

Summary of the Research Assessment 2012 of the Leiden University Medical Center.

1. The International Review Committee

In March 2012 an International Review Committee assessed the quality of the scientific research performed by the departments of the five divisions of the LUMC, using the Standard Evaluation Protocol 2009–2015.

The International Review Committee was installed by the Board of the LUMC. The Committee was composed of a so-called core team consisting of a chairman, a vice-chairman and a scientific secretary. For each division a number of international referees, selected on the basis of specific expertise relevant for the research assessment of the division, joined the core team.

Prof. J.C. Stoof, PhD (former dean of the UMC Utrecht and former rector of Utrecht University, the Netherlands) was appointed as chairman and prof. W.G. van Aken, MD PhD (former Professor of Internal Medicine and former chairman of the International Review Committee LUMC 2006, the Netherlands) as vice-chairman of the International Review Committee. Marij Stukart, PhD (MOAB488 Research and Consultancy,) and Kees Langeveld, PhD (Nederlands Tijdschrift voor Geneeskunde) were appointed as scientific secretaries.

The following referees were appointed as Members of the Committee:

Division 1

Prof. Lars Pålman MD PhD, University Hospital, Uppsala, Sweden

Prof. Kevin Burnand MD PhD, Guy's, King's and St Thomas' Medical School of King's College London, United Kingdom

Division 2

Prof. Pier Mannuccio Mannucci MD PhD, University of Milan, Italy

Prof. Alain Tedgui PhD, Paris-Cardiovascular Research Center, France

Prof. Roderic Pettigrew, MD PhD, National Institute of Biomedical Imaging and Bioengineering, NIH, Bethesda, USA

Division 3

Prof. Ole Steen Nielsen, MD PhD, University of Aarhus, Denmark

Prof. Jan van Gijn, MD PhD, University Medical Center Utrecht, the Netherlands

Prof. Bernard Sabbe, MD PhD, University of Antwerp, Belgium

Division 4

Prof. Tariq Enver, MD PhD, UCL Cancer Institute, London, United Kingdom

Prof. Tom MacDonald, PhD, Barts and The London School of Medicine and Dentistry, United Kingdom

Prof. Pier Mannuccio Mannucci, MD PhD, University of Milan, Italy

Division 5

Prof. Riita Lahesmaa, PhD, Turku Centre for Biotechnology, Finland

Prof. Carl-Hendrik Heldin, PhD, Ludwig Institute for Cancer Research, Uppsala, Sweden

Any existing professional relationships between the Committee members and the research under review were reported and discussed in the Committee meeting preceding the review of each division. No conflicts of interest were reported. The chairman concluded that there was no risk in terms of bias or undue influence in any of the reviews.

The present assessment covers the research carried out at the departments of the five divisions of the LUMC during 2005-2010.

2. Procedures followed by the Committee

The assessment consisted of a retrospective analysis of the quality, productivity, relevance, and vitality and feasibility of the departmental research programmes of the LUMC, a judgement of the position and focus of the research as compared to national and international standards, and a reflection on the future prospects of the research and the scientific and societal relevance of the research. The assessments were based on the documentation provided by the LUMC and the presentations and interviews held during the site visit. The Committee expressed the judgment both in qualitative and quantitative terms.

Approximately one month prior to the review the members of the Review Committee received the following documents:

- The self-evaluation reports of the divisions, departments and programmes of the LUMC
- An appendix to the self-evaluation report containing general information on the LUMC

The assessments are based on the documentation provided by the LUMC and the presentations and interviews during the site visit. The documentation included most of the information required by the Protocol as far as the assessment of the research quality was concerned.

According to the Standard Evaluation Protocol the Review Committee was requested to assess the research on four main aspects:

- Quality (international academic reputation, position and output of the unit to be evaluated)
- Productivity (scientific output)
- Relevance (societal relevance)
- Vitality and feasibility (prospects for the future, SWOT-analysis)

In line with the SEP, the Board of the LUMC charged the Review Committee with the following tasks:

- to assess the quality of the research output conducted by the LUMC-scientists

- to assess the position and focus of the research, compared with national and international standards of quality, productivity, relevance and vitality
- to reflect on the future prospects of the research, and to make recommendations on the future strategies in this respect, and the scientific and societal relevance of the research

The Committee has expressed the judgment both in qualitative and quantitative terms. The most important considerations of the Committee are clarified, while the conclusion is summarized in a single term according to a five-point scale: excellent (world leading), very good (internationally competitive), good (competitive at the national level), satisfactory (solid, but not exciting) and unsatisfactory (below acceptable standards).

At the request of the Executive Board, the Committee also paid attention to the possibilities for closer co-operation with the Erasmus MC Rotterdam and TU Delft (Medical Delta). Some departments were already collaborating with Rotterdam and/or Delft. For other departments co-operation could be useful, as is indicated in the individual assessments. However, the Committee is of the opinion that not all departments would benefit of co-operation with Rotterdam or Delft.

3. General observations on the research of the LUMC

The LUMC is one of the eight University Medical Centres in the Netherlands. In the LUMC the former academic hospital and the former Faculty of Medicine of Leiden University are merged. The LUMC is an independent and non-profit organisation. The LUMC has a decentralized organisation, which is based on the principle of integral management. The LUMC comprises five divisions, which form organisational units that accommodate the specialist departments. The present assessment is based on the division structure as it was at the beginning of 2012.

The aim of the LUMC is to continuously improve the quality of health care, and to play a leading role in the field of medicine, both nationally and internationally. Scientific research is one of the core tasks of the LUMC.

The research in the LUMC covers a broad spectrum. Fundamental and clinical research, as well as health care research, is conducted at the LUMC. In particular, the focus is on translational research, with the overall aim to accelerate transfer of findings from the laboratory to clinical application, and to the market. Translational research also includes the reverse route, in which clinical observations and questions are transferred to the laboratory.

Traditionally, the research in the LUMC is organized through departmental research lines, called programmes. The heads of the departments are fully responsible for the research within their department. They decide on the contents and direction of the programmes, and they appoint the research leaders. The programmes are officially recognized by the Science Advisory Committee of the LUMC. In 2006 multidisciplinary theme groups were established which are, similarly to the programmes, embedded in the LUMC organization.

The Executive Board has very recently decided to continue this process of focusing by further limiting the number of themes and to set up a new structure with three types of research organization: Profile Areas, Technology Focus Areas, and Facilities. For each Profile Area, a management team with a leader has been appointed. A dual leadership is responsible for the programme of the Profile Area and the spending of the available budget.

The following Profile Areas were chosen:

- Vascular and Regenerative Medicine
- Immunity, Infectious diseases and Tolerance
- Translational Neurosciences
- Ageing
- Cancer Pathogenesis and Therapies
- Innovation in Health Strategy and Quality of Care
- Biomedical imaging

The following Technology Focus Areas have been set up which are open to each LUMC researcher:

- Biobanks (BBMRI and Parelstoer)
- Biostatistics and Informatics
- Leiden Genome Technology Centre
- Proteomics & metabolomics

Among the LUMC facilities are a Good Manufacturing Practise (GMP) Facility and a Stem Cell Centre.

The Committee reviewed the 68 programmes of 37 departments and two LUMC profile areas (Ageing and Vascular Medicine)¹ and was impressed by the volume and quality of research activities within the LUMC.

In the overall assessments 21 departments were at least ranked as very good and sometimes as excellent. Ten departments were ranked as good, 4 of which as good to very good. One department scored satisfactory, two satisfactory to good and three departments were, for various reasons, not rated.

Of the 68 research programmes 30 scored as very good or excellent on all aspects and 21 programmes as very good or good. However, 10 programmes scored lower than good on at least one of the aspects. For various reasons 7 programmes were not rated.

The Committee is of the opinion that the new LUMC Profile Areas Ageing and Vascular Medicine will offer opportunities to strengthen the research in the LUMC and create chances for further co-operation between research programmes. The Committee was impressed by the collaborative initiatives already undertaken in the two Profile Areas that were part of the

¹ The other LUMC profile areas were not assessed since the organisation of these profile areas is in a too early stage.

review. The Technology Platforms and Facilities that have been set up in the LUMC made a very good impression to the Committee.

The Committee agrees with the LUMC that a bibliometric analysis is one of the valuable indicators of the quality of research. Therefore, the LUMC is to be congratulated with the rising trend (since 2006) of the crown parameter in the CWTS-analysis (CWTS citation analysis, May 2011). Another valuable indicator of the quality of research is the earning capacity and especially the Spinoza and the Veni-Vidi-Vici grants from NWO and the ERC grants are strong indicators. The total amount of money earned in the 2nd, 3rd and 4th flow of money looks quite substantial and is growing over the years.

The research in the LUMC is organized through departmental research lines, called programmes. The heads of the departments are fully responsible for the research within their departments. Apparently they have a great autonomy on how to spend the research budget. On top of that, a substantial amount of the research budget is used by the board of directors for strategic purposes and as incentive to further simulate scientific excellence.

Appendix: Summary per research group

DIVISION 1

Department of Anesthesiology

1.01.01 Perioperative Medicine: Efficacy, Safety and Outcome The bibliometric analysis indicates that the productivity and quality of the programme is good, although there has been a decrease in the impact of publications over the last three years. This is mainly because the physiological research line has been abandoned, while pain studies have been given priority. Recent papers have been published in good journals. The relevance of the research is intrinsically good. The vitality is good. Seeking strategic alliances is important. Large clinical studies are needed.

Department of Surgery

1.02.01 Vascular Surgery

The productivity of this unit is very good, and the quality of the research is good. The impact of the publications has however decreased slightly since the last review, but the research programme has a strong and relevant translational approach. The relevance and vitality of research in this area are very good.

1.02.02 Surgical Oncology

The productivity and the quality of this research are very good. The publications are strong and have a high impact. The relevance of the research, aiming to improve cancer care with a focus on the elderly patient, is excellent. The vitality of the department appears to be very good.

1.02.03 Transplant Surgery

The committee believes that a decision about the future of this programme is eminent; the options are investments and proper support, collaboration with a transplantation programme of one of the UMC's (e.g. Erasmus MC).

1.02.04 Trauma Surgery

The committee highly recommends that a more focussed research policy be adopted, as currently there appear to be too many different research themes. No rating is given.

Department of Orthopaedics, Rehabilitation Medicine and Physiotherapy

1.04.01 Orthopaedic Surgery

The productivity of the Biomechanics and Imaging part of the Orthopaedic Surgery programme appears good. The quality, however, is only satisfactory as reflected e.g. by the impact of the papers produced, which is below 1, despite the usage of the RSA method in over 40 centres worldwide.

The bone tumour research merely examines clinical outcome. This part of the programme is difficult to assess. The committee suggests that this research should possibly be reconsidered. The relevance of the Biomechanics and Imaging research appears viable. Collaboration with the department of Orthopaedics in the Erasmus MC should be exploited.

1.05.01 Pathophysiological analysis of movement disorders in relation to function

The committee feels that the quality and productivity of this research programme is weak. The department is small in size with few tenured staff. Although a number of grants have been obtained, these were mainly acquired in collaboration with other research groups. No overall score is given for the programme.

Department of Cardiothoracic Surgery

1.06.00 Cardiothoracic surgery

The department has especially obtained grants from Industry. The committee advises to integrate the research programme with Cardiology in the "Heart Center Leiden".

Department of Urology

1.07.01 Urological malignancies

The quality of the programme appears to be good to very good. In recent years excellent papers have been published and the citation index has increased. The productivity is good. The relevance and vitality are very good. The development of targeted nanodrug delivery systems for treatment of advanced prostate cancer is very promising. The committee advises to start clinical trials in collaboration with Erasmus MC. Several grants have recently been obtained which have resulted in a substantial growth in the total number of staff.

1.07.02 Neuro-urology: functional disorders in male and female urogenital tract

The quality and productivity of the research appears good. The output and impact are moderate, which is partly because this is a new area of research and the target journals have low impact. The number of publications, however, is increasing. The relevance and vitality appears good. The evaluation and marketing of the MAPLe by NCI- and STW-grants, in collaboration with the TU Delft, is going to be important. At the previous site visit it was concluded that the research of the department was unfocused. The committee is pleased to see that measures have been taken to reorganize the research which is now clearly focused on two areas. Overall the department is rated as good.

Department of Medical Decision Making

1.08.01 Analysis and support of clinical decision making

The quality of the research programme is very good. The papers are published in very good journals and have a high impact. The group is heavily dependent on other departments to provide “clinical questions” making the research programme rather diverse with a mix of service and science. By collaborating sensibly with other departments their expertise is used both within and outside the LUMC. The productivity is good to very good. The relevance of the programme is excellent. The research is very important and relevant for the Ministry of Health. The vitality and feasibility are very good. Funding comes from various sources such as the Health Insurance Board, Charity Funds and ZonMw. The research fits into the LUMC research profile “Innovation in health strategy and quality of care”.

DIVISION 2

Department of Cardiology

2.03.01 Vascular biology and intervention and 2.03.02 Cardiac dysfunction and arrhythmias (

Cardiology is a large and very active department that has organised its research very well. A huge number of highly cited publications is produced. This is partly due to the department being heavily involved in clinical trials. However, not many of these are published in the top journals. The quality of the research, including genuine translational science, appears very good and internationally well recognized. The future depends on how the department will be reorganized. The stem cell therapy is highly relevant and needs to be continued. The committee supports the plans to integrate the research of the department, together with the research programme of the department of Cardiothoracic Surgery, in one project line with different research themes, in the Leiden Heart Center.

Department of Pulmonology

2.04.01 Pathogenesis and treatment of chronic obstructive pulmonary disease and neoplasms

The quality and productivity of this programme is very good, with a lot of high impact publications. The number of publications has increased in the last 6 years. The relevance is intrinsically very high. The vitality is very good.

2.04.02 Pathogenesis and treatment of asthma

The future looks promising for this research programme. A good choice was made with the introduction of mice infected with *Helicobacter pylori* as a model to study fundamental mechanisms of allergy-induced asthma and to develop preventative and therapeutic strategies. However, it is difficult to make a judgement of this programme at the moment. Therefore no rating is given.

The department is relatively small with 3 fte permanent staff and three different topics to work on, but they have strategic collaborations and a lot of funding. The new chairman appears to

have great potential. In particular, the animal models for COPD and asthma he brought in look promising. The overall rating of the department is very good.

Department of Nephrology

2.06.01 Kidney and pancreas transplantation

The position of the transplantation/transplant immunology programme in the LUMC seems isolated. Six years ago the department was on its way to merge the two research programmes, but Vascular Nephrology has moved to the Vascular Medicine Profile Area. A relatively small research unit with 1,5 fte. tenured staff and 8 PhD students remained. There are hardly any collaboration with the other transplantation centres in the Netherlands, except from a joint Kidney Foundation consortium research programme and joint trials with UMC Groningen and the Academic Medical Centre in Amsterdam.

The quality and productivity of the research is good. However, the impact of the publications is decreasing in recent years. The group has a unique position in the diabetes and mesenchymal stem cells field and is the only national centre for combined pancreas/kidney transplantations. Therefore, their relevance is very good. The vitality is good, but the future perspectives are vulnerable. The committee strongly recommends exploring further collaborations with the Erasmus MC, both in basic and clinical research.

Department of Rheumatology

2.07.01 Pathophysiology and treatment of rheumatic diseases

During the previous site visit concerns were expressed about the small size of the group. In the preceding years the number of tenures and PhD students has increased. The department has a strong and excellent publication record. The productivity is high, the number of publications has been tripled in the last 10 years. The research programme is well focused. It has been a good decision to keep the research using animal models small and to focus on human immunology. The strategy to go for cure by early diagnosis as soon as possible and decrease inflammation is very interesting. In contrast to the low amount of intramural funding, the earning capacity is quite high, with a considerable percentage coming from the 2nd flow of money (70% EU, 30% ZonMw). The research is of very high relevance for the population.

For the future the committee advises to continue the collaboration with Clinical Pharmacy.

In conclusion, the department is excellent in all categories.

Department of Radiology

2.09.01 Neuro-imaging research

The quality and productivity is very good. The publications are of high impact. The relevance of the research is very high. Diagnostic tools and therapies are developed which are of benefit for patients. The vitality is excellent. The future looks bright for this very active group. However, the multitude of subjects poses a risk of a too thin spreading.

2.09.02 Cardiovascular aspects of radiology

Overall, this multidisciplinary department is one of the strongest and largest medical imaging groups in the Netherlands. They have a strong history developing software for quantitative

imaging analysis and are now commercializing the software in close collaboration with their spin-off company Medis. However, a significant number of papers has been published outside the research programmes. The overall rating of the department is very good to excellent.

Department of Clinical Epidemiology

2.10.01 Clinical Epidemiology

The committee was very impressed by the high quality of the research. No weaknesses have developed in the last time period. This group is really internationally leading in the field. In conclusion, the department is excellent in all categories.

Profile Area Ageing

Department of Gerontology and Geriatrics

The relevance of the research is very high. Ageing is one of the grand societal challenges and there is a strong interest for healthy ageing. The committee is impressed by the collaborative initiatives already undertaken in this very relevant field of research. The vitality and feasibility are rated as excellent. The future looks bright.

Profile Area Vascular Medicine

2.06.02 Vascular Nephrology

The quality and productivity are very good showing a lot of high impact publications. The relevance of the research is high. They form an integral part of the Vascular Medicine theme. The vitality is excellent.

2.01.02 Metabolic Health

For the future, the committee encourages the chosen strategy to link clinical and basic research better and to focus the research programme. However, it is not possible at the moment to give a rating for vitality and feasibility.

4.01.02 Thrombosis and Hemostasis

This is an excellent, very relevant and in some aspects highly ambitious programme on thrombosis. It is one of the leading programmes in the field. The quality of the research is very good to excellent. A large quantity of top publications with a high impact score is shown. The vitality is excellent. For the future the committee encourages the further integration of the research lines in the Vascular Medicine theme.

Overall, the committee encourages the co-operations and concerted actions in the Vascular Medicine initiative and is impressed by the high earning capacity.

DIVISION 3

Department of Gynaecology

3.01.01 Cervical cancer

The high impact publications of this department have been based on collaborations with basic research departments, for example with prof. Van der Burg (research programme Tumour immunology, department of Clinical Oncology). In this way, the department of Gynaecology is able to maintain a high quality along with a very high production, taking into account the size of the staff. Although three senior staff members will retire in the coming years, the department seems to be doing well in accommodating the change in staffing. Considering the prospects of the trials with HPV vaccines, the vitality and feasibility of this programme are very good.

3.01.02 Technology assessment of reproductive medicine

The committee refrains from giving an assessment in numbers for this programme, but the impression is that this line of research should not be continued in this department after the retirement of the principal investigator.

There are good opportunities for collaboration with the Erasmus MC, but the departments of Gynaecology in Leiden and Rotterdam are not sharing research fields, the department in Rotterdam being more interested in hormones related to cancer. Apart from the collaboration with TU Delft, it is not yet clear what advantages the Medical Delta will bring for the cervix cancer programme.

Department of Obstetrics

3.02.01 Maternal and fetal development and medicine

The number of PhD students is large compared to the size of the research staff. Many of the PhD students do research for a number of years and then start their residency. The committee has some doubts whether it is possible to guarantee adequate supervision of the PhD students considering the small number of research staff members. This imbalance raises questions on the amount of time spent on research and the quality of the theses. Nevertheless, the output and the impact of papers both have been increasing.

The quality and the productivity are rated as good. The relevance of the research is beyond doubt and is rated as excellent. The committee is not convinced that the department will be able to continue all research projects on a high level of quality, partly due to difficulty in obtaining research funding, partly because of the imbalance between the size of the research staff and the number of PhD-projects. Despite this, the vitality and feasibility are rated as good. The overall assessment of this department is good.

Department of Dermatology

3.04.01 Dermato-oncology

The research of this department is very well organized and the committee was impressed by the research programme. The societal relevance is very high, considering for example the impact of

research findings on the treatment of patients with cutaneous lymphoma. The relevance of the skin model as a means to replace animal models in skin research is even excellent.

The department has been very successful in acquiring grants and funding for research. There is confidence that it will be able to do so in the future. Therefore, the vitality is rated as excellent.

Department of Otorhinolaryngology

3.05.01 Disorders of the head and neck

Considering the bibliometric parameters, the quality and productivity were considered to be satisfactory to good. The relevance of the research on cochlear implants is good, the relevance of the other two research lines is satisfactory. The earning capacity seems to have declined somewhat, but the department participates in collaborative projects for which external funding has been acquired. Vitality and feasibility of the research programme are rated as satisfactory. The overall assessment of the department is satisfactory to good, the rating of 'good' applying to the research line concerning cochlear implants.

Although the future research themes fit in the three research lines defined by the department, the committee has doubts whether this is a viable strategy. The committee advises to bring more focus in the programme, in order for the research to become more successful.

Department of Neurosurgery

3.06.01 Assessment of spine and nerve surgeries

This is a small department with a relatively large output in number of publications. The impact is not very high, but this is explained by the fact that most of the papers are published in other than surgical journals. The papers in surgery journals, however, are taken up well. The quality of the programme is good, the production even very good. Considering the interest of the government and insurance companies in medical decision making in spine surgery, the societal relevance of the research programme is rated good to very good.

The overall assessment of the department of Neurosurgery is good. The committee appreciates the focussed attention of this programme. Although the research programme comprises two completely different research lines, the committee would not advise to split the programme.

Department of Neurology

3.07.02 Paroxysmal cerebral disorders

3.07.03 Neurological motor disorders

This is a strong department with a large number of PhD students. In addition, the investigators have shown a large earning capacity. The department has successfully continued its strategy of placing PhD students and post-docs in laboratories of other departments in stead of creating its own laboratory. The committee has some worries on the potential imbalance between the limited size of the staff and the number of PhD students. However, most of these students finish their thesis within the time available.

The committee has some concerns about the number of topics in the PaCD-programme. The research on migraine is excellent in all aspects. Considering the differences in the quality of research within both programmes, the overall assessment of this department is very good, with the remark that the research lines on migraine and Duchenne muscular dystrophy are excellent. Concerning the future, this department is facing some challenges. The funding of research concerning movement disorders is becoming increasingly difficult. In the coming years a relatively large proportion of the staff will retire. According to the committee, this department may have to reconsider the number of topics in both research programmes. Migraine and Duchenne muscular dystrophy research have the best perspectives and should be kept at top level. Stroke research could be a valuable extension of the migraine research programme. At present, there is a fruitful collaboration with colleagues from the Erasmus MC.

Department of Ophthalmology

3.08.01 Ophthalmic research

The committee acknowledges the efforts to revitalize the research programme of this department. However, there is an imbalance between the – limited – size of the staff and the heterogeneity in research lines. There should be more focus in the programme.

The number of publications has declined and the impact was not very high, according to the bibliometric indicators. Therefore, the quality and productivity were considered good to satisfactory. The relevance is equally rated good to satisfactory. Revitalisation of the research will increase the number of publications in the near future.

For the future, the department intends to narrow the focus to one or two research lines. The committee encourages the department to bring this intention into effect.

Department of Pathology

3.09.01 Immunopathology of vascular and renal diseases, and of organ and cell transplantation

Based on the bibliometric parameters, the quality and productivity of this programme are rated as very good, with a clear tendency of the quality going up. Retirements of tenured staff are foreseen and recruitment of new staff should be planned. Funding has been obtained from several sources. The committee is very positive about the future of this programme.

3.09.02 Molecular tumour pathology - and tumour genetics

The number of publications is increasing, but the impact remains at the same high level, the quality is very good. There is confidence that the quality can be kept at this high level, even though the principal investigator in the bone tumour research will leave the department this year to become Dean of the Faculty. More focus on biobanking is needed and the group has to put more focus on funding opportunities for biobanking.

3.09.03 Immunology and molecular genetics of gynaecological cancers

The quality of the programme does not reach the level of the other two programmes. On average, the quality of the publications is satisfactory to good. The productivity is good and the relevance of this research line is clear. The committee remarks that the programme on cervical

and endometrial cancer seems to be more important from a clinical and societal point of view than as a research line. The committee sees a risk of insufficient external funding of this research line in the future. In addition, the principal investigator will retire soon. Therefore, the vitality and feasibility are rated as satisfactory rather than good.

For the future, the committee advises to reconsider the number of research programmes. The question is whether the work on cervical and endometrial cancer should be continued as a research programme. Making a clear distinction between service to other departments and the actual research lines of the department itself could be helpful.

Collaboration with the Erasmus Medical Center with regard to molecular diagnostics is a good opportunity for this department.

Department of Psychiatry

3.10.01 Mood, anxiety and somatoform disorders and the HPA-axis (MASH)

The overall assessment of the department of Psychiatry is very good. The committee remarks that the department should now be careful in choosing specific research themes and make the research programme more focussed.

Department of Public health and primary care

3.12.01 Geriatrics in primary care

The research at this department, appears to be well organised. A very high proportion of the research budget is from governmental research grants, which is an indicator of the quality of research apart from the bibliometric indicators. Therefore, the overall assessment of the department is very good to excellent.

Regarding the future, the committee suggests that the research line Prevention and community care is turned into a separate programme. More important, however, is the continuation of the current tenured staff. This department has much potential in research.

Department of Pediatrics

3.13.01 Transplantation and immunomodulation

The Transplantation and Immunomodulation programme stands out between the other two programmes. The quality and the production are very good.

3.13.02 Epidemiology in pediatrics and child health

The quality is good and the production is high. The research in this programme is very relevant, but the projects have never been funded enough to build a group of dedicated research nurses. Therefore, the department is not involved in single-center studies anymore. Instead, they participate in multicenter studies. Taking this strategy into account, the vitality and feasibility are good.

3.13.03 Development

In the programme on development there are few PhD students. Although the productivity has gone up in the past five years, the impact is average. Considering the key publications and bibliometric indicators, the quality of the research is satisfactory to good. The vitality of the development programme, however, seems to be a problem. It is becoming increasingly difficult to obtain funding. Therefore, the vitality and feasibility are considered to be not more than satisfactory.

The committee recommends that cooperation is sought with pediatric departments from the UMC's in Amsterdam and Rotterdam (Medical Delta) to make agreements on the research profile per UMC, taking into account the strengths of the department in the various UMC's. The research programmes of this department will clearly profit from centralization in the Medical Delta. Cooperation with Rotterdam would offer an opportunity to get stronger.

3.3.12 Department of Child and Adolescent Psychiatry

3.14.01 New methods for child psychiatric diagnosis and treatment outcome evaluation

The list of publications is too short to give a fair rating of the production. Therefore, the committee refrained from an assessment in numbers. The volume of research and the number of PhD students, however, are increasing. The research strategy and the accomplishments thus far have impressed the committee. The leader of the programme made a clear choice of a topic that is central in both child and adolescent psychiatry and adult psychiatry. The only concern is that the workload may be too high. This group deserves the support from the LUMC. The good relationship with the research group at the VUmc should be fostered. The societal relevance of the work in the forensic field is high. There is a good chance that this group will be leading in the field of child psychiatry.

DIVISION 4

Department of Hematology

4.01.03 Immunobiology of allogeneic stem cell transplantation and immunotherapy of hematological diseases.

The research group collaborates with many prestigious groups around the world. There is no collaboration, however, with the department of Hematology in Rotterdam, particularly in the basic sciences, which surprises the committee. This was attributed to the differences between the research lines of these two departments.

This department has a very cohesive programme. The list of key publications is impressive and the bibliometric parameters indicate a high quality of the research. Moreover, the productivity is very high. The relevance is rated very high and the earning capacity is also very high. The investigator-initiated clinical trials in the programme, need strengthening and support. Nevertheless, the vitality and feasibility of the programme are very good.

Department of Immunohematology and Blood Transfusion (IHB)

4.02.02 Tumor immunology

The quality and the productivity of the research in the *Tumor Immunology* programme are excellent. The earning capacity of the department is very high. In relation to this programme it was mentioned, however, that the costs of animal models are increasing well above inflation and that this increase is not covered by external funding. Therefore, the number of mouse strains kept in the department is diminishing. All in all, the vitality and feasibility of this programme are excellent.

4.02.03 Autoimmunity and Transplantation Immunology

The productivity was excellent, but the quality was rated between very good and excellent. The vaccine and immunomodulatory cell therapy for type 1 diabetes are unique. The relevance of this research is excellent. The publication strategy in this programme has been changed towards fewer but better articles in journals with a higher impact. The vitality and feasibility of this programme are excellent.

4.02.04 Regenerative Medicine

The quality and productivity of this programme are still excellent. The relevance of the research concerning induced pluripotent stem cells is excellent. The prospects of this work are good. In mouse models, for example, these cells have been shown to produce human platelets. The vitality and feasibility of the programme are excellent.

In comparison with the previous evaluation, the department has progressed. The committee got a clear message that this department is actively managed. New professors have been appointed to succeed those who will retire in the near future. There are discussions with a research group in Rotterdam that has a common interest in some types of transplantation. Collaboration could be advantageous for both departments.

Department of Infectious Diseases

4.03.02 Immunogenetics and cellular immunology of bacterial intracellular infectious diseases.

Taking into consideration the bibliometric parameters and the key publications in the top journals, the quality and the production are very good. The fact that the programme relies mostly on external funding is also considered a sign of quality. The relevance is very high, considering the translational work, for example in Indonesia. Taking into account the earning capacity, the collaborations, and the facilities available, the vitality and feasibility are very good.

Department of Clinical Oncology

4.04.01 Experimental cancer immunology and therapy.

Although the number of published articles is decreasing slightly, the impact factor of the publications remains high. In conclusion, the quality and the productivity are very good. The relevance of the programme is also considered to be very good. The investigators have been very successful in obtaining external funding. Taking into account the earning capacity and the

collaboration with other groups, the vitality and feasibility of this programme are very good. The committee expects that the research could become excellent, i.e. of world class, if the principal investigator continues on this trajectory.

4.04.02 Biological, physical and clinical aspects of treatment of cancer with ionising radiation

Because of the small size, collaborations within and outside the LUMC – for example with the proton beam facility in Delft and the physics department in Rotterdam – are vital to the programme. The committee has the impression that the radiotherapy programme is quite vulnerable and may not be viable on its own. The committee advises to seek partnership with the Erasmus MC in Rotterdam and to reduce the number of (future) themes.

4.04.03 Experimental pharmacotherapy.

The productivity is high and the results are published in high impact journals. A very high percentage of the budget is from industrial funding. There is an ambition to establish a separate clinical trial unit. As yet, the group is discussing options to join with the clinical trial facility at the Erasmus MC Rotterdam in the future. All in all, the viability and feasibility of the programme are considered to be good.

The diversity of the project areas encompassed by the department, however, concerned the committee. In this regard the committee was reassured by evidence of strong communication and collaboration with other initiatives in individual areas of overlap.

The new chairman of this division is encouraged to pay close attention to this issue and to ensure that integration is worked towards as much as possible.

Department of Clinical Pharmacy and Toxicology

4.05.01 Heterogeneity of drug efficacy and toxicity in relation to individual pharmacokinetics, pharmacodynamics and pharmacogenetics.

Overall the department is assessed as good, and seems in certain aspects to be internationally competitive. Although there is an extensive collaboration with the pharmacotherapy programme of the department of Clinical Oncology, the department of Clinical Pharmacy and Toxicology seems somewhat isolated. The committee has the impression that both programmes could benefit if they were in one unit.

Department of Medical Microbiology

4.06.01 Molecular basis of viral replication, viral pathogenesis and antiviral strategy.

Although there has been some decline in the bibliometric parameters, the quality of the research and the productivity are good. The relevance, vitality and feasibility of the programme are also good. According to the committee, it would help if this department could show more collaboration with the Erasmus MC in Rotterdam.

4.06.02 Molecular basis of bacterial pathogenesis, virulence factors and antibiotic resistance.
The output of the Bacteriology programme is of very high quality and the number of publications is increasing. Considering the fact that *C. difficile* is a problem in elderly people, the ambition to expand the studies from hospital outbreaks to nursing homes makes the programme highly relevant. The vitality and feasibility are good.

The department is assessed as good with the potential to become very good, especially in the bacteriology programme. The percentage of external funding is increasing. To the committee, the work on *C. difficile* is most promising.

DIVISION 5

Department of Human Genetics

5.01.01 Mechanisms of disease, diagnostics and therapy

5.01.02 Tumourgenetics and Immunogenetics

5.01.03 Genomics, epigenetics, population genetics and bioinformatics

The committee is impressed by the high quality of the research. All three programmes are excellent having publications in high impact papers. The earning capacity is very high. The vitality of all programmes is excellent. The department is in a perfect position to play a prominent role in the topsector Life Sciences and Health in the coming years. The overall rating of the department is excellent.

It is clear that the departments of Human Genetics and Clinical Genetics are highly dependent on each other. The committee recommends, when the chairman retires, to reconsider the organisation of the two departments. The close collaboration should be maintained. A bottom up movement leading to the integration of Human Genetics and Clinical Genetics should be favoured.

Department of Anatomy and Embryology

5.02.01 Molecular Cardiovascular Developmental Biology

The research within the department has predominantly become focused on stem cells. The combination of stem cell research with clinical anatomy is not obvious. The latter mainly concerns a minor research programme for teaching of clinical fellows (surgery, orthopedics, cardiology). The overall rating of the department is excellent.

Department of Molecular Cell Biology

5.03.01 Signal transduction in aging related diseases

The quality of the research, resulting in high impact publications, is very good. The productivity is very good to excellent. In recent years an increase in the number of publications is shown. The relevance is very good. In close contact with the clinic and industry a translational research programme has been developed. The collaboration with the department of Anatomy and

Embryology is very fruitful. The vitality is very good. The research is largely sponsored by external funding of the 2nd and 3rd flow of money (EU-FP7, NWO, Cancer and Heart Foundation) and by various companies.

5.03.02 Molecular Cell Biology (Gene regulation and cell differentiation)

The quality of the research is very good and the publications have a high impact. The productivity is good to very good. Also the vitality is very good. The principal investigator is very active and successful in acquiring grants from the 2nd and 3rd (NWO, Cancer Society) flow of money, and from industry.

5.03.03 Neurosciences in Drosophila and rodents; from genes to neuronal networks

The quality of the programme is good, but the publications have a relatively low impact. The committee considers the research of both subprogrammes as very specialized. They appear to be isolated within the department.

5.03.04 Microscopic imaging and technology

The quality and productivity of the programme appear good to very good. The relevance and vitality are very good.

The committee is content about the restructuring of the research taken place in the department after the last site visit. The overall score for the department is very good, but the Neurosciences programme is rated lower.

Department of Parasitology

5.04.01 Host-parasite interactions with emphasis on immunology, molecular biology, glycobiology and epidemiology of parasitic infections

A malaria vaccine consisting of attenuated parasites is developed in collaboration with the Radboud UMC in Nijmegen and with Sanaria Inc (MD, USA). The quality and productivity of the research programme are very good. Together with Nijmegen this group is at the forefront of malaria (vaccine) research. They have been very successful up till now. The research is highly relevant and the future looks bright.

5.04.02 Biomolecular Mass Spectrometry Unit

This large core facility represents a unique concentration of mass spectrometry and has been a huge investment by the LUMC. The committee has the impression that the proteomics facility is not used yet in the most optimal way. There could be more collaboration especially on the national level.

The committee does not get a clear picture of their activities, apart from support and service. From 2005/2006 there has been an increase in the number of publications, but it is not clear to the committee which publications originate from the group's own research.

The committee advises to reconsider the role and position of the Mass Spectrometry Unit within the LUMC and to create a connection with the Faculty of Science (e.g. the Netherlands Metabolomics Centre) and the Netherlands Proteomics Centre.

Department of Toxicogenetics

For a large group the output is quantitatively not high, but the committee respects the choice to publish as much as possible in high impact journals. The quality and productivity are therefore rated as very good.

The committee is impressed by the changes that are made to create more coherence between the programmes. But there is room for further improvement. The department should present itself better to get more profile and impact. Also, the committee is concerned about the position of the department within the LUMC. It looks relatively isolated and collaborations within the LUMC appeared to be not substantial. The relation of the department to the Clinical and Human Genetics departments is not clear. The vitality appears good. The overall assessment of the department is very good.

Department of Medical Statistics and Bioinformatics

5.06.01 Development and application of statistical models for medical research

Since the previous site visit the coherence and joint research between Medical Statistics and Molecular Epidemiology, in particular with the statistical genetics group, has been much intensified. The committee is of the opinion that this is a positive development.

The number and impact factor of the publications is high. The quality of the programme appears good. The group is nationally leading. The productivity is very good. The relevance and vitality are also very good.

5.06.02 Molecular Epidemiology

The quality of this programme is very high with publications of high impact and the productivity is very good. The vitality is also very good. The future looks bright.

The overall score for the department is very good. Since the last site visit the department has made a recommendable move forward. The coherence of the programmes has been intensified.

Department of Clinical Genetics

5.08.01 Genetics of disease, diagnosis and treatment

The impact of the publications is lower than in the other two programmes. The reason might be that the research is predominantly focussed on rare diseases. The quality appears good.

5.08.02 Hereditary cancer genetics

The quality of this programme is very good. A large number of papers are published in good quality journals.

5.08.03 Genomics, population genetics and bioinformatics

The impact of the publications is high and the quality of the research is very good.

All three programmes have a good to very good productivity. The relevance of the research in the department of Clinical Genetics is intrinsically very high. Overall, the department is judged as good to very good. Because of counselling activities the staff spends only 20% of its time on

research. The committee is of the opinion that the research activities could be more focused and combined with those of Human Genetics. The future prospects and vitality are very good, as long as collaboration with Human Genetics continues.

Graduate school

Presently, a LUMC Graduate School is in development. The Graduate School committee has made an inventory of the number of PhD students at the LUMC, which appears to be approximately 550 in total. The data collected are presently being integrated in the LUMC research management system.

The design of the LUMC Graduate School is in line with the Standard Evaluation Protocol 2009-2015. The Review Committee highly recommends a systematic overview of PhD students, since it is important to keep track of the PhD student careers and performances. The Committee encourages the LUMC to speed up the development of the Graduate School and to come to an agreement with the HRM department on the exchange of administrative data. Finally, the Committee suggests, in order to further speed up the development, to contact another University Medical Centre where a Graduate School is already in place, e.g. Erasmus MC Rotterdam.