiologi, økonomi, farmasi, kjemi, fysikk, geofag)
- Idrettsmedisinske fag – tas ikke med i denne evalueringen fordi en felles nordisk evaluering av idrettsvitenskap (sports sciences) vil bli gjennomført i 2010-2011.
- Sosialfaglig forskning (barnevern, sosialtjenester) inkluderes ikke i evalueringen.

Appendix D. Time schedule for the hearing meetings

April 4-8, 2011

Monday April 4th

Time	Institution/department	Unit
0830 -0900	*Panel Meeting*	
	University of Oslo (UiO) **Faculty of Mathematics and Natural Sciences**	
0900- 1045	Department of Molecular Biosciences (IMBV)	1.The Cell Biology Programme 2.The Programme for proteomics, protein structure and function 3.The Programme for genomics, gene regulation and gene function
1045 -1100	*Panel Meeting/break*	
	University of Bergen (UiB) **Faculty of Mathematics and Natural Sciences**	
1100– 1200	**Department of Molecular Biology**	Molecular Biology
1200 -1215	*Panel Meeting*	
1215 - 1315	*Lunch*	
	University of Bergen (UiB), Faculty of Medicine and Dentistry	
1315-1515	**Department of Biomedicine**	1.Biorecognition 2.Cellular Networks Group 3.Cellular Dynamics & Communication 4.Matrix Biology 5.Neurotargeting 6.Translational Cancer Research 7.Translational Signaling Group 8.Molecular Imaging Center (MIC) 9.Proteomics Unit (PROBE)
1515 -1545	***Panel Meeting/break***	
1545-1715	**Meeting with postdoctoral fellows**	
1715-1730	*Panel Meeting*	

Tuesday April 5th

Time	Institution/department	Unit
0830 -0900	Panel Meeting	
	University of Oslo (UiO), Faculty of medicine	
0900- 1100	Institute of Clinical Medicine, Oslo University Hospital (OUS) Division of Diagnostics and Intervention	1. Department of Medical Genetics 2. Department of Microbiology 3. Department of Immunology and Transfusion Medicine 4. Department of Medical Biochemistry
1100-1115	Panel Meeting/break	
1115-1245	Institute of Basic Medical Sciences	1. Immunobiology 2. Cellular and Molecular Biology
1245-1300	Panel Meeting	
1300-1400	Lunch	
	Norwegian University of Science and Technology- NTNU, Faculty of Medicine and St. Olavs Hospital	
1400-1545	Department of Cancer Research and Molecular Medicine	1.DNA repair and genome stability 2. Immunology and Hematological Cancer
1545-1600	Panel Meeting/break	
1600-1645	Department of Laboratory Medicine, Children`s and Women`s Health	Tumor Biology Research Group
1645-1700	Panel Meeting/break	
	University of Bergen (UiB), Faculty of Medicine and Dentistry	
1700-1745	The Gade Institute	Infection
1745-1800	Panel Meeting	

Wednesday April 6th

Time	Institution/department	Unit
0830 -0900	*Panel Meeting*	
	Norwegian University of Science and Technology- **NTNU , Faculty of Natural Sciences and Technology**	
0900- 1015	Department of Biotechnology	1.Microbial Biotechnology 2.Biopolymers
1015 -1030	*Panel Meeting/break*	
1030– 1115	**Department of Biology**	Molecular and Systems Biology
1115 -1130	***Panel Meeting***	
	University of Bergen (UiB) Faculty of Mathematics and Natural Sciences	
1130-1215	Department of Informatics	Computational Biology Unit
1215-1230	*Panel Meeting/break*	
1230-1330	*Lunch*	
1330-1445	**Uni Research AS**	The International Centre for Marine Molecular Biology (Uni SARS Centre)
1445-1500	*Panel Meeting/break*	
1500-1545	**Norwegian Institute for Agricultural and Environmental Research, BIOFORSK**	Genetics and Biotechnology
1545-1600	*Panel Meeting/break*	
1600-1645	**SINTEF Fisheries and aquaculture AS**	Biochemistry and Biotechnology
1645-1700	*Panel Meeting/break*	
	University of Stavanger (UiS), The Faculty of Technology and Natural Science	
1700-1745	Department of Mathematics and Natural Science	Biological chemistry Group/Centre for Organelle Research (CORE)
1745-1800	*Panel Meeting*	

Thursday April 7th

Time	Institution/department	Unit
0830 -0900	Panel Meeting	
	Norwegian University of Life Sciences (UMB)	
0900- 1045	Department of Chemistry, Biotechnology and Food Science (IKBM)	1.Molecular Microbiology 2.Laboratory of Microbial Gene Technology and Food 3.Protein Engineering and Proteomics 4.Integrative neuroscience and sociogenomics 5.Food Sciences
1045-1100	Panel Meeting/break	
1100-1215	Department of Animal and Aquacultural Sciences	1.Animal Breeding and Quantitative Genetics 2.Centre for integrative genetics (Cigene)
1215-1230	Panel Meeting	
1230-1330	Lunch	
1330-1515	Norwegian Institute of Food, Fisheries and Aquaculture research (NOFIMA)	1.Breeding and genetics 2.Raw materials and process 3.Food and health 4.Food safety and quality
1515-1530	Panel Meeting/break	
	University of Tromsø (UiT), Faculty of Health Sciences	
1530-1645	Institute of Medical Biology	1.Immunology Research Group 2.Molecular Cancer research Group 3.Molecular Pathology 4.RNA and transcriptomics 5.Host-microbe interactions
1645-1700	Panel Meeting/break	
	University of Tromsø (UiT) Faculty of Bioscience, Fisheries and Economics	
1700-1745	Norwegian College of Fishery Science	Marine Biotechnology
1745-1800	Panel Meeting	

Friday April 8th

Time	Institution/department	Unit
0830 -0900	*Panel Meeting*	
0900- 1015	The Norwegian Institute of Public Health, (FHI)	Microbiology
1015 -1030	*Panel Meeting/break*	
	University of Oslo (UiO)	
1030– 1145	The Biotechnology Centre of Oslo/Centre for Molecular Medicine Norway	1.Cancer Biology and DNA repair 2. Mapping, Structure and Function of Supramolecular Complexes and signal Networks 3.Neurobiology
1145-1200	*Panel Meeting*	
1200- 1300	*Lunch*	
	University of Bergen (UiB), Faculty of Medicine and Dentistry	
1300-1345	Department of Clinical Medicine and Haukeland University Hospital	Section for Medical Genetics and Molecular Medicine
1345-1400	*Panel Meeting/break*	
1400-1430	**Institute of Medicine**	Lipid-group
1430-1600	*Final Panel Meeting*	

Appendix E. Overview of all panels

Panel	Includes
Panel 1 Botany, Zoology and Ecology-related Disciplines .	Evolutionary biology, ethology, marine biology, limnology, plant physiology, systematics and agricultural sciences.
Panel 2 Physiology-related Disciplines, including corresponding translational research.	Anatomy, physiology (human and zoophysiology), neurobiology, toxicology, pharmacology, embryology, nutritional physiology, pathology[1], basic odontological research, fish health, veterinary medicine.
Panel 3 Molecular Biology, including corresponding translational research	Microbiology, immunology, cell biology, biochemistry, molecular biology, genetics, genomics, biotechnology including breeding and bioinformatics
Panel 4A Clinical Research, including corresponding translational research	All surgery, anaesthesiology, oncology, physical medicine and rehabilitation, gynaecology, paediatrics, dermatology and venereology, ophthalmology, otolaryngology and all clinical odontology
Panel 4B Clinical Research, including corresponding translational research	All internal medicine (cardiology, nephrology/urology, gastroenterology, endocrinology, haematology, infectious diseases, respiratory tract diseases, geriatric medicine), neurology, rheumatology, radiology and medical imaging and other clinical medical disciplines
Panel 5 Public Health and Health-related Research	Public health, community dentistry and community nutrition. Epidemiology and medical statistics. Health services research, preventive medicine, nursing research, physiotherapy, occupational medicine, behavioural research and ethics, other health-related research.
Panel 6 Psychology and Psychiatry	Clinical psychology, social-, community- and workplace psychology, organizational psychology, personality psychology, developmental psychology, cognitive psychology, biological psychology and forensic psychology. Psychiatry, including geriatric psychiatry, child and adolescent psychiatry, biological psychiatry, and forensic psychiatry. Behaviour research.

Appendix F. List of the panels members

Members of Panel 3:

Professor Søren Brunak, Technical University of Denmark & University of Copenhagen (leader of the panel)

Professor Edith Sim, University of Oxford, England

Professor Janet M Lord, University of Birmingham, England

Professor Karin Dahlman-Wright, Karolinska Institutet, Sweden

Professor Stephen Cusack, EMBL, Grenoble, France

Professor Ralf-Rainer Mendel, Technical University Beaunschweig, Germany

Professor Peter Langridge, University of Adelaide, Australia

Professor Klas Kärre, Karolinska Institutet, Sweden

Professor Lubbert Dijkhuizen, University of Groningen, The Netherlands

Secretary: Professor Lars Juhl Jensen, Novo Nordisk Foundation Center for Protein Research, University of Copenhagen, Denmark

Appendix G. CVs for the panel members

Name: Søren Brunak

Date of birth: February 2, 1958

Present position: Professor in Bioinformatics, Center for Biological Sequence Analysis, Department of Systems Biology, Technical University of Denmark &

Professor in Disease Systems Biology, Novo Nordisk Foundation Center for Protein Research, Department of Disease Systems Biology, University of Copenhagen.

Research fields: Bioinformatics, systems biology, the interface between disease systems biology and medical informatics, human variation, metagenomics

Education:

1987 M.Sc. in Physics, Niels Bohr Institute, University of Copenhagen, Denmark.

1991 Ph.D. in Computational Biology, Department of Structural Properties of Materials, Technical University of Denmark.

2002 Dr.phil. (honoris causa), Natural Science Faculty, Stockholm University.

Name: Edith Sim

Date of birth: September 25th, 1951

Present position: Dean of the Faculty of Science, Engineering and Computing, Kingston University, UK

Also

Honorary Professor of Pharmacology, University of Oxford

And

Senior Research Fellow in Biochemistry, St Peter's College, Oxford

Research fields: Molecular pharmacology, protein structure and enzymology, drug metabolism and drug discovery particulary against tuberculosis

Education:

1973 BSc Biochemistry, Edinburgh University

1976 D. Phil. Biochemistry, Wolfson College, University of Oxford

1996 M.A. by incorporation University of Oxfor

Name: Janet M Lord
Date of birth: January 22, 1957

Present position: Professor in Immune Cell Biology, School of Immunity and Infection, University of Birmingham

Research fields: Human ageing (immunesenescence), innate immunity, cell signalling (PKC), apoptosis, chronic inflammatory disease, leukaemia (AML).

Education:
1979 BSc Hons 2.i Human Biology, Oxford Brookes University

1983 Ph.D. in Obesity and type 2 diabetes, Aston University

Name: Karin Dahlman-Wright

Date of birth: October 9, 1961

Present position: Professor in Molecular Endocrinology, Department of Biosciences and Nutrition, Karolinska Institutet, Stockholm, Sweden.

Head of Department, Department of Biosciences and Nutrition, Karolinska Institutet, Stockholm, Sweden.

Responsible for the Bioinformatics and Expression Analysis core facility, Karolinska Institutet, Stockholm, Sweden.

Research fields: Molecular endocrinology in particular estrogen signalling in breast cancer and metabolic disease. Functional genomics. Several years experience of industrial target discovery and drug discovery.

Education:
1986 M.Sc. Chemical Engineers, Chalmers University of Technology, Gothenburgh, Sweden.

1991 Ph.D. in Molecular Endocrinology, Karolinska Institutet, Stockholm, Sweden.

Name: Stephen Cusack

Date of birth: January 27, 1952

Present position: Head of Grenoble Outstation and Senior Scientist, European Molecular Biology Laboratory (EMBL)

Director of Grenoble University (UJF)- EMBL-CNRS International Unit for Virus Host-Cell Interactions (UVHCI), UMI3265

Research fields: Structural biology, structure-function relationships of protein-RNA complexes, translation, mRNA metabolism, viral replication, innate immunity

Education:

1973 B.A. in Physics and Theoretical Physics, Cambridge University, UK.

1976 Ph.D. in Theoretical Physics, Imperial College, London University, UK..

Name: Ralf-Rainer Mendel

Date of birth: March 20, 1952

Present position: Professor in Plant Biology, Department of Plant Biology, Technical University of Braunschweig, Germany

Research fields: Cell biology and molecular biochemistry of metal metabolism in plants and humans, bioimaging of protein interactions, plant sulfur metabolism

Education:

1974 Diploma in Biochemistry, Humboldt Universität Berlin, Germany

1978 Dr.rer.nat. in Biology at the Gatersleben Institute of Plant Genetics (Academy of Sci. GDR) and at the Martin-Luther-Universität, Halle

1985 Dr.sc.nat., Academy of Sci. GDR

1990 Dr.rer.nat.habil., Martin-Luther-Universität, Halle

Name: Peter Langridge

Present position: Director and Chief Executive Officer, Australian Centre for Plant Functional Genomics

Professor in Plant Science, University of Adelaide, Australia

Research fields: Plant breeding and genetics, cereal genomics and molecular biology

Education: 1977 B.Sc. (Hon 1) Australian National University

1980 PhD. CSIRO, Division of Plant Industry and Australian National University, 1980, "Protein synthesis in developing chloroplasts"

Name: Klas Kärre

Date of birth: January 12, 1954

Present position: Professor in Molecular Immunology, Department of Microbiology, Tumor and Cell Biology, Karolinska Institutet, Stockholm

Research fields: Cellular immunology, Natural killer cells (basic aspects, applications in cancer, transplantation and infection), MHC class I molecules in regulation of Natural killer cells and T-cells

Education: 1981 Ph D in Tumor Biology/Immunology, Karolinska Institutet.

1983 MD, Karolinska Institutet, Stockholm

1985 Postdoctoral training, Pasteur Institute, Paris (P Kourilsky)

Name: Lubbert Dijkhuizen

Date of birth: March 3, 1951

Present position: Professor of Microbiology, Groningen Biomolecular Sciences and Biotechnology Institute (GBB), University of Groningen, The Netherlands, and

Scientific Director of Carbohydrate Competence Center (CCC, with 19 companies and 6 knowledge institutes).

Research fields: Microbial Physiology, biotechnology, systems biology, synthetic biology, actinomycete metabolism and pathogenicity (tuberculous diseases), carbohydrate (starch, sucrose) enzyme structure/function relationships, metagenomics.

Education: 1975 M.Sc. in Biology, University of Groningen, The Netherlands.

1979 Ph.D. in Microbiology, University of Groningen, The Netherlands.

Name: Lars Juhl Jensen

Date of birth: May 18, 1975

Present position: Professor in Disease Systems Biology, Novo Nordisk Foundation Center for Protein Research, Department of Disease Systems Biology, University of Copenhagen.

Research fields: Bioinformatics, systems biology, data and text mining

Education: 1999 M.Sc. in Chemistry, Technical University of Denmark.

2003 Ph.D. in Bioinformatics, Center for Biological Sequence Analysis, Technical University of Denmark.

This publication can be ordered at
www.forskningsradet.no/publikasjoner

The Research Council of Norway
P.O.Box 2700 St. Hanshaugen
NO–0131 Oslo

Telephone: +47 22 03 70 00
Telefax: +47 22 03 70 01
post@forskningsradet.no
www.forskningsradet.no

October 2011

ISBN 978-82-12-02991-0 (printed version)
ISBN 978-82-12-02992-7 (pdf)

Design: Agendum
Cover photoes: Colourbox, Shutterstock
Print: 07 Gruppen AS