

Research Review

Theme Biomedical Sciences 2013-2018



Research review according to the Standard Evaluation Protocol 2015-2020

Erasmus MC Universitair Medisch Centrum Rotterdam







Contents

Preface 5
I. Introduction 6
Assignment to the committee
Assessment criteria6
Committee composition7
Documentation7
Working method7
Structure of the report8
II. Theme Biomedical Sciences9
Organization9
Erasmus MC and theme level9
Strategy 23 10
Integrity policy10
Diversity 10
Career planning 11
Infrastructure and computation11
PhD training12
III. Biochemistry 15
Strategy and targets15
Research quality 15
Relevance to society16
Viability16
PhD training16
Recommendations17
IV. Cell Biology 18
Strategy and targets
Research quality 18
Societal Relevance 19
Viability19
PhD programme19
Recommendations20

V. Developmental Biology	21
Strategy and targets	21
Research quality	21
Relevance to society	21
Viability	22
PhD training	22
Recommendations	22
VI. Genetic Identification	23
Strategy and targets	23
Research quality	23
Relevance to society	23
Viability	24
Recommendations	24
VII. Molecular Genetics	25
Strategy and targets	25
Research quality	25
Relevance to society	25
Recommendations	26
VIII. Neuroscience	27
Strategy and targets	27
Research quality	27
Relevance to society	27
Viability	28
Recommendations	28
Appendices	29
Appendix 1. Curricula Vitae of comn members	nittee 31
Appendix 2: Schedule of the site visi	t 33
Appendix 3. Quantitative data	36
Appendix 4: SEP Assessment Scale	38

Erasmus MC Universitais Medisch Centrum Rotterdam



Preface

On behalf of the committee, we here present our SEP-review of Theme Biomedical Sciences of Erasmus MC. The committee was impressed by the quality of research and detailed information provided to us upfront and during the two-day virtual visit at Erasmus MC. As the Covid-19 situation did not allow us to experience an onsite visit, which in particular would have been useful to evaluate the lab atmosphere and research facilities, we were very satisfied that reviewing Theme Biomedical Sciences still was made possible, with excellent presentations given by numerous junior and senior PIs, postdocs and PhD candidates of all six departments.

We strongly believe that with all given information, we are able to present a report that includes all of the discussion points from the interviews and the recommendations made by all members of the committee.

We are confident that this feedback is useful to further optimize the quality of research, the impact of this for the society, both nationally and internationally, the training of PhD candidates, reaching the gender balance at the PI- and department head-level and for viability.

We wish Theme Biomedical Science all the best for future directions and hope that our report is useful to further improve their excellent research in both fundamental and translational science.

Petra Knaus

Committee chair, Theme Biomedical Sciences February 2021



I. Introduction

Assignment to the committee

The Executive Board of Erasmus MC initiated an assessment of the scientific research done at the institute during the period 2013-2018. This quality assessment was part of the regular six-year evaluation cycle of the research of Dutch universities and University Medical Centers (UMCs).

The primary units of research at Erasmus MC are its 48 departments, which are (financially) responsible for carrying out the institute-wide research strategy. Each department is led by a department head appointed by the Executive Board of Erasmus MC. The department head is fully responsible for the core functions (research, education, and if applicable patient care) as well as for the atmosphere and working environment (diversity and inclusion, (research) integrity and health and (social) safety) of the department.

Historically, departments are distributed over nine overarching themes:

- 1. Biomedical Sciences (6 departments)
- 2. Brain & Senses (6 departments)
- 3. Daniel den Hoed (3 departments)
- 4. Diagnostic & Advice (7 departments)
- 5. Dijkzigt (8 departments)
- 6. Health Sciences (4 departments)
- 7. Sophia (7 departments)
- 8. SPIN (4 departments)
- 9. Thorax (3 departments)

For the purposes of this assessment, the Executive Board of Erasmus MC appointed a separate committee of international experts for each of its nine themes, consisting of international experts in the fields of the underlying departments. Each committee conducted its own assessment, amounting to a total of nine assessments. These took place in the period September 2020 to April 2021.

Originally, the members of each committee were intended to meet with one another and with institute and department representatives during onsite meetings. These were scheduled to take place in the spring of 2020. However, due to the Covid-19 pandemic, the site visits to Rotterdam were first postponed and later replaced by remote meetings via a digital platform. In order to compensate for the loss of interpersonal interaction during physical meetings, it was decided to schedule additional online meetings between committee members and use interactive working methods.

This report describes the findings, conclusions and recommendations of the committee that assessed the six departments that are part of Theme Biomedical Sciences (BMS). Each department was judged along the lines of research programmes of similar disciplines in academic institutions worldwide.

The committee did not attempt to draw a direct comparison between departments within Erasmus MC. Nonetheless, it has taken note of the results and strategies of the departments in Theme BMS and discussed them in relation to each other. The committee emphasizes that the assessments performed by the external reviewers of the nine overarching themes are essentially incomparable and should not be used as the basis for central funding strategies; each committee assessed the theme in question on its own merits. This observation holds particularly for the assessment of societal relevance. The scores that were given to this SEP criterion in this report reflect that societal relevance is of a different, but by no means less valuable, nature in the departments oriented towards fundamental science.

Assessment criteria

The assessment of Theme BMS was guided by the Standard Evaluation Protocol 2015-2021 (SEP) of the Royal Netherlands Academy of Sciences (KNAW), the Netherlands Organisation for Scientific Research (NWO) and the Dutch Association of Universities (VSNU). The three assessment criteria specified in SEP – (1) research quality, (2) relevance to society and (3) viability formed the starting point for the assessment. In its report, the committee both qualitatively and quantitatively assesses these criteria, using a fourpoint scale, ranging from world leading/excellent (1) to unsatisfactory (4) (appendix 2). In accordance with SEP, the assessment also includes a qualitative appraisal of Erasmus MC's PhD programme, and its research integrity and diversity policies and practices.

In addition to the SEP criteria, the committee took three specific research-related targets into consideration. These are part of Erasmus MC's current strategy (Strategy23), which designates 'Technology & Dedication' as its guiding principles. In the Terms of Reference for the research assessment the Executive Board of Erasmus MC



describes the three research-related targets as follows:

- 1. Positioning ourselves as a partner;
- 2. Using technology to lead the way in innovation;
- 3. Focusing on our staff and internal organization.

For each target, the Terms of Reference list a number of indicators, which the committee used as reference points.

Committee composition

Members of the committee that assessed the departments of Theme BMS are:

- Prof. Petra Knaus (chair), Freie Universität Berlin, Germany;
- Prof. Kamran Khodakhah (vice-chair), Albert Einstein University, US;
- Prof. Andres Aguilera, CABIMER, Spain;
- Prof. Amanda Fisher, Imperial College London, UK;
- Dr Walther Parson, Medical University Innsbruck, Austria;
- Prof. Wolf Reik, Babraham Institute, UK.

Dr Meg van Bogaert and Dr Floor Meijer were appointed as independent secretaries to the committee. A short curriculum vitae of each of the committee members is included in appendix 1.

All members of the committee signed a statement of impartiality and confidentiality to ensure a transparent and independent assessment process. Any existing professional relationships between committee members and departments under assessment were reported. The committee concluded that there was no risk in terms of bias or undue influence.

Documentation

Prior to the site visit, the committee received the self-evaluation report of the theme and its underlying departments, including the information and appendices required by SEP. The following additional documents were provided:

- Standard Evaluation Protocol 2015-2021;
- Terms of reference for conducting the site visit;
- A Beginner's Guide to Dutch Academia (The Young Academy, 2018);
- Overviews of publications and CV's of PI's of the departments.

Working method

Prior to the site visit, the committee members were asked to read the documentation and formulate preliminary assessments and questions for the interviews. In an online kick-off meeting, approximately six weeks prior to the site visit, the committee was introduced to the Standard Evaluation Protocol and agreed upon procedural matters. In a second online meeting, approximately three weeks prior to the site visit, the committee discussed preliminary assessments and formulated questions on relevant topics. These questions were afterwards sent to the department heads in order to facilitate their preparations for the site visit. At the beginning of the digital site visit, the committee held a closed online meeting to prepare for the interviews.

Each member of the committee was primarily responsible for the assessment of one specific department. As 'first assessor', he or she took the lead in preparing for the assessment of this department. Furthermore, this committee member chaired the online meetings with department staff and eventually drafted an assessment based on the SEP criteria. For reasons of continuity, a 'second assessor' was appointed to each department. Contrary to the first assessor, the second assessor was not necessarily an expert in the field of the department.

The online site visit of Theme BMS took place on 18-20 November 2020. During the site visit, the committee met with the Executive Board of Erasmus MC, as well as with representatives of the departments. Each department was given a time slot, which it filled with presentations and interviews. Committee members also spoke with PhD candidates of the departments during two consecutive speed dates. During its final meeting, the committee jointly scored all of the departments. To conclude the visit, the committee presented the main preliminary conclusions to the Executive Board of Erasmus MC and the staff of the departments of Theme BMS. The schedule for the site visit is included in appendix 3.

After the site visit, the chair and the secretaries drafted a first version of the committee report, based on the assessments drawn up by the first assessors. This draft report was circulated to the committee for all members to comment on. Subsequently, the draft report was presented to Erasmus MC for factual corrections and comments. In close consultation with the chair and other committee members, the secretaries used these



comments to finalize the report. The final report was presented to the Executive Board of Erasmus MC.

Structure of the report

This report contains the committee's findings and conclusions on the six departments constituting Theme Biomedical Sciences. In accordance with SEP, the committee details its assessments on strategy and targets, research quality, societal relevance and viability in separate chapters for all six departments. These chapters also discuss particularities with respect to PhD training, diversity and integrity. Overarching and institutional dimensions of such aspects (e.g. policies that are developed at Erasmus MC rather than at the departmental level, general practices at Theme Biomedical Sciences) are assessed in a general chapter that precedes the chapters on the departments. Details on the composition of the committee, the assessment scale and the setup of the digital site visit can be found in the appendices.



II. Theme Biomedical Sciences

Organization

Erasmus MC has traditionally been organized in a decentralized manner. Departments form the primary units for governance, HR and funding. Each department is led by a department head appointed by the Executive Board of Erasmus MC. The department head is integrally responsible for core tasks (research, education and, if applicable, patient care) and for formulating and realizing the associated department goals. Also, the head has to ensure a good atmosphere and working environment (diversity and inclusion, (research) integrity and health and (social) safety) within the department. The department head receives (first stream) research funding directly from the Executive Board.

The combined heads of departments, together with the theme director, form the Theme Board. One of the heads acts as chair. The theme board bears collective responsibility for drafting and realizing the annual tactical and operational strategic plan for the theme and is held accountable for this by the Executive Board. The annual strategic plan sets out how themes/departments will achieve the targets set out by the organization (Strategy23). The theme director is responsible for effective operational management of the theme.

Erasmus MC and theme level

Erasmus MC

Based on the interviews the committee held with participants of the six departments in Theme BMS, the overall conclusion is that researchers have a passion for their work and consider themselves to be privileged to work at Erasmus MC. There is a highly collaborative and supportive spirit in the departments, and this clearly results in high quality research.

In this report, the committee focuses on a number of recommendations that will help the departments, theme and Erasmus MC as a whole to maintain the high quality fundamental biomedical research.

The committee recognizes the advantages and challenges that fundamental research departments face in an academic hospital. Fundamental biomedical sciences are of major importance for clinical research and it is crucial that a high-quality research environment that supports fundamental research remains part of the Erasmus MC. Although the committee believes that the dean is supportive of fundamental research in the Erasmus MC, it also observes that the policy and decisions that are made often do not favour these departments.

An important frustration within the theme, and point for improvement, is the way in which direct funding is distributed. The total amount that can be distributed has decreased in recent years and is not expected to increase in the near future. In fact, Theme BMS mentioned a 16% budget cut in the upcoming year. If Erasmus MC wants to continue high-quality basic BMS research in the future, it will have to invest in this.

The distribution key for allocating first stream funding to the departments has a large historical component, which is generally to the advantage of the larger clinical departments. Younger and nonclinical departments are already lagging behind, regardless of their scientific success. Although there may be several reasons for moving from a fundamental research PI to a clinical research department, it is clear that a recent departure from the Neuroscience Department also involved a financial incentive. This indicates that the time is right for Erasmus MC to think about revising the way research money is distributed.

According to the committee it is important that success in research is rewarded. What success means, is not up to the committee to determine. There are, however, a number of general guidelines that the committee considers important. It should not be about numbers of publications, but about the quality of the publications. New, start-up departments should be given time and space to develop and there should also be room and opportunities to support departments in need. In order to draft a distribution key, an Erasmus MC wide strategic plan on research is recommended.

Theme BMS

The committee thinks that not only at Erasmus MC-level a strategy could help to maintain high quality research, BMS can also take steps as a theme. Although in some ways the six departments present themselves as a theme, this was not entirely convincing. It struck the committee that the departments are very different in size. While all conduct very high-quality fundamental research, some of the departments are so small that they appear to lack critical mass. The



committee is of the opinion that mutual cooperation between the departments in this theme could bring about economies of scale and would thereby help the development of the theme as whole, as well as strengthen the small departments. A strong common identity and strategy will benefit all departments in this theme and fundamental science as a whole.

The committee has, at various times, discussed the option of rearranging or even merging departments. It is clear that the departmental level is important within the Erasmus MC and from that perspective merging departments is not favoured.

Conclusion

In conclusion, the committee stresses the importance of fundamental biomedical sciences in Erasmus MC. Although a new system of funding can contribute to this, the committee is also of the opinion that changes and a common future should be considered within the theme and departments.

Strategy23

At Erasmus MC level, a number of collaborations are mentioned with other universities, like Eindhoven University of Technology, Radboud University Nijmegen and Delft University of Technology (TU Delft). Specifically, TU Delft is important to achieve the goal of a Technical Medical Centre ('convergence'). The aim is a joint feature with TU Delft and Erasmus University Rotterdam (Erasmus MC and EUR) as closely collaborating partners, rather than a merger.

The committee appreciates this idea, as it might strengthen the position of Erasmus MC. In the interviews with the BMS departments, the committee learned about a number of collaborative initiatives at departmental level with TU Delft departments, but it could not identify a strategy or joint BMS initiative in this respect. Perhaps the reason is the fairly recent development of the convergence initiative. The committee recommends both Erasmus MC and Theme BMS to develop a more structured and long-term strategy that overarches the smaller bottom-up initiatives that – although nice and interesting – run the risk of disappearing when the project is completed, or the people involved leave.

Integrity policy

Erasmus MC endorses the Code of Conduct for research of the Association of universities in the Netherlands (VSNU) and the revised European Code of Conduct for Research Integrity. Its policies on academic/scientific integrity are outlined in the Erasmus MC Research Code that covers the following aspects:

- Research with patient data and biomaterial;
- Data management;
- Guidelines for publishing and authorships;
- Guidelines inducements by companies;
- Intellectual property.

As of early 2018, Erasmus MC has guidelines in case of scientific misconduct. The committee concludes that research integrity receives sufficient attention at policy level. It is more difficult to assess how well policies are being followed, but the committee has received no signals that there are problems in this respect. An area of improvement is that more could be done to support Open Science, by consistently submitting articles to preprint servers.

Diversity

Because of its location in the multicultural city of Rotterdam, Erasmus MC caters to a diverse group of patients and student population. To reflect this diversity in its staff, Erasmus MC aims for a diverse composition of teams in all layers of the organization in terms of ethnic background, age and gender. According to the self-evaluation report, harnessing the benefits of the differences helps to be innovative and to further improve research, training and patient care.

Erasmus MC has specifically developed a number of policy initiatives to support female researchers. These include the Female Talent Class, consisting of various workshops and interventions intended for talented early career researchers (maximum of two years after PhD completion), and the Female Career Development Programme, developed for female scientists (clinical and non-clinical scientists between 4 and 8 years after promotion) who have the potential and ambition to reach the position of associate professor (UHD).

The committee applauds the plans on diversity and achieving a better gender balance. The current gender disbalance, specifically at the managerial and full professor levels, is not unique for Erasmus MC, many institutes suffer from a similar problem. Nonetheless, addressing this situation requires urgent attention. From the interviews and documents, the committee concludes that there is a cohort of young, talented female scientists who should be given ample opportunity to further develop themselves. It is very precarious that no formal programme is in place for creating new



positions for women, nor is there a formal tenuretrack programme. This results in talented female assistant and associate professors leaving, as they get offered such opportunities by other institutes. The committee considers this as a very critical issue, which needs to be solved centrally and will detail this in the reports for the individual departments according to their specific needs.

If Erasmus MC really aims at improving the gender balance at the highest levels, it should also be willing to invest. For example, the Erasmus MC board could stimulate/require that appointments of department heads prioritize female candidates. Smaller actions that help young parents to combine family life with their career development can also be taken. An example is to increase the availability of day care outside regular hours. In conclusion, the committee appreciates the existing plans and initiatives, but feels that stronger action and a well-defined timeline are required to achieve the objectives that Erasmus MC has set itself.

The committee also notices that some departments in Theme BMS clearly perform better than others in this respect. Departments that do well clearly prioritize this topic in their HR-strategy. Such practices could serve as a good example for other departments. One thing is crystal clear to the committee: the gender balance will not automatically improve over time. Achieving a better representation of women at top levels requires active interventions from Erasmus MC, the theme and departments.

Career planning

All departments appear to be able to attract excellent young researchers, as was evident from the presentations during the interviews. This is a great compliment and reflects the attractiveness of the departments in this theme. The committee stresses that it is important to offer promising researchers a clear perspective. This requires a talent management strategy which is currently not present.

The absence of a formal tenure track programme is a significant impediment for the departments in Theme BMS. It might contribute to the departure of talented young scientists who see a brighter career perspective in other institutions. Not only the uncertainty, but also the lack of clarity about promotion criteria leads to stress among junior and mid-career researchers. The committee advises the Erasmus MC to speed up ongoing developments with regard to a tenure-track programme. In addition, it stimulates the departments to clearly communicate on existing possibilities and applicable conditions for promotion.

The committee noticed that some departments deliberately cultivate their own talents. After obtaining their PhD, many are encouraged to look for an external postdoc position and then return. The committee understands that this is not unusual in the Netherlands. Nevertheless, the committee wants to encourage the various departments to increase external recruitment. According to the committee, this is good for the diversity and quality of the research in the long term.

Infrastructure and computation

In the interviews, the committee extensively discussed the infrastructure, and more specifically the computing power. It learned that the development of the Research Suite initiative is still ongoing. It considers this a good initiative for sharing data. The committee understands that Research Suite is focused on and meets the requirements of research in clinical departments. However, for the fundamental research programmes in Theme BMS, the amount of data being transferred is way beyond what the Research Suite is capable of. The requirements of BMS also go beyond the shared use of data and involve analysis platforms.

The speed with which the computer sciences develop, makes it difficult for individual departments to keep abreast of developments and make the necessary investments. This is a dilemma that needs to be resolved. However, the committee does not see that this is considered a joint issue at theme level. The various departments focus on their own wishes and needs. The committee recommends to reorganize the computational power and as a theme communicate with Erasmus MC about what is specifically required for the fundamental sciences in this theme.

In a wider sense, the committee discussed the core facilities at length during the visit. At Erasmus MC, these are independent units, at which departments can have specific services performed (such as proteomics analyses). On the one hand, joint core facilities have the advantage that more is possible with the budget of a small department. On the other hand, a core facility cannot always offer the specialist knowledge that a department or research line needs. The committee learned that a bioinformatics core facility is now being discussed



specifically. It advocates a "hub and spokes" model, where individual researchers join this core facility for a fixed period of time to conduct their research, learn bioinformation techniques, and bring "biology thinking" into the facility.

A topic that also came up is the Erasmus MC website, which does not showcase departmental research as well as it could. Improving and regularly updating the English version of the website would help to increase the visibility of individual researchers and their research topics.

PhD training

Erasmus MC offers three- to four-year (fulltime equivalent) PhD positions in which PhD candidates conduct research, follow a training programme and teach undergraduate students. These activities, as well as agreements on supervision, are detailed in a Training & Supervision Plan (TSP) that is drawn up at the start of a project and signed by the PhD candidates and the supervisor(s). The TSP is expected to be updated annually and to serve as a guide for the yearly evaluation of the progress of the PhD candidates.

Since 2019, Erasmus MC has a database system ('Hora finita') in which the status of PhD projects is registered. The availability of this system is said to greatly aid generation of management data regarding PhD graduations and aid in quality management. PhD training at Erasmus MC is organized in five PhD programmes (Health Sciences, Cardiovascular Research, Neuroscience, Biomedical Genetics, Molecular Medicine), each with its own research school where PhD candidates follow courses and lectures (NIHES, COEUR, Onwar, MGC, MolMed).

Participation in courses, lectures and conferences outside of the research school also counts towards the 30 EC that PhD candidates are expected to obtain over the course of their project. Completed courses and teaching activities are listed in a portfolio at the back of the doctoral thesis. A oneday course on research integrity is mandatory for all Erasmus MC PhD candidates. PhDs who conduct animal experiments are required to follow a course on laboratory animal science, while PhD candidates who are involved in patient-related research take part in a course on good clinical practice.

The committee conducted interviews with a number of PhD candidates from different departments. All PhD candidates indicated that

they are pleased with the scientific supervision that they get. They identified the approachability of the supervisors and the freedom to determine their own research as positive points.

The most important point of attention, especially in this period of Covid-19, is the care for the mental health of the PhD candidates. There is a pressing need to provide additional support to PhD candidates, many of whom are living away from their families. A large part of PhD candidates appear to struggle with limited social and scientific contacts, have doubts about the feasibility of their project within the set time and feel a lot of pressure to perform. Certainly, for foreign PhD candidates, who may not be able to travel home and may lack a social structure to fall back on, it is a very stressful period. Although there are opportunities for PhD candidates to seek help to discuss and improve their mental health, it is a big step for many of them. The committee believes that the supervisors have a responsibility to encourage struggling PhD candidates to seek the necessary help. In particular, it would encourage linkages with peers beyond individual departments and providing 'well signposted' access to dedicated mental health expertise.

Something that is currently missing at Erasmus MC, and that the committee urgently recommends to establish, is a system of mentoring. By linking all PhD candidates to a mentor from outside of the department, with whom they are in contact a number of times a year, there is an extra and approachable person within the organization to whom PhD candidates can turn in case of questions and problems. The mentor is not a content supervisor but can talk to the doctoral candidate about more general aspects of doing research and building a career after the degree ceremony. Finally, the mentor can also play a role in the annual appraisal meetings that PhD candidates have with their supervisor(s).

In addition to this important recommendation, there are a number of smaller aspects that deserve attention, as these will help PhD candidates in their daily life. A number of departments have been able to appoint many PhD candidates in recent years, as a result of successful grant applications. The supervision of these PhD candidates takes a lot of time and there are not many postdocs who can provide additional support. The committee found that organizing regular meetings with the whole team of supervisors on the progress of research is



important. The daily supervisor can pick up a very large part of the guidance and supervision, but the whole supervision team has a role in determining the direction and necessary strategy.

Although there are clearly differences between the departments, the committee notes that PhD candidates often have no idea of a departmental strategy and what goes on in the department. It seems that, at the start of their project, many PhD candidates do not have a clear picture, or an overview of what is expected of them. Often, they are not familiar with the exact requirements and criteria for obtaining a PhD. Depending on the supervisor or department, there is an oral instruction or written document. The committee believes that the newly established graduate school can play an important role at the start of a PhD trajectory, for example by providing an (up-to-

date) document with information. Regularly organizing an introductory session for new PhD candidates is also a good idea.

A final point to which the committee would like to draw attention, is the duration of PhD trajectories. Contracts are usually given for either three or four years. Although there are no formal figures that indicate the average duration of a PhD trajectory, the PhD candidates who talked to the committee mentioned that it is the rule rather than the exception that PhD candidates take five years (or more) to complete their PhD. The committee is of the opinion that supervisors could focus more on enabling timely completion, of course without compromising on quality requirements. This is in the best interest of both the PhD candidate and the department. Setting clear criteria could help in this respect.



III. Biochemistry

Research quality	Excellent (1)
Relevance to society	Excellent (1)
Viability	Good (3)

Strategy and targets

The Department of Biochemistry is a small-sized department, consisting of three research groups, centred around three group leaders. These are (1) the Proteomics group, (2) the Chromatin and Viral latency group and (3) the Epigenetics and Metabolism group. Lab-facilities are shared between groups. The department's mission is to investigate the molecular mechanisms of gene regulation that underpin development and disease, using insights from the department's fundamental research to address clinical challenges in human diseases, including HIV infection and cancer.

At first sight, the department seems to comprise a rather eclectic scientific mix, with the three research groups working on diverse topics. However, closer inspection reveals a common molecular base and a very competent and up-todate skill set, with a strategy that centres around epigenetics and metabolism, and the use of proteomics and biochemistry to better understand the impact of post translational modifications (particularly ubiquitination) and chromatin remodelling controlling viral latency. The groups use model systems (such as fly and human organoids) to pursue their studies. These are appropriate and cost effective. The department also provides a mission-critical 'proteomics service' to Erasmus MC and has key roles in undergraduate and postgraduate teaching.

Erasmus MC is proposing to invest in metabolomics. The committee sees that there may be considerable value in co-locating this alongside the proteomics facility run by the proteomics research group; additional resourcing into the Department of Biochemistry would be needed and this would ensure that the proposed metabolomics facility is overseen by staff with the expertise necessary to ensure its success, as well as potentially boosting the overall size and viability of the Department of Biochemistry.

Research quality

The quality of the science is excellent, as evidenced by the very high level of publications. Most of the research is very original and some of it is dogmaconfronting. In recent years, all three groups have made major discoveries and valuable contributions to the field. While the number of papers has dipped slightly, the mean normalized citation score is increasing steadily. This is reflective of the department's strategy to emphasize originality and quality over volume.

The leader of the Epigenetics and Metabolism group is one of only a handful of scientists worldwide that is seriously trying to bridge the gap between epigenetics and metabolism, using both genetic and biochemical approaches. His work on non-canonical targets of chromatin modifiers is also interesting and relatively novel. That said, it is critical that this group focus on getting some of the new work published – particularly as there has been a drop in output since 2015/16 and this needs to be remedied.

The Chromatin and Viral latency group is working on an interesting problem that has significant potential for societal impact. The group's leader has won a number of grants and is on an upward trajectory. It is unfortunate that the committee was unable to hear her present and answer questions about her research, due to unforeseen circumstances. There is clear potential for scientific overlap/interplay between the chromatin modifiers studied by the Epigenetics and Metabolism group and those that may contribute to silencing/latency by binding to the HIV LTR. In addition, the Chromatin and Viral latency group are in an excellent position to exploit the proteomics expertise of the Proteomics group, and to screen for novel candidates that reverse HIV latency. Overall, while recognizing that this is a competitive area, the committee were impressed with the progress and niche being developed by the Chromatin and Viral latency group.

The Proteomics group is a largely technologyfocused team that interrogate post translational modifications and proteosome function. This group is highly collaborative and focuses on 'pushing the boundaries' of proteome-typing, immunopeptidomics as well as in developing more quantitative approaches. PRM is clearly something that will add value to many studies across Erasmus MC on both fundamental and clinical fronts.

The strong emphasis on technology development and its expertise in the ubiquitin field have led to collaborations within the Erasmus MC (the Departments of Molecular Genetics, Cell Biology, and Neurosciences) and outside (NKI, LUMC, TU



Delft, Netherlands Institute for Neuroscience, etc.) and partnerships with SMEs such as Cell Signalling Technologies.

The leadership by the three group leaders is excellent. The department strongly believes in promoting 'small team'-science and is run in a nonhierarchical manner. Collaborations between the groups are more common than the committee originally expected, resulting in a high level of synergy. Interaction with other departments within and outside of Theme BMS could be increased.

Relevance to society

The relevance to society of the work of the biochemistry department is excellent. In particular, the committee recognized the relevance of the work of the Chromatin and Viral latency group towards a potential cure for HIV, and the values of new proteomics approaches for 'health' and 'wealth creation'. Studies targeting AMPK function are also likely to be important for the eventual understanding of, and treatment of, metabolic disease.

There is a high level of engagement with society. The department actively disseminates research results to the public by partaking in school demonstrations and public discussion. Leading researchers are members of relevant panels and boards. Examples given in the self-evaluation report indicate that community outreach activities are particularly prevalent for the research on finding a cure for HIV. Skills-transfer is also an important aim for the department, with the Chromatin and Viral latency group providing training in cutting-edge molecular biology to researchers from developing countries/areas.

In order to sustain and extend the already outstanding societal relevance, the department could aim for better linkage to clinical groups within the Erasmus MC. Especially for HIV, cancer and related diseases, pipelines for development of new therapeutic strategies could be extended.

Viability

From the SWOT-analysis in the self-evaluation report and the interviews, the committee identified some important issues that weaken the viability of this otherwise excellent department. First, there are some concerns about the financial viability of this small-sized department. In order to bear the rising costs of experiments and remain internationally competitive, the department needs a steady flow of funding. The department currently notes that direct funding from Erasmus MC is under pressure and that external funding for fundamental research is increasingly difficult to obtain.

Second, the staff composition requires attention. The committee learned that the department was unable to retain two of its top female researchers because of financial constraints, which it considers problematic. It is important that promising (female) researchers are given clear perspectives and that promises made to them are kept. Developing a clear talent management and retention policy will also help to secure the succession of senior researchers. The committee concludes that the department performs well for a small department and (because of the presence of a number of highly talented researchers) holds a lot of promise for the future. As it stands, however, the structure of the department may not be sufficiently robust to withstand further financial cuts, and clearly requires additional investment to thrive. It recommends that additional funding is secured in order to recruit a new female junior group leader and the metabolomics facility mentioned above to underpin the excellent science (and potential) that was evident.

PhD training

The committee was highly impressed by the Biochemistry PhD candidates (and postdocs) who participated in the site visit. These young researchers are of a high calibre and seemed thoughtful and motivated.

In general, PhD candidates are very satisfied with their experiences at the department and Erasmus MC. Training takes place at either MolMed or MGC (Medical Genetic Centre Leiden and Rotterdam) and the PhD candidates are pleased with the quality and range of courses on offer. They did suggest to improve communication on course availability, as this type of information is not automatically passed on to PhDs. Supervisors were commonly described as approachable and helpful. Some PhD candidates would, however, appreciate more attention to career guidance.

A general point of attention is the additional support provided to PhDs throughout the Covid19 pandemic. It is important to ensure that PhDs have the essential facilities to work from home if necessary and that they receive adequate mental health support in times that are highly challenging for a substantial number of PhDs.



Recommendations

The committee offers the following suggestions:

- In the committee's opinion, it makes sense to direct Erasmus MC-wide investments in metabolomics towards the Department of Biochemistry, which is ideally positioned to house such a facility, alongside the existing proteomics facility run by the proteomics research group. Such an investment could potentially help to boost the overall size and viability of the Department of Biochemistry.
- A greater continuity of (financial and organizational) support for the department is essential. The three groups currently rely on a

small number of high performing individuals, which affects their overall resilience. Given their excellent scientific quality, the groups should be enabled to expand and strengthen their existing research lines and invest in promising new research lines. Recruiting new (external) staff will help to achieve this.

• Establishment of a new junior group, headed by an excellent female scientist with complementary expertise to the 3 existing groups. It might be worth thinking about a person, who would also be able to support the set-up of a Metabolomics facility within the Proteomics CF.



IV. Cell Biology

Research quality	Very Good (2)
Relevance to society	Excellent (1)
Viability	Very Good (2)

Strategy and targets

Compared to some of the other departments in Theme Biomedical Sciences, the Department of Cell Biology is a large department that comprises fifteen research teams, subdivided over five pillars. The department's mission is to do fundamental research on the generation of cell diversity and function via instructed cell differentiation. It covers research topics such as neurodevelopment, epigenetics, functional genomics, gene regulation, cell behaviour and optogenetics. Diseases that are studied vary from sickle cell anaemia, cancer and autism to neuro-developmental diseases.

The strategy of the department is to remain an internationally renowned department for the study of the functions and action modes of key regulatory proteins and their molecular networks in individual or populations of cells in tissues/organs, animal models and human cells, in normal and counterpart pathologic processes. An overall objective is to apply this knowledge to the development of improved diagnostics and therapy within the Erasmus MC and beyond. Despite the overarching mission for every PI, which is to address molecular and cellular networks or genes/proteins that explain cell (de)differentiation and behaviour in health and disease, the committee noticed that the department has some difficulty in describing its research profile in a concise way. This is understandable given the variety of topics and diseases covered. The committee believes that developing a coherent overarching view could help to strengthen the department as a whole.

A major strength of the department lies in its ability to develop new technologies: gene therapy, new immunizing technologies, single cell genomics, organoids, spatial transcriptomics and spatial proteomics, optogenetics (quick, closed-loop control, automated), micropatterning (control cell shape, organelle positioning, directionality of cell movements, reconstitution), live-imaging microscopy (light sheet microscopy), single cell multi-omics. Some technologies as presented by a senior researcher of the department have led to major successes for Erasmus MC in the past. In recent years, the balance between technology and conceptuality has shifted rather sharply to the technological side. The committee feels that the department would do well to (re)examine this balance. Ideally, the department should aim for the middle ground, addressing biological questions from both technological and conceptual angles. This would create space and opportunity for younger researchers to pursue the type of biology that is most interesting to them.

In 2013, the department transitioned to a new department head, who has been able to achieve a lot in his relatively short time at Erasmus MC. Both the former and current department head have developed a good level of links to and collaborations with all the PIs in the department. A future aim of the management is to further rejuvenate and 'reset' the department in a careful, gradual way, but soon and in an open strategyapproach. According to the committee, a more inclusive governance model should also be aimed at, especially as excellent new/young scientists have recently been recruited. Their contribution to the department's governance could prove very valuable.

Research quality

The department's research quality is very high and covers a very broad range of technologies, biomedical, cell-biological and developmental biology topics. Single cell multi-omics and spatialtranscriptomics as well as spatial-proteomics are central to address questions related to neurodevelopment and related diseases, lymphocyte biology and pluripotent stem cells. Across different groups complementary technologies are developed and applied. Some have led to clinical trials and to spin off companies. The publication record has been very successful, also in recent times. The impact of publications has increased over the review period. The department has gone from strength to strength in developing new technologies and the quality and relevance of its output has been high. With more focus on commonalities in biological concepts, groups could have been even more successful in obtaining base funding.

According to the committee, the department's research topics are internationally very well recognized. For some of the research topics, the work is considered outstanding. In particular the groups who do work on lymphocytes, epigenomics, transcription factors in developmental neurobiology, optogenetics, single cell multi-omics,



breast cancer and extracellular matrix biology presented very promising and outstanding research to the committee. The collaborative spirit, vision and energy of these groups came across very well from the presentations, especially from those of the young investigators working on organoids, epigenomics, lymphocytes and tumour cells. As mentioned by the department, it is a continuous innovation engine, investing in technological developments. Although impressive, the focus on technologies - the area of expertise of the senior Pl's – dominates the research in the department. According to the committee, the research would have been even more impressive if these technologies were explicitly connected with and balanced by biological research questions that would highlight the research quality.

Societal Relevance

In the committee's opinion, the department is successful in achieving its objective to use technology to drive forward diagnostics and treatment. The biomedical aspects of the research performed at this department are (potentially) of high relevance to society. Topics that hold a particular promise in this respect are blood disorders, neurodevelopmental diseases, certain types of cancer, cell-based regenerative medicine and novel forms of anti-/nanobody based diagnostics and therapies, ranging from immune therapy in cancer to the acute treatment of venomous snake bites.

According to the committee, the high level of association with relevant clinical departments is an important accomplishment. Such collaborations help the department to quickly implement its discoveries, to the benefit of patients, customers, and society. Part of this approach is to develop plans during the initial phase of projects to ensure that they more frequently translate into long-term implementation strategies, with the continued involvement of various stakeholders from the start. An added benefit is that collaborations with clinical groups help to strengthen the visibility of fundamental research at the Erasmus MC campus.

Furthermore, the committee concluded that there is notable potential for spin-offs. Entrepreneurship examples are set very successfully for relevant topics (e.g. Covid19).

Viability

In many respects, the Department of Cell Biology has done well over the review period.

By focussing more strongly on commonalities in biological concepts, the research teams might increase their success in obtaining external research grants. In this respect, the committee also points out that the department is active in lobbying for more funding, e.g. by publishing opeds in newspapers, writing letters to parliament and in engaging in discussions with the minister of education.

Overall, the staff has increased and there has been a large influx of young research talent. The committee is convinced of the capacities of these talent, given the right guidance and opportunities. If the suggestions given by the committee are taken up, the committee sees a bright future for this department.

The future is, however, not without its challenges. A major problem is that important researchers (and with them: important research topics) have been lost over the review period. Issues with respect to staff retention seem to originate in a lack of sufficiently attractive career options (i.e. tenure track). The committee acknowledges that this is not entirely in the hands of the department, but nevertheless considers it a threat for the future success of the department. In order to keep talent on board, efforts at talent management will need to be increased. Talented (junior) PIs deserve a more long-term/stable perspective, which in turn would guarantee the sustainability and quality of research. This applies particularly to female talent, as some of the top researchers who left were women.

Improving the gender balance, especially at the PI level, should become an urgent priority. In this respect, the committee recommends offering attractive start-up packages to newly recruited female group leaders and putting in place support mechanisms for female scientists at crucial stages in their careers. The upcoming retirement of the current department head should be considered an excellent opportunity to promote female leadership. The concept for the structure of the department under a new head needs to be visible soon, in order to (1) keep the current juniors on board, (2) to develop a coherent and focused research strategy and (3) to establish a new department structure.

PhD programme

The committee met with a number of highly motivated PhD candidates who were very satisfied with the supervision and training provided to



them. The committee found the positive spirit and collaboration and networking skills of these PhDs particularly inspiring. PhD candidates proved well aware of their role in establishing and strengthening interdepartmental collaborations.

The length of PhD projects (5-6 years on average) is troublesome, especially as contracts run out after 3 or 4 years. Extensive delays should be reconsidered and discussed.

PhD candidates like the idea of mentoring and broadly composed thesis committees. They would like to see annual progress meetings being held on a yearly basis with all supervisors/mentors present. Currently there seems to be no consequence, if no such meeting is held. PhD candidates ask for more structured career-development programmes, including for non-academic paths. The participating PhD candidates appreciated efforts made by the PIs during the pandemic in offering online courses on for example bioinformatics and computation, which are relevant for their work.

Recommendations

The committee offers the following suggestions:

- The department should consider adopting a more inclusive governance model, favouring the participation of young PIs, both male and female.
- Talent retention is an important issue. The department should provide PIs with a more long-term/stable perspective, which would not only help to keep them in the department, but would also guarantee the sustainability and quality of research. For this, the support of the Erasmus MC Board is essential.
- Substantial delays in PhD projects are surprisingly common, which is not in the best interest of the PhD candidate and the department. Efforts need to be made to prevent/minimize delays. More structured annual progress reviews could be a useful tool in this respect.
- The committee recognized that a balance between technology development and biology should be carefully re-considered for the new orientation of the department.



V. Developmental Biology

Research quality	Very Good (2)
Relevance to society	Excellent (1)
Viability	Excellent (1)

Strategy and targets

The Department of Developmental Biology is a small department that covers a broad range of (important) biological topics. Its mission is to understand embryonic development, homeostasis and regeneration in the context of gene regulation and signal transduction. New insights are applied to establish model systems to study homeostasis and disease, and to develop diagnostic assays and treatments. The overall scope of the department is rather broad and with future appointments the committee recommends should be tightened.

The development and application of new technologies to address key biological questions is an important feature of the department. The committee found that this takes place at a high level. There is substantial industry involvement, and a successful spin-out company was created. The department should receive credits for founding (and funding) an iPSC facility in 2010, which became an official Erasmus MC iPSC core facility in 2018. As such, the iPSC facility will be of high value for the entire Erasmus MC and specifically for the department's own research lines involving human ESC and iPSCs.

The department hosts three internal research groups, as well as two external research groups led by PIs from clinical departments at Erasmus MC (Department of Gynaecology & Obstetrics; Department of Internal Medicine). To the committee, the department seems well-integrated, with good links and collaborations between PIs. Collaborations with other Erasmus MC departments and (inter)national partners are also at a very good level. Specifically, the committee commends the department for integrating associates from other departments. This practice opens the door to new research ideas and opportunities for collaboration and is a good example for other departments in Theme BMS.

From the interviews, the committee established that there is an excellent degree of energy and engagement at all levels (PhD candidates, postdocs, Pls). Leadership is very good and inclusive, with ample attention for a favourable gender balance. The upcoming availability of a junior PI position could further enhance and strengthen the department. The committee recommends using this opportunity to bolster existing science strengths rather than increase scientific diversity.

Research quality

According to the committee, the research quality is overall very high, with some heterogeneity observed across the department. Part of the department's research is excellent, while other parts are good to very good. Some of the work is considered very promising by the committee, while other parts require further attention to realise their full potential.

Outstanding, internationally leading elements include the work on X inactivation, sequencing technology development, brain enhancer evolution, and aspects of the work on meiosis. Promising work that has not yet led to outstanding results and impact includes exciting plans to develop in vitro gametogenesis for the work on meiosis which should enable more mechanistic studies. The committee considers this work a good development for the future. The work on human preimplantation development is interesting and important, but for the most part has remained descriptive. This seems a missed opportunity as the department is technologically strong and this would seem to enable more molecular and potentially mechanistic approaches. Work on human development is hugely important so in the committee's opinion this area deserves further development.

There are quite a number of papers quoted as submitted which the committee could not find on bioRxiv. Early submission to bioRxiv is recommended as an important contribution to open science.

Relevance to society

Most of the research is highly relevant to society, including work on fertility, reproduction, cancer, mental health, regenerative medicine. Part of the impressive societal relevance of this department are outreach activities which help with public understanding of diseases. Moreover, the department has recently spun out a company based on methylation sequencing technologies, which is already receiving attention. It has also established an iPSC facility which is widely used throughout the theme.



The technology behind DCM-ID is exciting and has the potential to reveal new biology and lineage relationships. The work on enhancers in the brain can potentially benefit from making connections with international efforts such as ENCODE etc.

Despite the focus on fundamental scientific research, the department considers it an obligation and responsibility to deal with impact of new findings and future applications of the findings. In this respect, the dissemination programmes, such as providing lessons at high schools and communication in popular media are well chosen activities. The department furthermore explicitly focuses on informing and advising policy makers on, for example, the embryo law.

Considering the small size of the department and the limited time and funds for active dissemination, the committee is impressed by the results.

Viability

The department is very proactive in making excellent use of new opportunities that arise. This is evident from grants that it attracts from more translational funding sources, from an increase in base funding which the department head achieved, and from the imaginative and exciting associations with group leaders from other departments. Of course, this brings its own challenges in terms of maintaining scientific focus but so far the department is handling this challenge pretty well.

There is an excellent focus on gender balance and on balancing junior with senior PIs, which is a good sign for the viability of this department going into the future.

PhD training

The PhD candidates that the committee spoke with are highly motivated and engaged, and portrayed a vibrant PhD culture and programme. There are some cross-theme activities which the PhD candidates like and appreciate. The workings of thesis committees were described as sometimes haphazard and not clearly defined, and there is no representation from other departments on the thesis committees which the committee feels is a missed opportunity.

How long a PhD should take is not prescribed, which has the inherent danger that the control over what is enough for a PhD can be variable and is often in the hands of the supervisor. The PhD candidates felt that more structured career development advice could be provided, including on non-academic career paths.

Recommendations

The committee offers the following suggestions:

- Use future appointments, including the upcoming appointment of a junior PI, to narrow the scope of the department rather than to increase scientific diversity.
- Consider making early submission of articles to bioRxiv the norm, as this would make an important contribution to Open Science.
- Make connections with international efforts such as ENCODE, which could potentially benefit the work on enhancers in the brain



VI. Genetic Identification

Research quality	Excellent (1)
Relevance to society	Excellent (1)
Viability	Good (3)

Strategy and targets

The Department of Genetic Identification performs innovative fundamental and applied research and technological developments in human genetics, genomics and molecular biology to address societally relevant questions (most notably in forensics) thereby contributing to increased public safety and security.

The research in the GI department is organized into five research lines in the period of evaluation:

- 1) Genetics and DNA prediction of Appearance
- 2) Y-Chromosome Genetics and Male Identification
- 3) Application of Human Epigenomic Variation
- 4) Molecular Time Estimation & Tissue Identification
- 5) Genetic Population Structure & Ancestry (discontinued in 2014/15)

The department is fully integrated in Erasmus MC's infrastructure. The committee learned about various collaborations with departments of Erasmus MC and concrete steps were taken to expand this (e.g. TU Delft). The Department of Genetic Identification participates in two ACEs at Erasmus MC and has initiated (and is coordinating) the Erasmus MC Forensic Biomedicine Initiative, bringing together researchers and clinicians from eight departments covering different subfields of biomedicine with forensic relevance. At national level the department has several collaboration partners, of which the collaboration with the NFI was most active until 2013/14. Unfortunately, the contract with and funding by the NFI was terminated after ten years. At international level the collaborations are impressive. As is described under research quality the department head has a clever networking strategy which - in combination with the outstanding reputation of the research leads to fruitful collaborations.

Research quality

Forensic genetics has its origins in the UK and the UK was dominating research until the early 2000's when the Forensic Science Service was shut down. It is fair to say that the Netherlands have taken this leading role in the meantime. The Department of Genetic Identification has substantial impact in this success, as many of the current research topics that are pursued world-wide originated there. People and labs worldwide make use of methods and techniques that were developed by this department.

The entire department presented outstanding, world-leading science and has accomplished unparalleled dissemination in the field. This is reflected by regular publications in highest Impact Factor (IF) journals, a huge load of publications covering research and applications of their foreground, permanent lecture invitations to the relevant conferences over the past decades, prizes, rewards etc. Especially impressive is the fact that the lowest ranking IF journals the group published in are the top leading forensic genetic journals worldwide. This small department has an impressive impact of the research outcome, higher than average at Erasmus MC with an MNCS >2.

The department head is an internationally recognized expert, but the other members of the department are also beginning to gain international visibility. The department head supports the careers of these young talented researchers by enabling them last and corresponding authorships and advances them at international conferences, for example. The young, talented and dedicated researchers show a high degree of motivation, independence, are hardworking and responsible for their own research line.

The department is very broad in terms of research topics, which is particularly noteworthy given their small personnel size. This is due to a clever networking strategy of the department head, who participates in consortia, or even co-chairs (e.g. VISIGEN consortium) to produce data and knowledge that has successfully been fed back to the core research focus (e.g. DNA phenotyping). The department has access to data and samples that allows them to take it back to their research.

Relevance to society

The social relevance and impact of this research department is tremendous. The department is not only known within the Netherlands, where the research leads to production of methods and tools to solve crime cases that were cold since decades; the department is also very well known internationally. It is consulting with forensic stakeholders worldwide to disseminate knowledge and train experts. In the presentations during the site visit it was mentioned that in Germany their



work led to a change in the law to allow phenotyping analysis for investigative leads. In fact, the department was changing the European legal landscape in terms of providing evidentiary leads for combating crime. A list of countries and the current state of the individual legal changes can be made available through the European Network of Forensic Science Institutes (ENFSI DNA Working Group. In the past 6-7 years main forensic institutes in Europe move towards changing laws to apply the methods developed by this group. In conclusion, this small group is changing the legal basis for combating crime at the level of the entire European continent.

Viability

The committee is convinced that this laboratory is world leading and has many excellent ideas for future research. The spirit and motivation of the young talented researchers further strengthen this conviction. There are no recommendations that the committee can make with respect to the scientific work, which is outstanding and can be applied to other domains than forensics. Not only scientifically the work is impressive, but the societal impact is also major. The committee was impressed by the democratic and transparent leadership of the department head, leading to a collaborative culture and good atmosphere. Although the department head is recognized as world leading in his discipline, he is successfully supporting and cultivating the young talents in the department who are doing impressive work.

However, there are threats for the future, according to the committee these threats are related to the structure, size and funding of the department. The department is extremely small and the funding has been continuously declining after the NFI terminated the commercial connection with this department. In 2016 the department received some additional funding from the Erasmus MC board, but the upcoming future does not look good with the upcoming budget cuts.

The possibilities for research grants are very limited for this research group. For many fundamental grants, the research of this department and forensic research in general is too applied and the previously available sources, for example the Netherlands Genomics Initiative, have been discontinued. The lack of full-time assistant professors also makes it difficult to write applications. At the moment of the site visit the department has – in addition to the full professor department head – one parttime assistant professor, a senior postdoc and a number of PhD students. The very talented senior postdoc is on track to an assistant professorship. According to the committee this position is crucial for the future of the department, as it requires critical mass in order to continue the outstanding level of research quality.

The department has had an extremely long breath to disseminate science at highest level from the very good years, in which the collaboration with the NFI was in place. The committee recommends that the department develops a strategy for the mid- to long term future, including a plan and strategy to obtain external funding, to work towards critical mass and more PIs to ensure the continuity of the department. The Erasmus MC Board has a key role to play in the future of this very small, yet world renowned research department, specifically on the short term. The committee is convinced that the support this small department requires is only a minor investment from the Erasmus MC s perspective, while the continuation will not only lead to continuation of the outstanding research, but also high impact on society as the department is developing new techniques and concepts that are being used by forensic institutes worldwide.

Recommendations

The committee makes the following recommendations to allow the continuation of the success story of this department:

- The department cannot survive further cuts in direct funding but requires a moderate increase of direct funding to be able to maintain a small but critical mass of senor post-doc/ assistant professor positions.
- There is currently a talented and motivated senor post-doc that should be further supported to achieve an assistant professor position to support the department head to further levy external funding.
- The departments' laboratory space was significantly decreased due to high costs associated with these over-heads. For a small department like this one, special possibilities should be provided to allow continuation and possibly further expansion of their portfolio.



VII. Molecular Genetics

Research quality	Excellent (1)
Relevance to society	Excellent (1)
Viability	Excellent (1)

Strategy and targets

The mission of the Department of Molecular Genetics is to generate new and fundamental mechanistic knowledge on the DNA damage response through multidisciplinary research. In collaboration with clinical colleagues the aim is to design novel targeted therapies to increase the quality of life of cancer patients and to increase the healthy lifespan of an ageing population.

The research line includes four research lines underlying of the central theme of DNA damage response:

- 1) Molecular Mechanisms of the DNA damage response
- 2) Cellular Function of the DNA damage response
- 3) The DNA damage response in Cancer
- 4) The DNA damage response in Ageing

The committee compliments the Molecular Genetics department on its diversity policy and its implementation. The department head indicates that a conscious effort is being made to improve gender balance, which has led to five of the six new group leaders being women. In addition, four of them are not Dutch and were not previously employed by the department. This department is capable of attracting excellent, international talent, which, according to the committee, leads to a further increase in quality.

Research quality

The large department, with 18 PIs does outstanding research. It is world leader in DNA repair and DNA damage response. The department has an established world recognized collection of reference mouse models of DNA repair diseases. There is an explicit strategy of fluidly distributing Pls over research lines, stimulating intradepartmental collaborations and multidisciplinary research. This led to the department winning the prestigious Ammodo Science Award. Furthermore, many researchers in the department were recognized with different awards. The department participates in highly relevant national consortia including the Zwaartekracht program of Cancer Genomics Netherlands and the Oncode Institute.

At international level the department is very active, many of its researchers are speakers at international meetings and conferences and organize meetings in the field. An impressive number of publications in high impact journals (Nature, Science, Cell, Mol Cell, Nat Comm, Nat Rev, etc) reflects the high quality and relevant research that is done. The committee specifically mentions the involvement of this department in the international meeting on DNA repair that is organized every five years in the Netherlands.

The department is very successful in raising extramural funding, which supposes up to six times the funds provided by Erasmus. These include personal research grants like the ERC Advanced Grant and Veni-Vidi-Vici grants as well as collaborative grants. Impressive to the committee is the participation in the NIH programme grant. It is not usual for Dutch departments to participate in these NIH grants. Also, the department is coordinator and/or participates in DNA repair ITN networks in Europe in H2020 programme and has been coordinator of the FP7-funded international project on DNA Repair.

Funding of the research strongly relies on these extramural funding. As the department is very successful in this respect, the size of the department has grown in the period of evaluation with six new groups that are all successful and competitive. These young PIs are well integrated in the department, feel heard by the management and feel that they have an influence on the department's strategy from an advisory role. There is a high degree of collaboration which leads to joint publications by researchers from different areas. In recent years the department has hired six new young and successful PIs with new research lines that are expanding the goals of the department both conceptually, with new research lines in the fields of replication, transcription and Aging, as well as technologically, with highthroughput Imaging or electron microscopy plus further support to single-molecule analyses. This is a remarkable and wise move that will strongly contribute to its international scientific position.

Relevance to society

The department explicitly aims at translating the fundamental research outcomes to applications in diseases related to cancer and DNA repair, an endeavour that has a long and successful history of this department spanning forty years since its contribution to treatment of chronic myeloid



leukaemia or the recent RECAP test to assay the ability of tumour patient cells to perform homologue recombination. An excellent example of relevance to society are the highly active participation and coordination in Master Programmes in Molecular Medicine and the Nanobiology. The committee also commends the active participation In societal events as those developed in the Science Gallery Rotterdam or the collaboration with the Willem de Kooning Academy (Rotterdam Art Academy) on science communication.

Viability

The committee sees a department that is flourishing and very successful, resulting in excellent research output. The one downside of this success for the department head is how to offer these successful researchers – who attract research funding – a stable and bright future within the department. The lack of a tenure track programme and the limited reward of such success in the distribution of direct funding make things complicated. The department head consciously chooses to retain talent, offering a permanent contract with which the department as a whole runs a risk. The size of the department and the continued success in grant application give the committee confidence that this tactic is working well.

On the basis of the results of the recent period, the committee does not really have any recommendations for the future. The strategy is clear, governance is transparent and the committee is convinced of an excellent future for this successful department. The committee encourages this department to share the success factors and best practices with other departments in Theme BMS and to formulate a joint strategy.

Recommendations

The committee makes the following recommendations:

- Increase computational power, whilst actively involving Theme BMS. This is necessary not only for genomic related studies but also for its increasing use of high throughput imaging tools.
- Enhance the opportunities for tenure of the young PIs to allow further growth of the department according to its success in raising extramural funds.



VIII. Neuroscience

Research quality	Excellent (1)
Relevance to society	Excellent (1)
Viability	Very good (2)

Strategy and targets

The mission of the Department of Neuroscience is to perform fundamental and translational studies, with the aim of explaining how circuits of neurons enable to sense, think about and act upon the world. This goal is achieved in collaboration with (inter)national partners and patient groups, and facilitates the development of new treatment strategies for neurological and psychiatric disorders.

The research in the department is organized in main research lines that are divided according to the mission statement. Each pillar is divided into several research groups.

- 1) Sensory Systems Pillar (I)
- 2) Cognitive Systems Pillar (II)
- 3) Motor Systems Pillar (III)
- 4) Surgical Recovery Pillar (IV)

The four pillars take part in the very successful Neuroscience master's programme, with some of them also making significant contributions to the basic medical curriculum by teaching areas such as anatomy, physiology and biomedical technology.

The committee discussed with the department the major gender disparity in the department, especially at the higher ranks. The hiring strategy of this department has been primarily to bring back talents who have performed a postdoc abroad after their PhD. The committee understands that this is not unusual in the Netherlands but is of the opinion that it is not the best strategy to achieve gender equality, or even for diversity in a broader sense. The committee, therefore, strongly encourages the department to actively adopt a strategy to improve gender balance, as it feels that the strategy of allowing the gender disparity to work itself out over time is not the most effective approach. A good opportunity arises from the unfortunate departure of the leader of the cognitive systems pillar. The committee strongly encourages the department and Erasmus MC to look for an external, female, full professor to replace him. This will not only ensure that the department has the necessary high-level expertise in this field, but will also

address the gender disparity head on. Having a female role model in the form of a full professor is extremely important for the talented young female faculty of this department.

Research quality

The research of the vibrant Department of Neuroscience is strong and internationally recognized, with impressive scientific and technological accomplishments. This is, for example, shown by the physician scientist in charge of the Motor System Pillar, who is world renowned, member of KNAW, with a lab also at the Amsterdam Herseninstituut. The outstanding work on the cerebellum by this pillar places them as one of the top world leading groups on this topic. The committee was specifically impressed by the strong and wonderful young and mid-career researchers in this department who are clearly very talented. The outstanding quality of this department's research is reflected in the multitude of grants it has secured, which includes an ERC advanced grant, two ERC starting grants, and Veni, Vidi, and Vici grants from NWO.

Collaboration across the pillars is very good. A strong connection is already present between the sensory and motor systems pillars. The committee notes that the cognitive pillar is also increasingly collaborating with the motor systems pillar, which is considered an excellent advance. The fourth pillar, surgical recovery, is at a somewhat greater distance from the other pillars. The research that is done in this pillar is of very good quality and very relevant to the clinic, but to the committee the position of this pillar in the department was initially not clear. In the interviews, however, it was explained to the committee that this pillar is strongly involved in teaching and plays a significant role in medical education, with its affiliation being historical in nature.

Relevance to society

The committee also considers the department extremely strong when it comes to societal relevance and impact. Entrepreneurship is clearly part of this department, such as setting up a company that plays an important role in the development and dissemination of new techniques and tools. There are many laboratories worldwide that make use of the techniques and instruments developed by this department. In addition, the committee sees clear interactions with the clinic, for example with regard to patients with visual or hearing problems. The surgical recovery pillar also clearly has a major societal relevance.



Viability

This large department with a track-record of very good to excellent research certainly has a very good future. The size of the department, the number of research lines and connections between research lines all fit well within the Erasmus MC organization. The research is outstanding, and the committee is not able to give any advice with regard to science beyond that outlined in the written report of the department, namely investments in computational neuroscience.

There are several topics, however, that merit discussion. In addition to contract research and direct funding which has increased during the review period (2013-2018), research grants are a constant source of income, although decreasing over the review period. The department indicates that the financial situation is increasingly difficult with the prospect of a budget cut of 16%. This makes it difficult for the department, for example, to replace the full professor that the department is losing to Clinical Genetics with someone of the same calibre and rank. This would be a missed opportunity for two reasons: 1) the committee believes that this is an excellent opportunity to improve the gender balance at the top of the department, 2) the department would scientifically benefit from having a senior professor with molecular biological expertise.

With respect to hiring, and balancing the departmental gender disparity, the committee recommends a shift in the hiring policy of young talent to a stronger focus on external, international talent. Although the department took advantage of the Dutch system to rehire former PhD candidates, the committee is of the opinion that it is important to find a balance with researchers who have different background, training, and vision. During the discussion with the committee, the department head stated his intention to modernize the governance and structure of the department. The committee warmly encourages this initiative. The organizational structure has a large historical component and the way in which finances are distributed is not clear to many of the faculty. The young and very talented researchers in this department can and should be much more actively involved in contributing to its overall strategy and policy. The reorganization of the department's governance structure, and an effort to increase transparency could support the junior faculty – who made an outstanding impression on the committee - in becoming independent, further developing their careers, and contributing to the future and mission of the department.

Recommendations

The committee makes the following recommendations:

- Recruit a female full professor with expertise in molecular Neuroscience.
- As much as possible, make efforts to recruit new faculty from outside the Inner circle of Erasmus MC.
- Actively engage the faculty in the governance of the department, strategic planning, and if possible, resource allocation.
- Appoint, and empower, small subcommittees to make recommendations to the Chair on major departmental issues.
- Make an effort to expand computational neuroscience in areas that complement the existing strengths of the department.
- Establish formal mentoring committees, using both internal and external advisors, for the junior faculty.



Appendices



Appendix 1. Curricula Vitae of committee members

Petra Knaus (chair) received her PhD (Dr. rer. nat) at the Center for Molecular Biology (ZMBH) in Heidelberg (Germany) in 1991. As a Research Fellow and Associate she did her Postdoctoral Training with Harvey Lodish at the Whitehead Institute for Biomedical Research (MIT, Cambridge, MA, US) until 1996. After her return to Germany, she received a Junior Group position at the Biocenter in Würzburg, in the Department of Walter Sebald. There she established her own lab with the focus on BMP receptor biology and signal transduction. In 2004 she became Full Professor for Biochemistry - Signaltransduction at the Institute for Chemistry and Biochemistry, Freie Universität Berlin. In 2010 she received a W3 Professorship for Biochemistry - Signaltransduction and Regeneration at the Freie Universität and BSRT/Charité.

Kamran Khodakhah (vice-chair) studied pharmacology at King's College at the University of London and received his PhD from the National Institute for Medical Research (UK). Currently, he is Professor of Neuroscience, chair of the Department of Neuroscience and Vice Chair for the Research Department of Psychiatry and Behavioral Sciences at the Albert Einstein College of Medicine (USA). The interest of his laboratory is to understand the role of the cerebellum in motor coordination, cognitive and social function, and in addiction. Of particular interest is the general computational principles of the cerebellum, its interactions with other brain structures, and its role in motor and non-motor behaviors. Khodakah approaches these questions from both basic science and clinical perspectives, using a combination of techniques, from behavioral studies to optogenetics and electrophysiology (both in vitro and in vivo).

Andres Aguilera is Professor of Genetics and head of the Department of Genetics at the Universidad de Sevilla (Spain). Also, he is Director of the Aldalusian Centre of Molecular Biology and Regenerative Medicine (CABIMER). He obtained his PhD in Seville in 1983, working on yeast genetics of ethanol tolerance. After two postdoctoral stays at Darmstadt Technical University working on molecular genetics of yeast glycolysis and New York University working on Genetic Recombination, he started his own lab dedicated to Genome Instability in 1991. His main research interests are the mechanisms by which replication stress, transcription and RNA processing and export cause genome instability. He is a member of EMBO, of a number of international scientific advisory boards for different research centres and of the editorial boards of several scientific journals.

Amanda Fisher is a British cell biologist and Director of the Medical Research Council (MRC) London Institute of Medical Sciences at the Hammersmith Hospital campus of Imperial College London, where she is also a Professor leading the Institute of Clinical Sciences. She has made contributions to multiple areas of cell biology, including determining the function of several genes in HIV and describing the importance of a gene's location within the cell nucleus. As a postdoctoral researcher, she produced the first functional copies of HIV, providing researchers with access to enough biologically active material to study the function of the virus's genes. She later became interested in epigenetics and nuclear reprogramming, particularly in white blood cells known as lymphocytes and embryonic stem cells. As of 2016 her research focuses on how gene expression patterns are inherited when cells divide, using lymphocytes as a model system.

Walther Parson received his doctorate in forensic molecular biology in 1999 and set up the Austrian National DNA Database Laboratory in Innsbruck. He is a trained zoologist and his main areas of research are forensic genetics, population genetics and medical genetics. The internationally recognized forensic databases EMPOP and STRidER were developed under his administrative and scientific supervision and he currently acts as responsible curator. He supervises an active group of scientists that investigate technological aspects of DNA quantitation and analysis, DNA sequencing on traditional and NGS platforms as well as collaborative studies and exercises on predictive DNA analyses for appearance, ancestry and age. Dr. Parson serves as advisor on international boards and steering committees including the ENFSI DNA Working Group, the European Academy of Forensic Sciences (EAFS), the Steering Committee of the International Commission on Missing Persons (ICMP) as well as numerous editorial boards of scientific journals.

Wolf Reik obtained his MD from the University of Hamburg. He did his thesis work with Rudolf Jaenisch, and postdoctoral work with Azim Surani in Cambridge. He is currently the Head and Associate Director of the Epigenetics Programme at the Babraham Institute in Cambridge. He is



honorary Professor of Epigenetics at the University of Cambridge and Associate Faculty at the Wellcome Trust Sanger Institute, where he is a founding member of the recently established Centre for Single Cell Genomics. He is a Member of EMBO, Fellow of the Academy of Medical Sciences, Fellow of the Royal Society, and Member of the Academia Europaea. Reik's research interests are in epigenetics, particularly in epigenetic reprogramming during mammalian development and its role in stem cell biology and inheritance. His urrent work addresses the mechanisms of genome-wide demethylation in the mammalian germline, links between reprogramming and pluripotency, the potential for transgenerational epigenetic inheritance, and the role of epigenetic mechanisms in experimental reprogramming.



Appendix 2: Schedule of the site visit

CET Time	Торіс	Explanatory remarks
14.30 - 15.00	Preparation Committee	
15.00 – 15.30	Welcome, by Board members	Present are: department heads and Theme Director
15.30 - 16.30	Preparation Committee upcoming interviews and reviews of tomorrow	
16.30 - 17.15	Introduction BMS	Brief introduction BMS; past and future. Ample time for Committee to ask questions.
17.15– 18.00	Erasmus MC Core Facilities	Which Core Facilities does Erasmus MC have, how departments make use of these, innovations, financial structure etc.
18.00 - 18.30	Evaluation time Committee, final preparations site visits tomorrow	Committee

19 November:

Department of Genetic Identification (Sub Committee 1, Chair: prof. Khodakhah)

Time	Торіс
14.00 - 14.15	Preparation time sub committee
14.15 - 15.30	Brief presentations department research lines by senior scientific staff: future plans, ample
	time for Committee to interview/discuss
15.30 - 15.40	Short debriefing
15.40 - 15.55	Break Committee
15.55 – 16.55	Brief presentations research lines by medior/junior scientific staff: future plans, ample time
	for Committee to interview/discuss
16.55 - 17.45	Evaluation time Committee
17.45-18.30	Dinner time

Department of Biochemistry (Sub Committee 2, Chair: Prof. Knaus)

Time	Торіс
14.00 - 14.15	Preparation time sub committee
14.15 - 15.30	Brief presentations department research lines by senior scientific staff: future plans, ample
	time for Committee to interview/discuss
15.30 - 15.40	Short debriefing
15.40 - 15.55	Break Committee
15.55 – 16.55	Brief presentations research lines by medior/junior scientific staff: future plans, ample time
	for Committee to interview/discuss
16.55 - 17.45	Evaluation time Committee
17.45-18.30	Dinner time



Department of Neuroscience (Sub Committee 1, Chair: Prof. Khodakhah)

Time	Topic
18.30 - 18.45	Preparation time sub committee
18.45 - 20.15	Brief presentations department research lines by senior scientific staff: future plans, ample
	time for Committee to interview/discuss
20.15 - 20.25	Short debriefing
20.25 – 20.40	Break Committee
20.40 - 22.10	Brief presentations research lines by medior/junior scientific staff: future plans, ample time
	for Committee to interview/discuss
22.10 - 22.30	Evaluation time Committee

Department of Developmental Biology (Sub Committee 2, Chair: Prof. Knaus)

Time	Topic
18.30 - 18.45	Preparation time sub committee
18.45 - 20.00	Brief presentations department research lines by senior scientific staff: future plans, ample
	time for Committee to interview/discuss
20.00 - 20.15	Short debriefing
20.15 - 20.30	Break Committee
20.30 - 21.30	Brief presentations research lines by medior/junior scientific staff: future plans, ample time
	for Committee to interview/discuss
21.30 - 22.00	Evaluation time Committee

20 November:

Department of Molecular Genetics (Sub Committeee 1, chair prof. Khodakhah)

Time	Торіс
13.50 - 14.00	Preparation time sub committee
14.00 - 15.30	Brief presentations department research lines by senior scientific staff: future plans, ample
	time for Committee to interview/discuss
15.30 - 15.45	Short debriefing
15.45 - 16.00	Break Committee
16.00 - 17.30	Brief presentations research lines by medior/junior scientific staff: future plans, ample time
	for Committee to interview/discuss
17.30 - 18.00	Evaluation time Committee
18.00 - 18.50	Dinner time Committee

Department of Cell Biology (Sub Committee 2, Chair Prof. Knaus)

Time	Торіс
13.50 - 14.00	Preparation time sub committee
14.00 - 15.30	Brief presentations department research lines by senior scientific staff: future plans, ample
	time for Committee to interview/discuss
15.30 - 15.45	Short debriefing
15.45 - 16.00	Break Committee
16.00 - 17.30	Brief presentations research lines by medior/junior scientific staff: future plans, ample time
	for Committee to interview/discuss
17.30 - 18.00	Evaluation time Committee
18.00 - 18.50	Dinner time Committee



PhD students speed dating session, debriefing and feedback session:

Time	Торіс
18.50 – 19.00	Introduction Chair Committee and PhD students
19.00 - 19.40	2 speed dates (20 min per round) rounds between Committee and 12 PhD students
	(After 20 minutes, the Committee members switch to 2-3 other PhD students)
19.40 - 20.00	Plenary session, to discuss e.g. main findings
20.00 - 20.15	Debriefing PhD session
20.15 - 21.15	Evaluation time Committee, preparation for feedback to all departments
21.15 - 21.30	Break
21.30 - 22.30	Feedback session and questions with Dean and Department Heads
22.30 - 22.40	Closure; secretaries and Committee



Appendix 3. Quantitative data

Biochemistry Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE										
Scientific staff	16	11.2	17	12.2	15	13.5	16	12.2	13	10.3	16	9.8
Support staff	7	2.6	6	2.7	6	1.6	5	2.2	7	1.6	4	1.8
Total staff	23	13.8	23	14.9	21	15.1	21	14.3	20	11.9	20	11.6

Financing of the department

_	2013		2014		2015		2016		2017		2018	
	FTE	%	FTE	%								
Direct funding	9.74	71%	10.21	69%	8.48	56%	6.82	48%	5.40	46%	7.27	63%
Research grants	1.75	13%	0.33	2%	1.00	7%	1.00	7%	1.02	9%	0.67	6%
Contract research	2.29	17%	4.33	29%	5.63	37%	6.52	45%	5.43	46%	3.67	32%
Other	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Total funding	13.79		14.88		15.11		14.34		11.85		11.6	

Cell Biology Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE										
Scientific staff	57	47.0	45	40.4	38	31.1	35	24.3	39	27.0	40	31.3
Support staff	18	11.9	15	10.4	16	9.3	10	7.6	14	7.2	13	9.6
Total staff	75	58.9	60	50.8	54	50.5	45	32.0	53	34.2	53	41.0

Financing of the department

	2013		2014		2015		2016		2017		2018	
	FTE	%										
Direct funding	26.89	46%	19.26	38%	20.93	52%	20.59	64%	26.94	79%	31.06	76%
Research grants	18.42	31%	15.08	30%	10.75	27%	6.85	21%	4.52	13%	6.07	15%
Contract research	13.55	23%	16.49	32%	8.79	22%	4.52	14%	2.75	8%	3.83	9%
Other	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Total funding	58.86		50.83		40.46		31.96		34.21		40.97	

Developmental Biology Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE										
Scientific staff	28	17.1	29	15.2	23	10.3	19	9.9	17	10.0	17	9.3
Support staff	7	5.2	8	5.2	10	3.8	5	2.5	9	2.5	7	4.8
Total staff	35	22.3	37	20.3	33	14.0	24	12.3	26	12.5	24	14.0

Financing of the department

	2013		2014		2015		2016		2017		2018	
	FTE	%										
Direct funding	6.43	29%	7.69	38%	7.48	53%	9.27	75%	9.04	72%	9.88	70%
Research grants	8.68	39%	7.59	37%	3.14	22%	2.46	20%	2.88	23%	1.63	12%
Contract research	7.20	32%	5.07	25%	3.43	24%	0.6	5%	0.58	5%	1.92	14%
Other	-	0%	-	0%	-	0%	-	0%	-	0%	0.59	4%
Total funding	22.31		20.34		14.04		12.33		12.51		14.02	



Genetic Identification Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff	9	9.1	8	7.7	5	4.3	5	4.2	8	4.2	8	5.6
Support staff	3	2.3	2	0.9	1	0.4	2	1.5	3	1.2	6	2.4
Total staff	12	11.5	10	8.7	6	4.7	7	5.6	11	5.4	14	8.0

Financing of the department

	2013		2014		2015		2016		2017		2018	
	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%
Direct funding	2.0	18%	5.58	64%	2.95	63%	4.3	76%	4.24	79%	6.64	83%
Research grants	9.4	82%	3.08	36%	1.00	21%	0.25	4%	-	0%	-	0%
Contract research	-	0%	-	0%	0.73	16%	1.08	20%	1.16	21%	1.33	17%
Other	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Total funding	11.45		8.66		4.68		5.63		5.40		7.98	

Molecular Genetics Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE										
Scientific staff	79	45.3	70	42.8	71	40.1	67	36.5	88	43.0	80	50.0
Support staff	35	17.1	28	15.3	28	13.3	28	11.6	29	14.5	25	13.0
Total staff	114	62.5	98	58.1	99	53.4	95	48.1	117	57.5	105	62.8

Financing of the department

	20)13	20	14	20	15	201	.6	20	17	203	18
	FTE	%										
Direct funding	11.94	19%	12.59	22%	11.41	21%	9.63	20%	17.79	31%	19.55	31%
Research grants	22.62	36%	18.52	32%	20.43	38%	15.32	32%	14.44	25%	15.49	25%
Contract research	27.89	45%	26.96	46%	21.58	40%	23.10	48%	24.36	42%	27.13	43%
Other	-	0%	-	0%	-	0%	-	0%	0.90	2%	0.61	1%
Total funding	62.45		58.07		53.41		48.05		57.49		62.79	

Neuroscience Department

Composition of the department

	2013		2014		2015		2016		2017		2018	
	#	FTE										
Scientific staff	121	63.3	110	60.0	100	51.5	113	54.0	117	58.6	117	61.6
Support staff	46	19.8	36	16.8	32	14.0	31	15.9	99	18.9	88	20.8
Total staff	167	83.1	146	7.2	132	65.5	144	69.9	216	77.4	205	82.4

Financing of the department

	20)13	20	14	20	15	201	16	20	17	203	L8
	FTE	%										
Direct funding	44.39	53%	43.11	57%	37.05	57%	46.81	67%	53.04	69%	58.02	70%
Research grants	20.46	25%	15.36	20%	16.10	25%	10.04	14%	8.83	11%	9.39	11%
Contract research	18.25	22%	16.74	22%	11.45	17%	12.42	18%	15.57	19%	14.93	18%
Total funding	83.10		76.21		65.52		69.94		76.91		82.38	



Appendix 4: SEP Assessment Scale

	Meaning	Research quality	Relevance to society	Viability
1	World leading/ excellent	The relevant research unit has been shown to be one of the few most influential research groups in the world in its particular field.	The relevant research unit is recognised for making an outstanding contribution to society.	The relevant research unit is excellently equipped for the future.
2	Very good	The relevant research unit conducts very good, internationally recognised research.	The relevant research unit is recognised for making a very good contribution to society.	The relevant research unit is very well equipped for the future.
3	Good	The relevant research unit conducts good research.	The relevant research unit is recognised for making a good contribution to society.	The relevant research unit makes responsible strategic decisions and is therefore well equipped for the future.
4	Unsatisfact ory	The relevant research unit does not achieve satisfactory results in its field.	The relevant research unit does not make a satisfactory contribution to society.	The relevant research unit is not adequately equipped for the future.