Research Assessment 2018
Radboud Institute for Molecular Life Sciences
Radboud Institute for Health Sciences
Radboud University
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1. Introduction

1.1 Background

This report presents the assessment of the research conducted at two research institutes of Radboud university medical center (Radboudumc) in Nijmegen (the Netherlands) in the period 2012-2017:

- the Radboud Institute for Molecular Life Sciences (RIMLS),
- the Radboud Institute for Health Sciences (RIHS).

The assessment covers these two institutes as well as the 13 research themes in which the institutes are involved. The third institute of Radboudumc (Donders Center for Medical Neuroscience) will be evaluated separately by another assessment committee in 2019.

The assessment was performed by an external review committee using the Standard Evaluation Protocol (SEP) 2015-2021. The SEP was drawn up and adopted by the Royal Netherlands Academy of Arts and Sciences (KNAW), the Netherlands Organisation for Scientific Research (NWO), and Association of Universities in the Netherlands (VSNU). All research conducted at Dutch universities, University Medical Centres, and NWO or KNAW institutes is assessed once every six years in accordance with the SEP. The primary aim of SEP assessments is to evaluate the quality and relevance of academic research and to suggest improvements where necessary. SEP assessments focus on the strategic choices and future prospects of research groups.

Several target groups are served by this assessment:

- The institutes’ scientists and management want to know how the quality of the research, its societal relevance, and its strategy are perceived by independent experts and how these elements may be improved.
- The Board of Radboud University wishes to track the impact of its research policy.
- The Dutch government wants to know the outcomes of assessments in connection with the institution’s accountability for expenditure and its own efforts to support an outstanding research system.
- Society and the private sector seek to solve a variety of problems using the knowledge that RIMLS and RIHS research delivers.

1.2 Members of the evaluation committee

The Executive Board of Radboud University has appointed a 15-member evaluation committee in consultation with the two institutes. The committee members were selected so that the overall committee profile matched the institutes’ research and societal domains, as well as the SEP conditions for the composition of evaluation committees. The evaluation committee operated in four subcommittees (see Table 1). Subcommittee 1 evaluated one RIHS-specific research theme and five cancer-related themes (Healthcare improvement science, Cancer development and immune defense, Rare cancers, Tumours of the digestive tract, Urological cancers, and Women’s cancers). Subcommittee 2 evaluated one RIMLS-specific research theme and six non-cancer themes (Nanomedicine, Infectious diseases and global health, Inflammatory diseases, Mitochondrial
diseases, Reconstructive and regenerative medicine, Renal disorders, Vascular damage). Subcommittee 3 evaluated RIMLS and subcommittee 4 evaluated RIHS.

The members of the assessment committee were, in alphabetical order:

- Hans Bart, MSc (representative Dutch Kidney Patients Society),
- Professor Boudewijn Burgering, chair of subcommittee 1 and 3 (University Medical Center Utrecht, the Netherlands),
- Professor Rebecca Fitzgerald (University of Cambridge, UK),
- Professor George Griffin (St George’s, University of London, UK),
- Professor Cees Kallenberg, chair of subcommittee 2 (University Medical Center Groningen, the Netherlands),
- Professor Gemma Kenter (Amsterdam UMC, location VUmc, Amsterdam, the Netherlands),
- Dr Ida Korfage (representative Dutch Cancer Foundation; Erasmus MC, Rotterdam, the Netherlands),
- Professor James Kirkpatrick (University Medical Center, Mainz, Germany),
- Professor André Knottnerus, general chair and chair of subcommittee 4 (Maastricht University, the Netherlands),
- Professor Nils-Göran Larsson (Department of Medical Biochemistry and Biophysics, Karolinska Institute, Stockholm, Sweden),
- Professor Stéphane Laurent (Paris Descartes Medical School, France),
- Professor Ramón Martínez Mánuez (Polytechnic University of Valencia, Spain),
- Professor Pierre Ronco (Sorbonne Université, Tenon Hospital and Inserm/UPMC Unit 1155, Paris, France),
- Professor Sabine Siesling (University of Twente and Netherlands Comprehensive Cancer Organisation (IKNL, Utrecht), the Netherlands),
- Professor Arnulf Stenzl (University of Tübingen, Germany).

Dr Linda van den Berg and Dr Ingeborg Meijer served as scientific secretaries to the assessment committee. Short CVs of the committee members are provided in Appendix 1. The evaluation and recommendations in this report constitute the subcommittees’ consensus.

Table 1: Composition of the four subcommittees

<table>
<thead>
<tr>
<th>Subcommittee (Chair, Secretary)</th>
<th>Members</th>
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<tbody>
<tr>
<td>1. One RIHS-specific + five cancer-related themes (Burgering, Meijer)</td>
<td>Knottnerus, Siesling, Fitzgerald, Stenzl, Kenter, Korfage</td>
</tr>
<tr>
<td>2. One RIMLS-specific + six non-cancer themes (Kallenberg, Van den Berg)</td>
<td>Griffin, Larsson, Kirkpatrick, Ronco, Laurent, Martínez Mánuez, Bart</td>
</tr>
<tr>
<td>3. RIMLS (Burgering, Van den Berg)</td>
<td>Griffin, Fitzgerald, Larsson, Kirkpatrick, Ronco, Martínez Mánuez, Bart</td>
</tr>
<tr>
<td>4. RIHS (Knottnerus, Meijer)</td>
<td>Stenzl, Kenter, Korfage, Siesling, Kallenberg, Laurent</td>
</tr>
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1.3 Procedure

The committee evaluated RIMLS and RIHS research based on the institutes’ self-evaluation report and interviews with representatives of the institutes and themes during a site visit in December 2018. The self-evaluation report was sent to the committee four weeks prior to the site visit. Among other things, it addressed the mission, strategy (past and future), organization, composition & financing, and targets of the institutes and themes, as well as the results achieved in the period 2012-2017 and SWOT analyses. During the site visit, the committee interviewed the Executive Board of Radboudumc, the RIMLS and RIHS management, Internal Advisory Boards, theme leaders, PhD candidates, postdocs, and representatives of the PhD Training & Supervision Plan committee. The discussions with these representatives were open and transparent. The site visit programme is listed in Appendix 2. The committee considered international trends and developments in science and society as it formed its judgement.

Assessment of research

The committee made a qualitative judgement of RIMLS, RIHS, and the 13 themes based on three assessment criteria:

- **research quality**, i.e., the quality of the research, the contribution of the research to the body of scientific knowledge, and the scale of the research results (scientific publications, instruments and infrastructure developed, and other contributions to science).
- **relevance to society**, i.e., quality, scale, and relevance of contributions (advisory reports for policy, contributions to public debates, etc.), targeting groups that the institute or theme has itself designated as target groups.
- **viability**, i.e., the strategy that the institute or theme intends to pursue in the years ahead, the extent to which it can meet its targets in research and society during this period, and the governance and leadership skills of the management.

In addition to the qualitative judgements, the committee assigned scores to the themes for each of the assessment criteria. The four possible scores are excellent (=1), very good (=2), good (=3), and unsatisfactory (=4). The scores are explained in more detail in Appendix 4 of this report. The committee felt that the grading system as used in the SEP is not always appropriate to take into account heterogeneity within the themes.

Assessment of PhD programmes

The committee also considered the supervision and training of PhD candidates at RIMLS and RIHS. During the site visit, the committee interviewed several PhD candidates (four RIMLS and four RIHS representatives), who were in different stages of the PhD track. In addition, the committee met representatives of the PhD Training & Supervision Plan committees of the institutes. The following topics were covered:

- institutional context of the PhD programmes (embeddedness),
- selection and admission procedures,
- programme content and structure,
- supervision and effectiveness of the programme plans and supervision plans,
- quality assurance,
- duration and success rate,
- guidance of PhD candidates to the job market,
• career prospects,
• exit numbers to research, industry, government, or non-profit.

Assessment of facilities, research integrity policy, and diversity policy
The committee evaluated the institutes’ policy regarding research facilities, as well as the state and adequacy of the facilities. It should be noted that the committee did not have the opportunity to visit facilities. The committee considered the institutes’ policy on research integrity and the way in which violations of such integrity are prevented. The committee was interested in how the institutes deal with scientific integrity and the extent to which a critical pursuit of science occurs at the institutes. In addition, the committee evaluated the institutes’ efforts to ensure a diverse staff composition from the junior through the senior scientist level.

1.4 Radboudumc at a glance

Radboudumc is a research & education institution as well as an academic hospital. It is closely aligned with Radboud University. Its mission is to increase and disseminate healthcare knowledge through education, training, and scientific research from molecule to man to population, thereby actively contributing to the improvement of healthcare and enhancing the wellbeing of people and society. With its objective to have a significant impact on healthcare, Radboudumc strives to be the most innovative and personalized university medical centre (UMC) in the Netherlands. It comprises 50 departments, which are responsible for education, research, and often patient care. The department chairs are responsible for human resources and the budget. Each department is supported by a business manager and a centralized service unit for policy, finance, HRM, housing, IT, and facilities.

Institutes and themes
Until 2014, Radboudumc harboured six institutes and 42 research themes. To create more synergy and focus, Radboudumc reorganized its research into 18 new themes in 2014 (16 disease-oriented themes and 2 generic themes, see Figure 1). Simultaneously, Radboudumc clustered its research into three institutes, each with its own Graduate School:
• Radboud Institute for Molecular Life Sciences (RIMLS),
• Radboud Institute for Health Sciences (RIHS),
• Donders Center for Medical Neuroscience (DCMN).
The institutes strongly steer on quality (i.e., high impact research) rather than quantity (i.e., number of papers).

Radboudumc’s researchers are appointed by a department and affiliated with one research institute and one research theme for 0.1-1 FTE of their appointments. The institutes have three main tasks:
• to support the themes by creating and supporting platforms for collaboration, providing support in grant writing, advising on technology centres, and organizing lectures and symposia,
• to provide a formal PhD training programme consisting of courses, supervision, mentoring, retreats, scholarships etcetera,
• to develop and implement the Radboudumc research strategy by creating new directions and opportunities, deciding on new chairs and fellows, distributing research money, and working on internal and external visibility.
Radboudumc Technology Centres
The research themes are facilitated by 19 Radboudumc Technology Centres (RTCs), which provide technological expertise, equipment, and biobanks. Radboudumc allocates approximately 8 million euros per year to the RTCs. There are six central and 13 decentral RTCs. The central RTCs are vital for many Radboudumc research groups. Hence, they are financed by Radboudumc, apart from the direct costs for users. They are linked to and directed by one of the research institutes. The decentral RTCs are vital to a smaller number of research groups, so they are affiliated with and directed by a department. Decentral RTCs receive a yearly premium of 50 thousand euros, covering a part-time coordinator and marketing costs.

Radboudumc strategy
Radboudumc has developed a Research Agenda 2025, with the following focus points:
- steering on scientific excellence through the PI structure and talent programmes (see below),
- involving patients as partners in research,
- focusing on a limited number of research themes,
- optimizing training and education,
- fostering a culture of good scientific practice (research integrity),
- maintaining world-class infrastructure and the associated support staff,
- encouraging researchers to collaborate with public and private partners in- and outside academia (networks).
Radboudumc is currently in the process of renovating some of its buildings and constructing new facilities on its grounds. It has installed a committee that will assess the arrangement of laboratory space within Radboudumc, in which a compact and intense use of the current and new buildings is envisioned.
Finances
Radboudumc has an annual research budget of more than 160 million euros, comprising 83 million euros direct research funding by the government and 84 million euros of funding through research grants and contract research. The direct funding budget is divided in three compartments: (i) infrastructure, (ii) performance (competition between departments, e.g., principal investigator system), and (iii) new talents. Radboudumc uses its principal investigator (PI) system to award scientific quality at the level of individual scientists. Junior PIs (jPIs) receive 70 thousand euros per year and PIs receive 110 thousand euros per year. The criteria are leadership, international esteem, societal impact, scientific production, and the acquisition of grants. Every three years, the PIs and jPIs have to re-apply; this will be every five years from 2018.

The new talent compartment is used to finance
- a premium for newly appointed professors,
- Hypatia fellowships to attract external high potentials at assistant / associate professor level,
- six to eight PhD projects per institute per year,
- six PhD scholarships for talented Master's students per year,
- four joint PhD projects with the regional partner hospitals per year.

Talent programmes
To promote scientific excellence, Radboudumc offers several talent programmes:
- Radboud Da Vinci Challenge for talented PhD candidates: one-year programme that offers PhD candidates the opportunity to deepen and broaden their scientific and personal development.
- Radboud Galilei Track for talented postdocs: 3.5-year programme that supports postdocs and helps them find the right balance between professional and personal development.
- Radboud Hypatia Track for research group leaders: one-year programme that guides talents towards becoming successful research group leaders.

Grant support
Radboudumc has a Department of Valorization, which provides support in grant writing and submission, legal issues concerning research contracts, and business development. Its Grant Support Office (currently expanding from three to eight people) offers expertise in grant writing and collaborates with a personal grant committee consisting of (junior)PIs. In addition, Radboudumc has developed several tools to facilitate the translation of research results into healthcare practice: the internal proof of concept fund and the Radboudumc Holding company.
2. Assessment of Radboud Institute for Molecular Life Sciences

Director of the institute: René Bindels
Academic staff in 2017: 447 FTE, 829 persons

2.1 RIMLS mission, strategy, and organization

Mission and organization
The mission of the Radboud Institute for Molecular Life Sciences (RIMLS) is to achieve greater insights in the molecular mechanisms of health and disease. The institute’s history goes back to 1994, when its predecessor (the Institute of Cellular Signalling) was established. At present, RIMLS research is organized in eleven disease-oriented research themes (from molecule to man) and one mechanism-based theme focusing on nanomedicine (see Figure 1 on page 8). In the disease-oriented themes, RIMLS researchers closely collaborate with RIHS researchers. In addition, there are ample collaborations with DCMN. The nanomedicine theme is a collaboration between RIMLS and the Institute for Molecules and Materials (IMM) of the Faculty of Science. The Cancer development and immune defense theme also includes scientists from the Faculty of Science. At the national level, there are many collaborations with UMCs, universities, and various public & private partners. At the international level, RIMLS collaborates with various prestigious institutes.

Management
RIMLS is headed by the scientific director (Professor René Bindels). He is supported by a three-headed secretarial office and two scientific policy advisors (one of whom is also assigned to RIHS). The scientific director is advised by a seven-headed Internal Advisory Board that meets approximately four times per year to discuss issues such as long-term policy, research strategy, Graduate School procedures, funding opportunities, national and international collaborations, and RIMLS visibility. The institute has several dedicated committees, including a grant review committee, five Radboudumc-wide talent committees, a Training & Supervision Plan committee (which is part of the PhD programme), a PhD Council, and the Radboud Postdoc Initiative.

Staff and funding
In 2017, the RIMLS research staff consisted of 829 employees, representing 447 full-time equivalents (FTE): 115 FTE senior scientific staff members, 61 FTE postdocs, and 270 FTE PhD candidates. In addition, the institute had 118 FTE support staff members. The total number of research staff members decreased during the evaluation period, reflecting difficulties to attract research grants. The number of senior scientific staff, postdocs, and support staff decreased, whereas the number of PhD candidates increased. Further details about the RIMLS staff are provided in Table A1 of Appendix 3. RIMLS’ total funding was stable over the last few years, but the contribution of competitive (e.g., NWO and ZonMw) research grants from the Dutch government decreased. RIMLS spends approximately half of its expenditure on personnel costs and half on materials, equipment, and overhead costs. Further details about funding are provided in Table A2 of Appendix 3.
Strategy
The RIMLS strategy in the period 2012-2017 was based on rewarding the quality of researchers, supporting talent, finding new ways to seize scientific opportunities, and educating the scientists of the future. The institute has worked on a fairer and more flexible PI system following recommendations from the 2011 assessment committee. In addition, it has established several talent programmes in collaboration with RIHS and DCMN (see section 1.4).

2.2 Assessment of RIMLS research quality, societal relevance, and viability

Research quality
The committee is impressed by RIMLS’ overall research quality, which ranges from very good to excellent. During the review period, RIMLS has published several papers with a very high impact in the international scientific arena. Research highlights include the work on trained immunity, immunotherapy in melanoma, and the malaria vaccine. RIMLS scientists hold leading positions in international research networks, committees, professional organizations, and evaluation panels. In addition, they have received a variety of prestigious personal grants, including a Spinoza Prize (Netea, 2016), an ERC Advanced grant (Stunnenberg, 2013), and four NWO Vici grants (Hoenderop, 2012; Roepman, 2012; de Vries, 2013; van Rij, 2017).

Societal relevance
The societal relevance of RIMLS research also ranges from very good to excellent. Although the institute’s research is fundamental, it strongly steers on clinical impact (motto ‘today’s molecules for tomorrow’s medicine’). The reorganization in 2014 has substantially increased the number of clinicians within the institute, promoting translational research. These clinicians are actively involved in all core activities and committees of RIMLS, including the Internal Advisory Board, review and TSP committees, and PhD Council. The collaborations of scientists and clinicians within the centres of clinical expertise further promote clinical impact. In addition, the institute has initiated joint PhD projects with partner hospitals in the Nijmegen region to stimulate translational research. It has also launched calls for collaborative projects between clinical and fundamental researchers.

The institute harbours several facilities that assist the scientists in translating their research results into practical applications, including the Department of Valorization, an internal proof of concept fund, and the Radboudumc Holding company. Examples of products of RIMLS research that are relevant to society include the spin-off company ‘Khondrion’ (drug development for mitochondrial diseases), the Centre for Molecular and Biomolecular Informatics (database and software packages that are used by external scientists and industry), the melanoma treatment, and the vaccine against malaria. RIMLS scientists actively engage in public outreach events, for instance in ENABLE symposia, New Frontiers symposia, and Public evenings. The quality and level of patient participation varies between research themes, with the Renal disorders and the Women’s cancers themes as examples of best practices. This will be discussed further in Chapter 5.

Viability
Overall, the committee considers RIMLS’ viability very good. With an annual amount of grants worth approximately 300 FTE of personnel, the institute has demonstrated its ability to acquire external
funding. In addition, RIMLS has successfully attracted talented researchers during the review period. The scientists that the committee met during the site visit were highly motivated and enthusiastic. Professor Bindels is a strong leader, who clearly is responsive to the advice of his Internal Advisory Board (IAB). The committee is impressed by the IAB, which consists of strong (young) leaders that take their task seriously. The size of the IAB is optimal. The committee encourages the RIMLS management to continue ensuring a strong influence of the IAB (as it has done during the review period). The committee also supports RIMLS' plans to install an External Scientific Advisory Board. Some themes have very little collaboration with other themes; this may be improved.

Several points related to the viability of RIMLS call for more in-depth discussions. We will briefly summarize them here and elaborate on them in Chapter 5:

- The themes do not seem to maximize the synergy within the institute. In 2017, RIMLS requested the staff’s opinion on the future strategy of the institute. The RIMLS researchers put forward four key points: ‘simple’, ‘clear’, ‘unburden’, and ‘quality’. Importantly, the researchers advocated minimal organizational structure, with research groups as basic units. Accordingly, the committee recommends carefully examining the organizational structure of Radboudumc research (departments, institutes, themes, and centres) and considering a more researcher-centred organization.
- The committee recommends rethinking the current PI structure because it eventually leads to too many senior PIs with their own group, thereby fragmenting financial resources and generating a lack of scientific focus.
- Although there was some confusion about the label of ‘postdoc’ during the site visit, the number of postdocs within RIMLS appears to be very small compared to the number of PhD candidates. The committee met several postdocs (or assistant professors) that supervised as many as eight PhD candidates. The committee recommends establishing a larger ‘middle layer’ of people that know the subject matter and have experience in relevant methods and techniques.

2.3 Assessment of the RIMLS PhD programme

In 2017, RIMLS harboured 415 PhD candidates. These were all enrolled in the RIMLS Graduate School, which is accredited by the KNAW. Around 30-40% of the PhD candidates at RIMLS are clinicians. The committee learned that some of these are embarked in a full-time PhD track, whereas others combine the PhD track with clinical specialization.

Selection and admission procedure
RIMLS has eight PhD positions available each year. In addition, Radboudumc organizes a PhD proposal competition for excellent Master’s students, with six PhD scholarships available each year, and four PhD positions are offered in collaboration with regional hospitals. The recruitment of PhD candidates is performed by PIs. They aim to select talented and motivated PhD candidates and diversity is encouraged. The Human Resources Department is currently developing tools to assist PIs in selecting good PhD candidates.
Institutional context of the PhD programme

The RIMLS Graduate School is fully integrated into the institute. The Graduate School organizes training and education in molecular mechanisms of disease for Master’s students and PhD candidates. The Graduate School has a four-member Training & Supervision Plan Committee that strives to ensure high-quality training and supervision for all PhD candidates. In addition, it has a PhD Council that serves the interests of the PhD candidates. This Council consists of ten PhD candidates, one of which also participates in the Training & Supervision Plan Committee. The Council meets with the scientific director and scientific managers of RIMLS once every month and welcomes new PhD candidates in a personal meeting. In addition, they organize an annual two-day PhD Retreat as well as workshops for PhD candidates. The Graduate School also organizes social activities such as a Midsummer Night activity (lecture, barbecue, drinks), monthly PhD drinks, and a ‘Supervisor of the year award’.

Quality assurance and supervision

The committee learned that every PhD candidate at RIMLS is allocated at least two supervisors, one of whom is the promotor. In addition, every student has a mentor that acts as an independent supervisor, monitoring the general progress, giving career advice, and assisting in case of problems. However, in some cases, one assistant professor supervises eight or nine PhD candidates. The committee finds this unacceptable.

A Training & Supervision Plan (TSP) is used to evaluate the candidate’s progress in research and education on a yearly basis. The plan also contains agreements about responsibilities of the supervisors. In addition, RIMLS has implemented facultative PhD thesis committees, where the candidate, supervisors, mentor, and an external colleague reflect on the PhD track annually to improve the quality of the PhD track. The committee recommends implementing a formal go/no go evaluation at the end of the first year.

Programme content and structure

The RIMLS training and education programme may be tailored to the personal interests and career plans of the PhD candidate. RIMLS offers courses on the molecular mechanisms of disease as well as on general topics such as communication, ethics & social understanding, career management, personal effectiveness & development, and teamwork. The candidates can also follow courses at other Graduate Schools of Radboudumc, Radboud University, and elsewhere. New PhD candidates are offered an introductory course (‘In the lead of your PhD’), which coaches them to take responsibility for their own careers. The PhD courses are evaluated with questionnaires and an evaluation meeting; these are used to improve the courses.

RIMLS encourages its PhD candidates to actively participate in local scientific events (e.g., seminars, ‘Meet the expert’ sessions, ‘New Frontiers’ symposia, the PhD Retreat), contribute to the Bachelor’s and Master’s curricula of Biomedical Sciences, and engage in international activities (e.g., courses, conferences, and work visits). Funding for international experiences is available via the RU International Office and RIMLS.
Duration and success rate
At present, the average duration of a PhD track at RIMLS is 5.6 years. This average duration includes several months of waiting between acceptance of the thesis by the manuscript committee and the actual defence, pregnancy leaves, clinical duties, and sick leaves. In addition, some PhD candidates combine their PhD training with clinical specialization, which extends the duration. RIMLS has already developed a package of policies to reduce the duration of PhD tracks. The committee recommends further analyzing the factors that may cause unnecessarily long durations for both part- and full-time PhD candidates. The institute may use the outcomes of this analysis to improve the quality and organization of its PhD training for both full-time and combined routes.

There do not seem to be clear rules on the number of manuscripts and other minimum requirements for PhD graduation. It would be good to develop minimal standards, and to communicate these clearly to the PhD candidates. In the period 2009-2017, around 6% of the students discontinued their PhD track for various reasons.

Guidance to the job market and career prospects
The RIMLS training programme helps PhD candidates to acquire competencies that are necessary to take the next step in their careers. The RIMLS PhD Council and the Radboud Postdoc Initiative regularly organize workshops about career planning and opportunities. Recently, RIMLS developed a two-day career development course ('The next step in my career') for PhD candidates and postdocs in collaboration with the valorization Department. Highly talented PhD candidates may participate in the Radboud Da Vinci Challenge, which is a one-year programme that offers PhD candidates the opportunity to deepen and broaden their scientific and personal development.

The career prospects of the PhD graduates seem to be good, with most of them finding positions in academia, industry, education, or in governmental positions. Indeed, the PhD candidates that the committee met were optimistic about their career prospects. The institute is very realistic about the candidates’ career options and continuously creates awareness of the fact that less than half of the PhD candidates will be able to establish a successful career in research. The committee values this. In 2017, the institute collected career prospect information from 205 of its alumni. Of these former PhD candidates, 47% continued in research, 25% in healthcare, 19% in industry, 3% in a non-profit organization, 2% in a governmental organization, and 3% elsewhere.

2.4 Assessment of RIMLS facilities, research integrity policy, and diversity policy

Facilities
As explained in Chapter 1, Radboudumc researchers have access to 19 Radboudumc Technology Centres (RTCs), which provide technological expertise, equipment, and biobanks. Of the six central RTCs, RIMLS formally supervises the Microscopic Imaging Centre (MIC) and the Animal research facility. MIC has substantially invested in state-of-the-art instruments, including a home-built STORM microscope which is now fully operational. The Animal research facility has recently improved its financial situation and customer satisfaction under supervision of a new director (Professor Boerman). In addition, this facility assists Radboudumc researchers in complying with the novel national requirements for animal research. The RTCs will be discussed further in Chapter 5.
Research integrity policy
During the site visit, the assessment committee also addressed RIMLS’ research integrity policy. RIMLS appears to foster a safe atmosphere with open communication about integrity-related issues. The institute actively trains its PhD candidates to understand the dilemmas and temptations regarding research integrity. The committee is of the opinion that senior researchers (including those in tenure) should also be trained in integrity. The topic of research integrity will be discussed in more detail in Chapter 5.

Diversity policy
The RIMLS management actively strives to increase diversity in various respects. For instance, it works to ensure that the composition of important committees is as diverse as possible. In 2017, 52% of RIMLS’ scientific staff was female (61% of PhD candidates, 55% of postdocs, 50% of assistant professors, and 17% of full professors). The institute would like to achieve the goal of at least 30% female full professors in 2020, but struggles to achieve this goal.

As regards diversity in nationality, 23% of the RIMLS scientific staff originate from outside the Netherlands (27% of PhD candidates, 39% of postdocs, 9% of assistant professors, 7% of associate professors, and 16% of full professors). RIMLS aims at a minimum of 30% foreign employees. The institute stimulates diversity by encouraging the use of English in all communication and by allocating a buddy to foreign PhD candidates to facilitate their integration in the academic and social life of Nijmegen. In addition, the institute has Hypatia fellowships that are exclusively open for scientists outside Radboudumc. They actively invest in partnerships outside the Netherlands. In spite of these measures, the committee did not meet many scientists with a non-Dutch background during the site visit. The committee will elaborate on the topic of diversity in Chapter 5.
3. Assessment of Radboud Institute for Health Sciences

Director of the institute: Bart Kiemeney
Academic staff in 2017: 497 FTE, 1524 persons

3.1 RIHS mission, strategy, and organization

Mission and organization
The mission of the Radboud Institute for Health Sciences (RIHS) is to innovate and personalize healthcare and public health. RIHS’ focus is on developing tests, treatments, methodologies, and policies that optimize personalized healthcare and on the application of these tools in disease-oriented research themes (from man to population). Research at RIHS takes place within eleven disease-oriented research themes (see Figure 1 on page 8), working closely together with RIMLS colleagues, and a generic methodologically-oriented theme ‘Healthcare improvement science’ that is completely embedded within RIHS. RIHS aims to bridge the gap between science and society; societal impact is at the core of the institute’s ambition. At the national level, there are ample collaborations with UMCs, universities, and various public & private partners. At the international level, RIHS collaborates with various prestigious institutes, such as WHO, European Centre for Disease Prevention and Control (ECDC), and UNESCO, to mention a few.

Management
RIHS is headed by the scientific director (Professor Bart Kiemeney). He is supported by a three-headed secretarial office and two scientific policy advisors (one of whom is also assigned to RIMLS). The scientific director is advised by five scientists who make up an Internal Advisory Board that meets approximately three times per year to discuss issues such as long-term policy, research strategy, Graduate School procedures, funding opportunities, national and international collaborations, and RIHS visibility. The institute has several dedicated committees, including a grant review committee, five Radboudumc-wide talent committees, a Training & Supervision Plan committee (which is part of the PhD programme), a PhD Council, and the Radboud Postdoc Initiative.

Staff and funding
In 2017, the RIHS research staff consisted of 1524 employees, representing 497 full-time equivalents (FTE): 230 FTE senior scientific staff members, 26 FTE postdocs, and 241 FTE PhD candidates. In addition, the institute had 78 FTE support staff members. The total number of research staff members slightly increased during the evaluation period, mainly because of an increase in the number of PhD candidates. The number of senior scientific staff, postdocs, and support staff remained stable. Further details about the RIHS staff are provided in Table A3 of Appendix 3. RIHS’ total funding was stable over the last few years, but the contribution of competitive (e.g., NWO and ZonMw) research grants from the Dutch government decreased. RIHS spends approximately half of its expenditure on personnel costs and half on materials, equipment, and overhead costs. Further details about funding are provided in Table A4 of Appendix 3.
Strategy
In 2011, the predecessor of RIHS, the former Nijmegen Centre for Evidence Based Practice (NCEBP), formulated the 2012-2017 goals as follows: ‘Stronger branding and (inter)national visibility of the institute; more visiting professors to boost an international network; stronger coherence within the institute to develop and apply population sciences methodology; stronger collaborations with healthcare providers, basic scientists, other Radboud University faculties to evolve into an interfaculty research institute; safeguarding valorization and especially data management; development and accreditation of a Graduate School; and more formalized PhD training including requirements for supervisors and mentors.’ The institute has established several talent programmes in collaboration with RIMLS and DCMN (see section 1.4).

3.2 Assessment of RIHS research quality, societal relevance, and viability

Research quality
RIHS’ overall research quality is very strong, rated from very good to excellent. During the review period, RIHS has published many papers with a very high impact in the international scientific arena. Around half of the papers are published in international collaboration. Research highlights include the work on malaria, medical image analysis, orthopaedic research, prostate cancer diagnosis, Lyme disease, and renal tubular disorders. Other important research outputs are the PROM-toolbox and the Nijmegen Biomedical Study (a large biobank and dataset of general population samples). RIHS scientists hold leading positions in international research networks, committees, professional organizations, and evaluation panels. In addition, they have received a variety of prestigious personal grants, including for instance the Eijkman Medal for tropical medical research (Bousema, 2015), ERC grants (one Advanced by Verdonschot, 2012; and one Consolidator by Evers, 2013), and three NWO Vici grants (van Ginneken, 2012; Baltussen, 2014; Rovers, 2017).

Societal relevance
Overall, the societal relevance of RIHS research also ranges from very good to excellent. The goal of the institute is to support the man-population part of the Radboudumc mission, as shown by the RIHS motto ‘science for care, care for science’. The reorganization in 2014 aimed to strengthen the population-oriented, epidemiological, and methodological innovation of (clinical) research by bringing in the perspective, knowledge, and expertise of the Healthcare improvement science theme. This has resulted in many relevant societal outputs, such as manuals, clinical guidelines, and policy documents for professionals; wide and established implementation of products in the healthcare market (e.g., BREATH, a self-management website for breast cancer survivors); outreach activities (e.g., at the Lowlands pop festival, RIHS Open Day); patents/licenses and spin-offs (e.g., MedValue, Soteria Medical, Thirona, SPL Medical, and Atro Medical), and collaboration with non-academic organizations (e.g., academic collaborative centres where Radboudumc connects with primary care, nursing institutions, and municipal health services) and societal actors (e.g., the ‘Burgerforum’, a citizens panel).

Although the SWOT in the self-evaluation report mentions that patients are involved in most research themes, the steering and actual level of patient involvement is not always clear. It is not always explained what kind of patient involvement takes place, why it occurs and why not. The
quality and level of patient participation varies between research themes, with the Women’s cancers and Renal disorders themes as examples of best practices. This will be discussed further in Chapter 5.

**Viability**

Overall, the committee considers RIHS’ viability very good. It strengthens the population-based healthcare orientation of basic and clinical research. In cases where this connection is integrated into the themes (e.g., in Urological cancers), science and society clearly benefit. Some themes could however benefit more from the embedding of clinical and ‘population-type’ scientists in disease-oriented themes to achieve RIHS’ aims and goals. Coherence within and collaboration between themes can be improved. The annual amount of grants is approximately 300 FTE of personnel, demonstrating the institute’s ability to acquire external funding (similar to RIMLS). RIHS research is well-placed to study important developments in healthcare like personalized healthcare, ageing and multimorbidity, focus on transmural and regional care, digital technology, and big data. The scientists that the committee met during the site visit, mainly selected from the talent pool, were highly motivated and enthusiastic. Professor Kiemeney is a strong leader, but he will step down next year, and his succession has not been secured yet. This fuelled a discussion on merging RIHS and RIMLS into one institute (see Chapter 5 on this issue). The committee sees a more formal/structured role for the Internal Advisory Board (IAB), which now primarily serves as a sounding board for the director. The committee also supports RIHS’ plans to install an External Scientific Advisory Board.

Several points related to the viability of RIHS call for more in-depth discussions. We will briefly summarize them here and elaborate further in Chapter 5:

- The themes do not seem to maximize the synergy within the institute. The embedding of a population and healthcare research perspective is not always taking place naturally in some of the themes.
- There should be better career perspectives for part-time researchers to progress to senior staff member positions, whose professional position in healthcare can be outside or inside the hospital (e.g., general practitioners, physiotherapists, nurses).
- The committee recommends rethinking the current PI structure because it eventually leads to too many senior PIs with their own group, thereby fragmenting financial resources and generating a lack of scientific focus.
- Although there was some confusion about the label of ‘postdoc’ during the site visit, the number of postdocs within RIHS appears to be very small compared to the number of PhD candidates (26 FTE postdocs vs. 241 FTE PhD candidates). The committee recommends establishing a larger ‘middle layer’ of people that have experience in research and relevant research methodologies and techniques.

### 3.3 Assessment of the RIHS PhD programme

In 2017, RIHS harboured 542 PhD candidates. These were all enrolled in the RIHS Graduate School, which is member of the Netherlands School of Public Health and Care Research (CaRe), accredited by the KNAW. The 542 PhD candidates represent 241 FTE, indicating that the institute has many part-time PhD candidates, combining their research with work in for instance medical and allied healthcare practice. PhD candidates have a wide variety of backgrounds. The vision of the RIHS
Graduate School is to train junior researchers who have the intrinsic ambition to improve healthcare and public health to become highly qualified independent scientists. The committee is of the opinion that the Graduate School is very well developed, and aligns well with the Bachelor and Master programmes. The RIHS Graduate School obtained formal accreditation from the KNAW in 2014.

Selection and admission procedure
The recruitment of PhD candidates is performed by PIs and is based on talent and motivation. The majority of RIHS indirect research funding comes from funders (e.g., NWO, ZonMw, charities, and EU) that provide external peer review of project proposals. In addition, RIHS has six PhD positions available each year, and Radboudumc organizes a PhD proposal competition for excellent Master students, with six PhD scholarships available each year. Furthermore, together with regional hospitals four PhD positions are offered.

Institutional context of the PhD programme
The RIHS Graduate School participates in research school CaRe, and operates independently from RIMLS and Donders Graduate Schools, but the three Schools actively collaborate to improve the quality of the PhD tracks. The Graduate School organizes training and education in skills (subject- and methodology-related) and competences required to take the next career step. However, for PhD candidates working with more molecular techniques, the health science courses fit less well. The School motivates PhD candidates to visit outpatient clinics, surgery, and public health settings to optimally familiarize them with the subject of their project. The Graduate School has a ten-member Training & Supervision Plan Committee that strives to ensure high-quality training and supervision for all PhD candidates, which is taking a lot of effort. In addition, it has a very active PhD Council that serves the interests of the PhD candidates. This Council consists of ten PhD candidates, one of whom also participates in the Training & Supervision Plan Committee. The Council meets with the scientific director and scientific managers of RIHS once every six weeks and welcomes new PhD candidates in a personal meeting.

Quality assurance and supervision
The committee learned that every PhD candidate at RIHS is allocated at least two supervisors, one of whom is the promotor. In addition, every student has a mentor that acts as an independent supervisor, monitoring the general progress, giving career advice, and assisting in case of problems. PhD candidates indicate that the mentorship is highly appreciated. A Training & Supervision Plan (TSP) is used to evaluate the PhD candidate’s progress in research and education on a yearly basis. The plan also contains agreements about responsibilities of the supervisors.

Programme content and structure
The RIHS training and education programme may be tailored to the personal interests and career plans of the PhD candidate. All RIHS PhD candidates follow the RIHS introduction course at the start and a research integrity course in their second year. The students can also follow courses at other Graduate Schools of Radboudumc, Radboud University, and elsewhere. The PhD courses are evaluated with questionnaires and an evaluation meeting; these are used to improve the courses. In discussion with the committee, PhD candidates mentioned that flexibility and support for family issues, such as pregnancy, are among the few things to further improve.
**Duration and success rate**
At present, the average duration of a regular (full-time) PhD track at RIHS is 5.5 years. About 12% graduates in 4 years, and receives a €750 bonus. In the period 2009-2017, around 4% of the students discontinued their PhD track for various reasons. RIHS has made the €20,000 bonus that the promotor receives after completion of a PhD thesis dependent on having an approved TSP of the candidate. This was implemented after noticing that especially part-time PhD candidates did not submit a TSP. Other measures of RIHS to reduce the duration include the Hora Est PhD tracking system, reducing the number of papers to be written (3-5), and the regulation that the institute director needs to approve extension of contracts. It is important to secure that for part-time PhD candidates with clinical duties, a defined time slot is available for their PhD-work giving them sufficient opportunity to perform research.

**Guidance to the job market and career prospects**
The RIHS training programme also helps PhD candidates to acquire competencies that are necessary to take the next step in their careers. The RIHS PhD Council and the Radboud Postdoc Initiative regularly organize workshops about career planning and opportunities. Recently, a two-day career development course (‘The next step in my career’) for PhD candidates and postdocs was developed in collaboration with the Valorization Department. Highly talented PhD candidates may participate in the Radboud Da Vinci Challenge, which is a one-year programme that offers PhD candidates the opportunity to deepen and broaden their scientific and personal development.

The career prospects of the PhD graduates seem to be good, with most of them finding positions in healthcare or academia. Indeed, the PhD candidates that the committee met were optimistic about their career prospects. The institute is realistic about the PhD candidates’ career options and continuously creates awareness of the fact that a minority of PhD candidates will be able to establish a successful career in research. The committee supports this. RIHS has been collecting career prospect information since 2012. RIHS graduates found subsequent employment in research (27%), teaching (9%), healthcare (39%), a combination of healthcare and research/teaching (14%), policy (6%), or other sectors (5%).

### 3.4 Assessment of RIHS facilities, research integrity policy, and diversity policy

**Facilities**
As explained in Chapter 1, Radboudumc researchers have access to 19 Radboudumc Technology Centres (RTCs), which provide technological expertise, equipment, and biobanks. Of the six central RTCs, RIHS formally supervises the Biostatistics, Clinical Studies (as of 2019), Data stewardship, and the Radboud Biobank. Especially the newly developed Digital Research Environment (DRE) supports the good research practices according to the FAIR Principles. Clinical Studies (as of 2019) provides support in the conduct of clinical research involving humans (mainly phase 1-3 trials). The RTCs will be discussed further in Chapter 5.

**Research integrity policy**
During the site visit, the assessment committee also addressed RIHS’ research integrity policy. RIHS appears to foster a safe atmosphere with open communication about integrity-related issues (e.g.,...
on co-authorship). PhD candidates are aware of grey areas, and generally know how to act. With the research integrity course, the institute actively trains its PhD candidates to understand the dilemmas and temptations regarding research integrity. The committee is of the opinion that senior researchers (including those in tenure) should also be trained in integrity. The topic of research integrity will be discussed in more detail in Chapter 5.

Diversity policy
RIHS recognizes the added value of diversity to represent a wide range of backgrounds, perspectives, and experiences, promoting the quality and effectiveness of scientific teams. In 2017, 53% of RIHS’ scientific staff was female (64% of PhD candidates, 57% of postdocs, 49% of assistant professors, 38% of associate professors and 25% of full professors). RIHS is moving towards the Radboudumc goal of at least 30% female professors in 2020. The committee was intrigued by the fact that most PhD mentors are female, whereas most supervisors are male. In terms of creating change, this might offer an option.

As regards diversity in nationality, 8% of the RIHS scientific staff originate from outside the Netherlands (9% of PhD candidates, 24% of postdocs, 7% of assistant professors, 8% of associate professors, and 5% of full professors). This relates to some extent to the fact that the Master’s students are not very international either, and they serve as a natural pool of PhD candidates. Some groups are quite international, but others are fully Dutch. This is the consequence of RIHS projects in which Dutch-speaking patients are involved. The institute stimulates both diversity and integration, by encouraging the use of English in all communication and by allocating a buddy to foreign PhD candidates to facilitate their integration in the academic and social life of Nijmegen. In addition, the institute has Hypatia fellowships that are exclusively open for scientists outside Radboudumc. It actively invests in partnerships outside the Netherlands. In spite of these measures, the committee did not meet many scientists with a non-Dutch background during the site visit. The committee will elaborate on the topic of diversity in Chapter 5.
4. Assessments per theme

4.1 Healthcare improvement science

Leader: Gert Westert
Academic staff in 2017: 119 FTE; 364 persons

This theme focuses on specialized questions addressing general healthcare outcome and delivery, and goes beyond the traditional boundaries of disease-oriented themes. Central aim is to develop and execute multidimensional and multidisciplinary research to better understand how person-centred evidence-based medicine and healthcare delivery in the complex context of daily practice are linked. Research focuses on four lines of research: (i) Generic mechanisms in healthcare; (ii) Patient-centeredness; (iii) Improving value of care delivery; and (iv) Novel research methods and approaches; together comprising 22 research topics. The theme is affiliated with a number of Centres of clinical expertise, such as Radboudumc Alzheimer Center, Radboudumc Center of Expertise for Pain and Palliative Medicine; Radboudumc Center of Expertise for rare congenital developmental disorders; and Radboudumc Center for Oncology. The theme actively supports the Health data, Health economics, and Biostatistics RTCs. Healthcare improvement science also participates in for instance the so-called ‘academic working places’ (for research outside the hospital), in the REshape center (technological healthcare innovation), Celsus center for sustainable healthcare, and the Transmural Knowledge and Innovation Center, all contributing to implementation in healthcare outside of the UMC.

Research quality
The Healthcare improvement science theme performs excellent research; it has been at the level of world leadership in its field already for some decades. The theme is very productive, and leading in the topic of primary care science, integrated care, quality of care, and the related methodology. It also provides highly relevant expertise to the other themes in RIHS, to be connected with clinical and basic science.

Societal relevance
The committee considers the work of this theme highly relevant to society. The researchers are addressing healthcare and societal problems very well, for example the work on chronic illness in general practice, and the care programme for improvement of detection and treatment of depression. The relevance relates to their contribution to health policy, their contributions in international guidelines, and their impact outside the UMC, for instance through the academic working places. A particular example is the programme ‘Doen of Laten’, showing that 40% of healthcare is not effective and sometimes even harmful. Implementation of the themes’ quality of care research in Radboudumc can be strengthened.

Viability
Overall, the committee rates the viability of the theme as very good. It is important that the internationally leading research in primary care and quality of care keeps its visibility. The current PI
system should be reconsidered as it is not helpful for part-time researchers who are also involved in clinical or professional practice to progress into senior academic ranks and to prepare for new leadership. While the patients’ perspective is key in this theme, it is not always clear whether they are optimally participating, not only as research object but also in designing the research.

4.2 Cancer development and immune defense

Leader: Joop Jansen
Academic staff in 2017: 128 FTE; 190 persons

This theme aims to be a leading Centre of expertise regarding the pathogenic mechanisms and development of targeted (immune)therapy in cancer. In order to reach this goal, the focus is on gaining more insight into the immunological, molecular, and (epi)genetic processes that are involved in tumour development, outgrowth, immune control, and therapy response. Research is centralized around two lines: Treatment using the immune system, and Treatment directed against molecular defects; ranging from molecule to man, to population. The theme uses and requires advanced research infrastructures, and it has developed several platforms, for instance In vivo imaging of compounds and cells, single cell transcriptome infrastructure and (epi)genomic platforms and bioinformatic specialists, in addition to specific animal models, biobanking and cleanrooms for GMP. These facilities are now part of the Radboudumc Technology Centres, providing state-of-the-art infrastructure, which provides opportunities for this theme to work more closely with disease-oriented themes. In addition, (international) collaborations were established with for instance the International Human Epigenome Consortium, large EU-oriented training and education networks, the national Oncode Institute, as well as contributions to enhance a national biobank.

Research quality
The Cancer development and immune defense theme performs excellent research. Excellence is primarily in two fields: immunology and -omics. The clear research focus is a strength with tumour immunology and epigenetic research at the centre. It could be too narrow and turn into a weakness if the momentum in immune therapy turns. The Dendritic cells vaccination research is cutting-edge. However, it is not clear whether this will eventually result in an ‘off the shelf’ product. Linkages with disease-oriented themes could be improved. The research around the Lynch syndrome may serve as a good example.

Societal relevance
The research of this theme is highly relevant to society. The impact of research that has made it all the way to implementation of melanoma treatment is impressive, requiring a lot of commitment in carrying out investigator-driven phase 3 clinical trials. The effort to bring top of the world basic research in immune defense treatment to the clinic cannot be underestimated. There also is a lot of energy in dendritic cell vaccination, as was shown for the prevention of cancer development in patients with Lynch syndrome, but the clinicians need a bigger research team, and the GMP facilities (clean rooms) are limiting, making it difficult to keep it going. Competition with big pharma on this
topic could be both a risk and an opportunity and relates to the previous remark on the ability to produce ‘off the shelf’ products.

**Viability**

Overall, the committee rates the viability of the Cancer development and immune defense theme as very good. The theme has proven that it is able to manage very complicated R&D from basic science to use in the clinic. It builds upon strong researchers, and the number of postdocs is higher than in other themes. However, the majority of them are Hypatia fellows, which may put the tenure system under pressure on the longer term, and may dilute the number of research topics. The theme has a strong technology dependency, in terms of biobanking, clean rooms, and trial logistics, and the committee wonders whether that is sufficiently taken care of financially. GMP facilities are enormously costly, and the theme would prefer to put all cleanrooms together, where they can be used under the responsibility of the pharmacy department. Collaboration with bioinformatics could be intensified. Running and organizing DC vaccination is a major operation. Future use of it also depends on the perception of citizens and patients on preventive vaccination strategies in population health and thereby poses a risk.

### 4.3 Rare cancers

**Leader:** Carla van Herpen  
**Academic staff in 2017:** 52 FTE; 158 persons

The mission of the theme is to improve diagnosis, treatment, and outcome of rare cancers, by performing translational research, clinical studies, and population-based research. The research focuses on seven main domains, four of which are connected with the European Reference Network (ERN) for adult rare solid cancers (EURACAN), and one with EuroBloodNet (for rare haematological diseases). The domains are: Head and neck cancer, Sarcomas, Endocrine tumours, Brain tumours, Rare haematological malignancies, Adolescent and Young Adult (AYA) research, and Lung and trachea cancers (although this is not rare). Collaboration with (inter)national partners and patient advocacy groups is key. For rare cancer research and patient care, research infrastructures are crucial and hence the Radboud Technology Centres play a key role, as well as the close connection with the Radboud Center for Oncology. Collaboration with the Maastricht UMC is secured for proton therapy.

**Research quality**

The Rare cancers theme performs very good research, building upon national registries and clinical research. There is a significant amount of contract research, which might be a risk factor for curiosity-driven research. The committee recommends increasing the focus and building a stronger connection with basic research, including overarching research questions that connect scattered rare cancers to more common type of cancers. More focus is needed when there are many part-time researchers resulting in a relatively low number of FTE.
**Societal relevance**

The committee considers the work of this theme **very relevant** to society. Rare cancers (<6/1000) often suffer from late diagnosis, with a 13% poorer overall survival than common cancers, and this theme fights to give them a diagnosis as early as possible. Patients from the rare cancer patient group (NFK) are involved and contribute to the research agenda, through a patient network that meets once a month. The theme leader has a leading role for the national registries and international connection is anticipated, but it takes time, effort, and funding to take up international leadership. International collaboration as in RARECAREnet and ERNs is important, but although Radboudumc is an ERN for some tumours, it is not very clear how the theme will link to the international projects in the broadest sense. And how will the link and collaboration be made with regional and national projects, and general practice/cancer registries? Hence, prioritizing seems needed. Collaboration with other disease-specific themes that also have rare varieties among their theme (Women’s cancer and Tumours of the digestive tract, for instance) could be intensified. The work on lung cancer, which is a very common cancer type, is very relevant for society due to the impact of the disease and the possible prevention. Visibility of this theme on the Radboudumc website could be further enhanced.

**Viability**

Overall, the committee rates the viability of the Rare cancers theme as **good**. The theme has the problem of being a collection of small topics that are not necessarily related clinically. Many rare cancers are not addressed, and not all topics are rare (e.g., lung cancer). At the initiative of Center for Oncology, there have recently been two new professors appointed in the field of (non-rare) lung cancers. At the same time, within Radboudumc some rare cancers are part of the common cancers in which they are more logically in place. Therefore, the choice for the topics in the theme is not intrinsically clear. An additional complication is that two top researchers are affiliated elsewhere, albeit still collaborating part-time: how will this relation be viable? And there is a risk of few FTE vs. many staff, often part-time junior clinicians doing a PhD, and few postdocs, requiring protection of research time. While there clearly is a wish for a ‘family feeling’ in the theme, the actual synergy does not seem strong. The committee recommends to either rename the theme, or to make lung cancer an affiliated partner. Alternatively, a merger with other themes could be considered to create more critical mass.

### 4.4 Tumours of the digestive tract

**Leader:** Iris Nagtegaal  
**Academic staff in 2017:** 32 FTE; 83 persons

The mission of the theme is to improve the outcome for patients with cancer of the digestive tract through optimal classification of patients, surveillance and early detection, optimal diagnosis including molecular analyses and innovative imaging, and innovation in treatment ranging from improved surgical techniques to immunotherapy treatment. The multidisciplinary research focuses at three main research lines: (i) Discovery of novel genetic and exposure factors; (ii) Evidence-based pathology; (iii) Innovative treatment modalities. The theme is dependent on the Radboud Technology Centres infrastructure, and a particular strength involves a large cohort of well-
characterized patients with (pre)malignant disorders of the digestive tract in Nijmegen, supported by a regional network.

**Research quality**
The ‘Tumours of the digestive tract’ theme performs some **very good** research. The theme - albeit small - is productive in terms of publications. The high impact output is mainly from the genetic researchers. The microbiome research is key for the future of the theme, for instance by exploring the potential synergy of microbiome and immune response, as well as the collaboration with Johns Hopkins Hospital. However, while this theme is essentially translational in nature, the balance is currently towards ‘full-time’ clinicians. The integration between basic science and the clinic could be improved.

**Societal relevance**
The committee considers the work of this theme **very relevant** to society. The molecular diagnostics for evidence-based pathology and specific endoscopic imaging for gastrointestinal tumours is available for large numbers of patients. For instance, metabolic characterization of pancreatic cancer using 18F-FDG-PET will guide personalized treatment. In addition, the theme is very active in clinical guideline committees. Now that patients are primarily treated in peripheral hospitals, the link to research appears more difficult. The committee suggests engaging patients and their representatives as true partners in designing and performing the research.

**Viability**
Overall, the committee rates the viability of the ‘Tumours of the digestive tract’ theme as **good**. In the theme, emphasis is on discovery-oriented basic research, offering opportunities to collaborate more closely with the Cancer development and immune defense theme. Real integration with the clinical work is limited, and research is increasingly dependent on regional collaboration as a result of outsourcing patients to other peripheral hospitals. How is the regional collaboration established? The obvious link to Wageningen University is not so well-described. The low number of FTEs is a risk, with strong dependence on external funding, leaving little room for strategic choices. Furthermore, there are older and young scientists, but not many postdocs in between. The theme seems dependent on a small number of very good PIs, which makes it vulnerable. Collaboration with the Rare cancers theme seems logical. The committee recommends to improve the translational approach and to improve the way research funding is distributed by clinical departments.

4.5 **Urological cancers**

Leader: Tom Scheenen
Academic staff in 2017: 52 FTE; 94 persons

The mission of the theme is to solve the diagnostic and treatment dilemmas for prostate, kidney, and bladder cancer. The focus is on (i) finding biomarkers that can indicate patients with localized tumours; (ii) finding pre-treatment biomarkers that can identify patients who are responsive to specific therapies; (iii) new diagnostic and treatment modalities with better efficacy and less
mutilating effects. The theme is closely connected to several Centres of clinical expertise, coordinating a Radboud Technology Centre, such as the RTC Image-guided treatment, as well as a biobank of a large series of patients with kidney, prostate, or bladder cancer. There are many international collaborations with prominent institutions (Harvard University, University of London).

**Research quality**
With an outstanding worldwide reputation, the quality of this theme’s research is excellent. The theme is under strong international leadership, has good focus, and made well-thought strategic choices focusing on innovation. The excellence is reflected in the bibliometric impact scores (e.g., 6.3% in top 1% most cited papers).

**Societal relevance**
The research of the Urological cancers theme is highly relevant to society. While the work has high clinical relevance, there is immediate implementation in care, for instance through sophisticated imaging and new treatments, biomarkers from urine, and also via clinical guidelines (e.g., mpMRI of the prostate, non-muscle invasive and muscle invasive, as well as metastatic bladder cancer). At the same time, this immediate implementation also promotes fast evaluation and further research. While the theme’s contribution to society is clearly large, the committee feels that collaboration with patients as participants in research needs improvement.

**Viability**
The Urological cancers theme has excellent viability. The researchers managed to secure the succession of the strong leaders, which is a very important aspect. The committee is of the opinion that this theme may extend its capacity in biobanking urine samples, for instance in the pursuit of new biomarkers related to other cancers. The committee also wants to signal that obtaining research grants may be a point of attention.

### 4.6 Women’s cancers

Leader: Leon Massuger

Academic staff in 2017: 58 FTE; 153 persons

The theme is dedicated to the study of malignancies that specifically occur in women, with the goal to improve patient-centred quality of care in partnership with patients and their relatives. Research includes all stages of care: prevention, early diagnosis, treatment and post-treatment follow-up, survivorship, and palliative care. Research topics are breast cancer, ovarian cancer, cervical malignancies, and more rare women’s cancers. The interdisciplinary research team is supported by a Patient Advisory Board, strong collaboration with regional hospitals, and the national expert centre for screening (LRCB). A wide range of RTC-facilities is available for this theme, including biobank specimens, clinical data of large cohorts, long running screening data. Many relevant international collaborations exist, with European and global partners.
Research quality
The quality of the Women’s cancers theme is very good. Combining breast cancer and gynaecology was a challenge but it worked out quite well, according to the committee. Now breast imaging and ovarian onco-protection is a stronghold of the theme, in addition to screening of Human Papilloma Virus (HPV). The upscaling of activities with international partners has started.

Societal relevance
The research of the Women’s cancers theme is highly relevant to society. This is in particular due to the approach of how to involve patients to the agenda setting and research of the theme. The Patient Advisory Board is fully integrated in the organization of this theme. The committee recommends this approach as a best practice for the other themes and for both institutes. In terms of clinical relevance, the change in screening from cytology to HPV testing in the prevention of cervical cancer is highly relevant to society as well, since cervical cancer is the fourth leading cause of cancer death among women worldwide.

Viability
The committee rates the viability of the Women’s cancers theme as very good. The theme has established good collaboration with the Radboud Breast Cancer Center. It recently engaged a new medical oncologist and surgeon, which is supportive to strengthen clinical leadership. At the same time, PI-specific direct research funding is used to compensate deficits in care, a weakness as clearly noticed in the SWOT in the self-evaluation report. Further points of attention according to the committee are: improving coherence in research; future leadership and development of future ideas; and - as in other themes - outsourcing patients to peripheral hospitals requiring regional collaboration. Hiring a surgeon from the periphery might be a good way to establish connections.

4.7 Infectious diseases and global health
Leader: David Burger
Academic staff in 2017: 115 FTE; 238 persons

The Infectious diseases and global health theme (IDGH) seeks to improve the diagnosis, treatment, and prognosis of patients with infections. IDGH scientists use fundamental, translational, epidemiological, and health systems-based approaches. The theme consists of multiple research lines, roughly divided in ‘the pathogenesis, prevention, and treatment of severe infections’ and ‘infections as a major global health problem’. IDGH is affiliated with several nationally recognized centres of clinical expertise: the Center for Innovation and Lead Discovery, Center of Clinical Expertise in Mycology, Center of Clinical Expertise in Lyme Disease, and Center of Clinical Expertise in Q-fever. In addition, the theme is responsible for several Radboudumc research facilities: a clinical malaria trials unit and GMP facilities to develop and test new medicines and vaccines, a malaria unit with advanced facilities to breed parasites and mosquitoes, and strong field sites for TB, HIV, and malaria in Indonesia and East & West Africa.
**Research quality**
The IDGH theme performs **excellent** research. The work on malaria, the innate immune system, Lyme’s disease, fungal diseases, and tuberculosis is at the international forefront. The researchers have published world-leading articles, particularly on innate immunity and new malaria vaccines for humans. Overall, the publication record is excellent, both at the basic science and at the translational level.

**Societal relevance**
The research of the IDGH theme is **highly relevant** to society. IDGH scientists produce applicable knowledge on infectious diseases that constitute serious threats to global health such as malaria, tuberculosis, HIV, and arbovirus infections. They are keenly aware of the problem of antimicrobial resistance and are addressing it. Their collaborations with clinicians within the centres of clinical expertise ensure that they can bring the products of their research to patients. They are actively involved in clinical trials. During the review period, they had a direct impact on healthcare by producing clinical guidelines, participating in advisory boards, establishing patents and spin-off companies, and engaging in public outreach activities. Examples of societal highlights are the New England Journal of Medicine paper on definitive treatment of chronic Lyme disease and the strong drive towards malaria vaccines.

**Viability**
The committee rates the viability of the IDGH theme as **excellent**. The theme has good critical mass and international visibility. It is headed by enthusiastic young leaders that are aware of the importance of focusing. The theme should explore clinical pharmacology as an important aspect of infectious disease research. IDGH has plans to establish a Radboudumc Centre for Infectious Diseases, which combines patient care, education, and research. The committee strongly supports this initiative because it will enable the theme to expand its thematic and societal role.

### 4.8 Inflammatory diseases

**Leader:** Irma Joosten  
**Academic staff in 2017:** 52 FTE; 121 persons

The Inflammatory diseases theme aims to understand and control inflammatory diseases for the benefit of individual patients. Its main focus areas are systemic autoimmune diseases, osteoarthritis, and immune-mediated inflammatory disease of skin, joints, and bowel. The theme consists of three research lines: (i) pathophysiology of inflammation, (ii) personalized medicine in practice, and (iii) population-based biomarker studies. The theme leaders explicitly steer on collaboration. The theme has access to multiple large, well-characterized cohorts of patients with inflammatory disorders. In addition, the theme has access to fully accredited genetic and medical immunology labs as well as human and animal models to study inflammation.
Research quality
The Inflammatory diseases theme performs very good research using conventional techniques. They have published a substantial number of high-impact papers during the review period. The committee recommends to increase the adoption of modern technologies (i.e., omics studies) into the theme’s research.

Societal relevance
The committee considers the work of this theme very relevant to society. With more than two million patients in the Netherlands alone, chronic inflammation is among the leading causes of morbidity and mortality. As the research of the Inflammatory diseases theme contributes to our understanding of these disorders, it is very relevant to society. The researchers are successfully working with patient groups, for instance by involving patients in discussing their research strategy. In addition, they are exerting themselves to create public awareness on the burden of inflammatory diseases. The committee encourages them to continue this effort. The fruitful collaborations with patient groups may be exploited to increase the visibility of the theme.

Viability
Overall, the committee rates the viability of the Inflammatory diseases theme as very good. The theme harbours good scientists. They have been struggling with their visibility and identity during the review period, and have tried to improve the theme’s coherence by focussing on common underlying mechanisms of inflammatory diseases. The committee suggests more collaboration with the themes of Renal disorders and Infectious diseases and global health. To increase the theme’s viability, the committee recommends to:
- pay attention to succession planning,
- introduce young clinical scientists at the right place,
- ensure that the theme’s research laboratories are located in close proximity within the new Radboudumc building.

4.9 Mitochondrial diseases
Leader: Jan Smeitink
Academic staff in 2017: 34 FTE; 72 persons

The mitochondrial diseases theme seeks to understand cellular bioenergetics in health and disease at all levels of complexity. This should enable the theme to develop preventive and supportive measures and substantially contribute to the development of rational treatment strategies for mitochondrial diseases. The researchers focus on the mitochondrial oxidative phosphorylation system, in particular on the respiratory chain complex I. The theme consists of three highly integrated research lines: (i) structure and function of molecules and complexes, (ii) cellular consequences of hampered oxidative phosphorylation, and (iii) clinical aspects of mitochondrial diseases. The theme is aligned with the Radboud Center for Mitochondrial Medicine, which is an internationally acknowledged reference center for patient care, diagnostics, counselling, education,
and research in the area of mitochondrial medicine. In addition, the theme is part of the European Reference Network EURO-NMD and it plays a leading role in several RTCs and other facilities.

**Research quality**
The Mitochondrial diseases theme performs **excellent** research. The science is at a world-leading level, with many influential papers and prestigious personal grants. An example of a research highlight is the development of innovative live-cell read-outs being instrumental in the selection of drug candidate KH176 (by Khondrion), which has successfully passed phase II studies now.

**Societal relevance**
The research of this theme is **highly relevant** to society. The researchers use the term ‘patient to patient’ to describe their research, meaning that they start with understanding pathophysiology in patients, proceed to drug development and animal studies, advance to clinical trials, and then bring the products of these trials back to patients. To this end, they have launched a spin-off company (‘Khondrion’) that develops new drugs for mitochondrial diseases. The scientists also closely interact with patient advocacy groups, meeting approximately every three months and learning from them. In addition, the theme organizes outreach events such as national patient information days, and has written several publications for a large audience.

**Viability**
The committee rates the viability of the Mitochondrial diseases theme as **very good**. The leadership is strong and the theme has demonstrated its ability to obtain external funding. However, the theme is facing the challenge to adapt to the forthcoming changes in senior staff and leadership and to maintain a critical mass and sufficient funding by attracting new and highly qualified staff, reinforcing and complementing the research portfolio. There are plans to appoint two new chairs: a preclinical scientist who will decipher mitochondrial pathways and a clinical scientist who will further fortify the translation to the clinics. The committee supports these plans.

### 4.10 Reconstructive and regenerative medicine

**Leader:** Wout Feitz  
**Academic staff in 2017:** 83 FTE; 251 persons

The Reconstructive and regenerative medicine theme (RRM) aims to develop personalized care and cure for patients needing reconstructions of abnormal, lost, or damaged tissues and organs. The theme consists of three research lines: (i) surgeon of the future, (ii) materials to support self-healing, and (iii) regrowing tissues, organs, and limbs. This theme is affiliated with the nationally acknowledged Radboudumc expertise centres for Congenital Diaphragmatic Hernia and Neonatal Pulmonary Hypertension, Center for Colorectal Surgery, Craniofacial team Nijmegen, Center for Hemangiomas and Congenital Vascular Anomalies Nijmegen, (Pediatric) urology center, and the Cleft (Lip and) Palate Center Nijmegen. In addition, the theme is linked to the European Reference Networks eUROGEN, CRANIO, ERNICA, and VASCern.
Research quality
The quality of RRM research is very good, with substantial variation between the research groups. Some specific fields and researchers within this theme perform at a very high level, whereas others seem to lag behind. Some RRM scientists have received highly prestigious personal grants, including an ERC Advanced grant.

Societal relevance
The work of this theme is very relevant to society. In theory, reconstructive and regenerative medicine may have far-reaching implications for personalizing healthcare, from partially solving the problem of organ donation to improving wound healing. Indeed, the theme’s work has resulted in several clinical applications, including a technology to predict femoral bone strength in metastasized cancer patients and a temperature-sensitive hydrogel that was developed in collaboration with researchers of the nanomedicine theme. A patent has been filed for the latter and a spin-off company (‘Secmatix BV’) has been launched. In addition, the theme has contributed to clinical guidelines, written chapters in medical books, engaged in outreach activities, and filed for several patents. Patient involvement in the RRM research is limited, so the committee encourages the theme to improve this. In addition, the committee encourages the theme to intensify its collaboration with the Nanomedicine theme, which is expected to increase the societal impact of both themes.

Viability
Overall, the committee rates the viability of the Reconstructive and regenerative medicine theme as good. The field of regenerative medicine is on the rise worldwide and the theme harbours several excellent scientists. However, the research within the theme is rather conservative. In addition, there seems to be a lack of focus within the theme and unclarity about future directions. The committee has several recommendations to improve the theme’s viability:
● Intensify the interactions with the nanomedicine theme, for instance through joint PhD projects.
● It is important to focus, so cut research that is not fruitful.
● Many PIs will be leaving soon, so a strategy to fill these vacancies is required. In this context, the committee supports the theme’s efforts to establish a chair in regenerative medicine. This person should have the drive and skills to interact with the nanomedicine group. Experience in adult stem cells should also be in evidence.

4.11 Renal disorders
Leader: Joost Hoenderop
Academic staff in 2017: 68 FTE; 139 persons

The Renal disorders theme aims to lead discovery in the field of kidney disease research, with the ultimate goal of achieving excellent, efficient, innovative prevention and clinical care for renal disorders. The research focuses on understanding the molecular mechanisms, physiology, and pathogenesis of glomerular diseases and tubular transport disorders, including acquired and inherited forms of kidney diseases. The theme consists of four research lines: (i) glomerular disease, (ii) tubular disorders, (iii) ciliopathies, and (iv) renal replacement therapy. The theme’s clinical
research is embedded in a nationally recognized expert centre: the Radboudumc Center of expertise on rare kidney disorders and the European Rare Kidney Disease Reference Network (ERKNet). There are affiliations with several other centres of clinical expertise. A variety of technologies and models have been developed or are available to the researchers.

**Research quality**
With an excellent worldwide reputation, the quality of this theme’s research is **excellent**. An example of a research highlight is the discovery of a new rare kidney disorder: salt losing tubulopathy due to mutations in claudin10.

**Societal relevance**
The research of the Renal disorders theme is **highly relevant** to society, as kidney diseases pose a significant global health problem. The scientists of this theme generate valuable knowledge that can be used to improve the treatment of kidney diseases, and the cooperation with the kidney patient association in research and education is strong. For instance, they have identified several rare kidney disorders and have produced a guideline for a restrictive eculizumab regime in atypical haemolytic uremic syndrome patients. They are very active in public outreach activities, such as the World Kidney Day. The committee considers this theme an example of best practice in patient involvement.

**Viability**
The Renal disorders theme has **excellent** viability. It is a coherent and strong theme with excellent leadership. It has been able to secure many grants. The research is focused, which is applauded by the committee.

### 4.12 Vascular damage

**Leader:** Gerard Rongen  
**Academic staff in 2017:** 51 FTE; 175 persons

The Vascular damage theme aims to prevent and treat cardiovascular disease by deciphering causes and consequences of vascular wall pathology, with a focus on atherosclerosis. The theme consists of three research lines: (i) pathogenesis of atherosclerosis and its consequences, (ii) pathogenesis of genetic, metabolic, and endocrine causes of vascular damage, (iii) personalized diagnostics and treatments of atherosclerosis and its consequences. The theme is affiliated with the Radboudumc Cardiovascular Center, which integrates care, research, and medical training around the patient with cardiovascular disease. In addition, the theme is affiliated with the Center for Hemangiomas and Congenital Vascular Anomalies Nijmegen, the Radboudumc Center of expertise for Adrenal Gland Diseases, and the Hemophilia Treatment Center.

**Research quality**
The quality of the Vascular damage research theme is **very good**. It constitutes strong research in a competitive area. The researchers are well-known for their ultrasound studies of plaques and their
research on the influence of physical exercise on the cardiovascular system. The committee encourages the theme to continue the work in these areas.

Societal relevance
The committee considers the research of this theme very relevant to society because the results help to improve the diagnosis, risk prediction, and prevention of atherosclerosis, which constitutes a major health problem. The theme is strongly clinically-oriented and many clinicians are involved in the research. They have produced clinical guidelines and have filed for several patents. Patient involvement and educational activities at a national and international level are limited.

Viability
Overall, the committee rates the viability of the Vascular damage theme as very good. It has recently acquired a substantial amount of external funding. The committee has several recommendations to improve the theme’s viability:
- They should sharpen their profile to increase their visibility. In this context, elaborating the functional significance of innate immunity constitutes a unique opportunity.
- They should collaborate with the themes of Inflammatory diseases and Infectious diseases and global health, particularly with respect to chronic inflammation in vascular damage.
- The committee suggests to critically reconsider the uniqueness of uric acid research and the new focus on this topic.

4.13 Nanomedicine

Leader: Daniela Wilson
Academic staff in 2017: 31 FTE; 55 persons (RIMLS researchers only)

The Nanomedicine theme seeks to design and synthesize molecular assemblies, in order to understand and manipulate cellular functions and generate precise solutions for intricate medical challenges in diagnosis and therapy of diseases. The theme consists of two research lines: (i) cellular and extracellular nano-organizations and (ii) precision diagnostics and therapies. Researchers within this theme are either affiliated to RIMLS or to the Institute for Molecules and Materials (IMM) of the Faculty of Science. In this evaluation, the committee exclusively focused on the RIMLS researchers. The theme has close ties with the Donders Centre for Neuroscience and two recently established outreach initiatives: the Radboud Nanomedicine Alliance and the Nanomedicine Living Lab. In 2018, these two initiatives have merged into a single entity, bridging nanomedicine innovation to societal needs and their commercial applications.

Research quality
The committee is impressed by the excellent quality of the research of the Nanomedicine theme. The theme has published very high-quality papers and is conducting very strong innovative science.
Societal relevance
Nanomedicine as a research topic constitutes a unique opportunity for collaboration between basic and clinical scientists. However, such collaboration has not been sufficiently realized within Radboudumc yet, due to a lack of clinical involvement in the theme. Clinical involvement is crucial to increase the societal relevance of the nanomedicine research at Radboudumc. Therefore, the committee urges the more clinically-oriented themes (for instance the Reconstructive and regenerative medicine theme, but other themes as well) to strengthen their interactions with the Nanomedicine theme and encourages the Nanomedicine theme to continue its efforts to involve clinicians. Having said that, the theme is actively striving to have societal impact: the scientists have written book chapters, filed for several patents, and provided consultancy and advisory services. Taken together, the committee rates the societal relevance of this theme as good.

Viability
The viability of the Nanomedicine theme is very good. It is a unique team of scientists with high potential. To improve the viability, the committee has the following recommendations:
- Intensify the interaction with the RRM theme and other themes (as explained above).
- The committee supports the instalment of a chair in translational nanomedicine.

4.14 Summary in numerical scores
In line with the qualitative judgements of the themes’ research described in sections 4.1-4.13, the committee has assigned scores to the themes. The four possible scores are excellent (=1), very good (=2), good (=3), and unsatisfactory (=4). The scores are explained in more detail in Appendix 4 of this report. The committee would like to note again that this scoring system is not very sensitive and does not allow for heterogeneity in the assessment of subgroups within the themes.

Table 2: Quantitative assessment of 13 Radboudumc research themes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Research quality</th>
<th>Societal relevance</th>
<th>Viability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare improvement science</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Cancer development and immune defense</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Rare cancers</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Tumours of the digestive tract</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Urological cancers</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Women’s cancers</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Infectious diseases and global health</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Inflammatory diseases</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mitochondrial diseases</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Reconstructive and regenerative medicine</td>
<td>2</td>
<td>2</td>
<td>3</td>
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<td>Column 1</td>
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<tr>
<td>Renal disorders</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Vascular damage</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Nanomedicine</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>
5. General observations and recommendations

Overall, the committee is of the opinion that RIHS and RIMLS have established impressive research programmes, with a number of groups among the world leaders, with high societal relevance. The committee supports the key strategic areas that Radboudumc has laid out in the future research strategy in its self-evaluation report (‘excellence’, ‘patients as partner’, ‘focus’, ‘training’, ‘integrity’, infrastructure’, and ‘networks’). The documents provided to the committee show thorough thinking about future developments and their implications for the organization. They proved to be good starting material for the site visit, which was characterized by open and interesting discussions, where the committee met highly motivated and enthusiastic researchers. The SWOT analyses in particular were very transparent and highly appreciated. Given the size of the organization and the short duration of the site visit, the committee feels that its judgement will not cover all details. In this Chapter, general observations and recommendations that apply to both RIMLS and RIHS will be discussed.

Organizational structure

Radboudumc has a rather complex organizational structure, with a matrix of departments, institutes, themes, and centres. At present, the department chairs are responsible for human resources and the budgets, and the institute directors have a very limited budget at their disposal. While basic, clinical, and health scientists should work together within the themes, the steering of research and talent is incentivized at another level. In addition, researchers tend to collaborate more easily within the clinical centres than across themes, maybe as a consequence of the disease orientation of the themes. Some of the themes are small, and/or are a collection of (unrelated) topics, in which overarching research questions are lacking. Adverse effects of such organization are described in one of the SWOTs in the institutes’ self-evaluation report: ‘Direct research funds are sometimes used to cover financial deficits of clinical departments.’ The committee also heard that the complex matrix context results in an excessive administrative burden for young researchers. Taken together, the structure does not seem to work optimally for several themes.

Indeed, the organizational structure is a topic of ongoing discussions in the Radboudumc Executive Board. In addition, RIMLS researchers advocated a minimal organizational structure, with research groups as basic units, in a 2017 evaluation. In order to establish such a researcher-centred approach, organizational and financial processes should be organized accordingly.

The committee agrees that the complex structure calls for critical reflection. Perhaps, a minimal organizational structure with a research group plus group leader as the basic unit would be more appropriate. This may also prevent fragmentation of budgets over an increasing number of PIs. However, such a reorganization may also change the atmosphere within the research groups because it may result in within-group competition. These arguments should be carefully balanced and discussed with those involved. In general, those in charge of research should be involved in important research policy decisions, and this should be supported by responsibility for budgets as well (together with clinical department heads). At the same time, the committee realizes that significant reorganization efforts have been made following the previous evaluation and that restarting structure changes may not be welcomed by the research community. However, the issues just mentioned deserve rethinking, given the committee’s interviews and observations.
The institutes have also asked the committee to reflect on a possible merger between RIMLS and RIHS. The committee would advise against such merger. It is the committee’s impression that imbalance in the matrix structure and funding responsibilities rather than the existence of two institutes causes difficulties in directing Radboudumc’s research. Merging the institutes would not solve this issue, and the institutes function well as organizers of the Graduate Schools. Moreover, if the Radboudumc mission remains ‘from molecule to man, and from man to population (and back)’, top leadership, oversight over research units (or themes), and institutional support are required for both sides of this research spectrum, in mutual balance and complementarity.

*Interaction between clinical and basic science*

Although the themes have promoted interaction between clinical and basic scientists, this interaction could be further strengthened, also in connection with population scientists. In order to achieve this, proximity will be helpful. The new building constitutes an excellent opportunity to ensure close physical proximity of researchers and clinicians, as well as research laboratories that collaborate. The committee recommends maximally exploiting this opportunity and ensuring optimal interaction between basic and clinical scientists.

*Staff and PI system*

The committee made several observations related to the staff of the institutes:

- There appears to be a quick growth in newly created permanent positions, amongst others instigated by the Hypatia program. The committee recommends limiting the number of permanent PI positions within the institutes because it eventually leads to too many senior PIs with their own group, thereby fragmenting financial resources and generating a lack of scientific focus.
- Although there was some confusion about the label of ‘postdoc’ during the site visit, the number of postdocs within the institutes appears to be small compared to the number of PhD candidates. The committee met several postdocs (or assistant professors) that supervised as many as eight PhD candidates. The committee recommends establishing a larger ‘middle layer’ of people having the required subject matter expertise and experience in relevant methods and techniques. This also applies to support staff.
- There should be clarity on titles of postdocs. Postdocs are often registered under a different label (e.g., ‘assistant professor’) in the Radboudumc HR system.
- Career perspectives and research time of clinical researchers (i.e., medical doctors doing research) and biomedical researchers are different, which is not always acknowledged. This issue is not specific for the Radboudumc, but applies to all UMCs in the Netherlands. It was addressed in a national advisory report by the Health Council of the Netherlands (‘Onderzoek waarvan je beter wordt’).
- In the PI system, career opportunities are not well-arranged for part-time researchers that are involved in clinical care or public health, within or outside Radboudumc. This may hamper their career development towards seniorship, and may also result in missing opportunities for Radboudumc to realize practice-related scientific leadership, which is essential for productive translational research.
- The PI criteria do not sufficiently consider family planning issues, which is a disadvantage especially for female researchers to progress their careers. This is just one example that may
cause the slow progress in the number and percentage of female full professors. Awareness of implicit biases with regard to gender and diversity is critical and should have priority.

**Patient participation**
The committee included two patient representatives, in line with Radboudumc’s strategic area ‘Patients as partner’. These committee members were asked to specifically pay attention to the societal relevance of the research and to the way patients are included in research. The assumption is that patient participation will lead to better science and strategies, which in turn will lead to better healthcare for patients. The committee would like to raise the point that Radboudumc frequently mentions that there is a lot of contact with patient organizations and that it invests a lot of effort in public and patient-directed events. Indeed, for patient organizations the credo is ‘Nothing about us, without us’. But what is the patient perspective in the eyes of the Radboudumc professionals? What is expected from patients and how are they supported to fulfil such roles? Moreover, being a partner in research as a patient requires a lot of time and preparation, and this effort must be optimally utilized. This should be further discussed at all levels between institute, themes, and patient representatives alike to enable true patient involvement and to prevent tokenism. The committee highly appreciated that patient participation was included in the research assessment process. The involvement of patient representatives in research currently differs between themes, and the committee appreciated best practices in a few themes (e.g., Women’s cancers). In future assessments, the evaluation should not only focus on how or how well researchers involve patients, but also on the role and input of the patient representatives to the theme.

**Facilities**
Radboudumc researchers have access to 19 Radboudumc Technology Centres (RTCs), which provide technological expertise, equipment, and biobanks. The committee learned that Radboudumc currently is in the process of critically evaluating the RTCs. The committee does not consider it appropriate to judge the organization and performance of the RTCs in detail because it did not have the opportunity to visit any of the RTCs. Some general recommendations regarding the RTCs, based on the self-evaluation report and the interviews, are:

- In general, well-functioning core facilities are crucial to a modern medical research institution.
- There currently is no advisory board for the RTCs; the committee recommends installing such a board.
- Radboudumc scientists with knowledge of the relevant technologies should be able to influence the organization of the facilities.
- The RTCs do not seem to have enough visibility within the institutes. This should be improved.
- High-quality biobanks (with more than pathological samples alone) constitute a goldmine for a modern medical research institute. Therefore, a research agenda on biobanking is a crucial aspect of the institutes’ policy. Researchers should be able to proactively influence this research agenda.
- The Biostatistics and Data stewardship RTCs seem less supported than the Biobank or more technical facilities.

**Research integrity policy**
The institutes appear to foster a safe atmosphere with open communication about integrity-related issues. Radboudumc has adopted the Netherlands Code of Conduct on Academic Practice as issued by the VSNU, which addresses topics such as honesty and scrupulousness, reliability, verifiability,
impartiality, independence, and responsibility. Radboudumc and Radboud University have implemented additional policies, such as the Radboudumc Research Code. Radboudumc’s intranet offers an ‘integral quality system scientific research’, which serves as a guideline, tool, and reference book for clinical research. Scientists can approach one of three Radboudumc contact persons in case of integrity-related issues, including suspicions of scientific misconduct. These persons operate in a strictly confidential manner. PhD candidates can also contact their mentor.

The institutes actively train their PhD candidates to understand the dilemmas and temptations regarding research integrity. For instance, ethical issues and self-reflection are covered in the mandatory RIHS introductory course, in the mandatory RIMLS introductory course ‘In the lead of your PhD’ and in the mid-term RIMLS PhD course ‘Within sight of my PhD’. In addition, there is a compulsory two-day scientific integrity course for second-year PhD candidates. The supervisors are invited to participate in this course as well. In 2017, the first RIMLS PhD mentor meeting was organized, where mentors openly discussed integrity problems and how to act when confronted with them.

The committee is pleased that research integrity is covered in the PhD training at Radboudumc. In general, the institutes are obviously aware of the importance of research integrity and there were no indications of serious research integrity issues in RIMLS and RIHS. However, decision making related to co-authorship issues was mentioned as a challenge in connection to integrity. This relates to the ‘publish or perish’ debate in science. However, the committee feels it cannot perform an in-depth evaluation of this topic because there was insufficient time to cover this in detail during the site visit. The committee is of the opinion that senior researchers (including those in tenure) should also be trained in integrity.

Adequate research data management contributes substantially to research integrity and research quality. Radboudumc has introduced electronic laboratory notebooks and a digital research environment to facilitate research data management. In 2014, Radboudumc started implementing electronic laboratory notebooks of Labguru. At present, researchers of more than 20 departments use these notebooks for day-to-day registration of experimental procedures and data acquisition. It seems to be a secure, web-based platform that can be accessed simultaneously by PhD candidates, postdocs, and their supervisors.

In 2017, Radboudumc launched its Digital Research Environment (DRE), which is a web-based secure environment for data management and analyses. The DRE ensures that there are trails of different versions of both data and programmes, that a ‘third user’ can be invited to the data without transferring data, that identifiable data are pseudonymized, and that data can be made accessible according to the FAIR Principles. Researchers at Radboudumc have to use the DRE unless its functionality is insufficient or if they can prove that they arranged the same functionality in an alternative way. At present, a team of data stewards helps researchers switch to the DRE. In the near future, Radboudumc institutes will appoint an additional dedicated quality officer, who will advise researchers on data handling and coordinate the collection of data handling tracers, as well as attend to RTC data stewardship for FAIR related matters. The committee applauds Radboudumc’s initiatives to promote adequate research data management and encourages the institutes to continue along this line.
Diversity policy
The institutes would like to achieve the goal of at least 30% female professors in 2020, but they struggle to achieve this goal. Indeed, the committee considers the percentage of female staff at the senior PI level too small. The committee recommends investing in measures to stimulate a family-friendly environment during the various phases of career development. For instance, the current five-year tenure track does not take into account maternity leave. It may be worthwhile to refer to the framework of the Athena SWAN (Scientific Women’s Academic Network) initiative in the UK, which recognizes organizations’ commitment to, and progress on, equality and diversity, particularly ethnic and migration background and gender.

As regards diversity in nationality, the committee was surprised by the limited number of international staff members in the interviews. Internationality is an important topic; welcoming scientists from abroad contributes substantially to the prestige of a great institute. The committee encourages the institutes to strengthen their efforts to promote international participation.

To summarize, the committee’s main recommendations are:

Research quality, societal relevance, and viability
1. Critically evaluate the organizational structure with departments, institutes, themes, and centres, and consider a more researcher-centred approach. Simplify/decrease the administrative burden for young researchers.
2. Critically evaluate the current PI system.
3. Assign more budget responsibilities to RIMLS and RIHS and the research leadership.
4. Refrain from merging RIMLS and RIHS.
5. Improve the career/senior perspectives for part-time researchers that are active in healthcare, also at the level of professorships.
6. Maximally exploit the opportunity that the new building offers to ensure optimal interaction between basic and clinical scientists, and also between clinical and health scientists.
7. Improve the quality and level of patient participation in research themes where this is suboptimal.
8. Ensure a proper balance between the numbers of PhD candidates and postdocs.
9. Limit the number of permanent PI positions within the institutes, to ensure new talent coming in.
10. Install External Advisory Boards for the institutes.
11. Give the Internal Advisory Board of RIHS a better-defined role.

PhD programmes
12. Implement a formal go/no go evaluation at the end of the first year.
13. Develop minimal standards for PhD graduation and communicate these clearly.
15. Analyze the factors that may cause unnecessarily long durations for both part- and full-time PhD candidates and use the outcomes of this analysis to improve the quality and organization of PhD training.
Facilities, research Integrity, diversity

16. Increase efforts to reach the target of 30% female full professors in both institutes.
17. Install an advisory board for the RTCs.
18. Improve the visibility of the RTCs within the institutes and involve researchers.
19. Develop a research agenda on biobanking and involve researchers and clinicians in it.
20. Foster a family-friendly environment.
21. Increase the efforts to promote internationality.
22. Consider the framework of the Athena SWAN initiative in the UK, to help recognize the organization’s commitment to, and progress on, equality and diversity, particularly ethnic and migration background and gender.
6. Response of the institutes

On behalf of all theme leaders, we would like to express our sincerest gratitude to the members of the External Evaluation Committee for their thorough and well-balanced assessment of our research institutes and its thirteen research themes. The Institutes appreciate the specific recommendations of the Committee to further improve the quality and societal impact of our research, PhD training and the visibility and sustainability of the Institutes. The comments and recommendations will be included in our medium- and long-term policy plans. Since the organizational structure of Radboudumc is currently in transition, it is, however, possible that some of our goals might be adapted or will not be applicable anymore (#1,3,4). The progress and the adjustments will be yearly discussed as part of the quality assurance cycle. The references (#1-22) relate to the recommendations listed on pages 41-42.

RIMLS and RIHS aim to address the following goals during the upcoming evaluation period:

1. We will further improve the support of our researchers by performing the following actions:
   1.1. A more researcher-centered approach, where a simplification of the administrative burden will be pursued and a supportive atmosphere will be created. The support in terms of project management information, ICT and grant applications will be further professionalized. Thereby, we will unburden our researchers maximally, so that they can devote more time and energy to their research. To this end, dedicated workshops with our researchers and other stakeholders will be organized. Currently, an implementation plan is being developed, which will be further communicated during the regular PI meetings of the Institutes (#1).
   1.2. By gaining more budget responsibility of the Institutes, a focus on research and optimal facilitation of the researchers will be achieved. The organizational structure of Radboudumc is currently in transition, which could result in a new governance system of the Institutes facilitating this process (#2,3).
   1.3. A better-balanced financial system will be created, including the PI system, in terms of fixed versus performance-based financial support taking into account the new developments with respect to open science, publication burden and research impact. In this way, we aim to formulate a stimulating incentive for optimal performance of our researchers, irrespective of their field of expertise. (#2,3).
   1.4. A strategy will be developed to transparently assign the dedicated research time for the clinical researchers (#6).

2. We will further develop and implement our Human Resource management focusing on the career perspectives of Radboudumc researchers at all levels. We already started this process in 2018 and the following specific actions will be taken:
   2.1. A new policy for career development of PhD candidates and postdocs has already been outlined and will be implemented shortly. A plan for tenure track and staff scientist is currently in preparation. The policy concerning career perspectives of senior researchers, including part-time researchers, from assistant to full professor is being developed. We will ensure that there are sufficient opportunities for assistant professors, also part-time researchers, to progress to associate and full professor (#8,9).
   2.2. The postdocs will be given particular attention. The proposed steps of the abovementioned policy include the identification of postdocs in their different career stages along with their
needs and ambitions, reflected in a set of actions towards optimal career prospects, within or outside Radboudumc. This will include fostering a family-friendly policy and implementation of an Individual Development Plan for all postdocs (#5,20).

2.3. We will work to achieve a better balance between the number of PhD candidates and postdocs (#8,9).

2.4. We will clearly distinguish the functions of postdoc, scientist and assistant professor in our HR system (#8).

3. The following improvements in the PhD programs will be performed:

3.1. Within the current collective labor agreement (Radboudumc training regulations, addendum to CLA) a formal Go/No Go after one year will be implemented (#12).

3.2. Currently, the NFU guidelines for a PhD graduation are being rewritten. Once published, these guidelines will be adopted and communicated clearly (#13).

3.3. In addition to the large number of courses already available for PhD candidates, we will further develop more specific training in transferable skills and career development for PhD candidates, make all courses easily findable on our website and develop an overall strategy for funding. The training program for PhD candidates will better facilitate part-time and external PhD candidates (#5,13).

3.4. The supervising skills of our supervisors will be given special attention. We will initiate dedicated meetings with stakeholders and will develop a course on supervising skills for supervisors and mentors (#14).

3.5. We are continuously monitoring the factors that may cause unnecessary long durations for both part-time and full-time PhD candidates. A number of actions (e.g., extension of a PhD contract needs to be approved by the director of the Institute, simple outline of thesis requirements, guideline to include a maximum of three papers in a thesis) have already been taken. In 2020 a new PhD tracking system (Hora Finita) will be implemented that will include a detailed tracking system of individual PhD candidates and a survey module for PhDs with the aim to identify unexpected delays in the PhD project (#15).

4. Diversity policy is high on the agenda of our Institutes. In general, the policy of Radboud University is being followed. Furthermore, an HR diversity strategy concerning gender, cultural background and international background is being developed for all stages in career:

4.1. Radboudumc strives for equal opportunities at all levels (#16).

4.2. In all committees, including appointment and assessment committees, diversity is always pursued. We will, in particular, involve female researchers and the Radboudumc Postdoc Initiative, to achieve a sustainable policy (#16,22).

4.3. Recently, the procedure has started to appoint extra female full professors in 2020 (#16).

4.4. The Radboudumc Internationalization committee is currently formulating our internationalization strategy which will be based on the Radboud University strategy document “Radboud International 2025: Quality First!” (#21).

5. In addition to the internal advisory board of the institutes, an external advisory board will be installed consisting of leading scientists, medical experts, patient representatives, funders and policy makers in healthcare. The external advisory board will provide advice on shaping our research activities, impact of our research and researchers, graduate school, and knowledge
transfer. The internal advisory board will provide guidance in the daily activities of the institute (#10,11).

6. A general advisory board for the **Radboudumc Technology Centers** (RTC) and a user board for each RTC will be installed. Here, the Radboudumc Biobank, that will be implemented within the collaborating hospitals in the region, will serve as an example (#17,18,19).

7. We will further intensify the **collaboration** with other RU faculties, in particular the Faculty of Science, the Faculty of Social Sciences and the Nijmegen School of Management. To this end, the annual interfaculty calls of the RU Executive Board will be used. The first initiatives have been started in the fields of deep learning, biostatistics, ethics, spiritual healthcare and behavioral medicine (#1, 6).

8. In the coming years, a new **compact hospital** will be built. Consequently, the research activities will be concentrated in three closely connected buildings. In addition, the interaction among researchers and clinicians will be further facilitated by hubs located in central areas in these buildings (#1,6).

9. All research themes have provided an **improvement plan** based on the recommendations of the Evaluation Committee. These plans will be discussed, evaluated and adjusted (if necessary) in regular intervals as part of the **quality assurance cycle** (yearly planning and control cycle).

9.1. Common topics in most of the research themes are:

9.1.1. We will develop a strategy to intensify the interactions between research staff members and clinical staff members in order to maximize research impact, innovation power and quality of care, education and research. The experience with European Reference Networks (ERN) for rare and complex diseases, in which Radboudumc already participates in 14 of the 24 pan-European networks, may be an excellent starting point for this strategy, since the three principal tasks (care, education and research) are already integrated in the recognition of the participating centers of expertise (#5,8).

9.1.2. We will strive to reach a diverse and complementary composition of the research themes (#5,8).

9.1.3. Patient participation in research themes, as well as in the research institutes, will be further intensified. The role of Patient Advisory Boards will be discussed in different forums, such as the Research Council meeting with the theme leaders, the Radboudumc Technology Centers, the research themes, and the Internal Advisory Boards of the Institutes. Best practices will serve as examples (#7).

9.2. Specific points of attention per theme are:

9.2.1. Healthcare improvement science
   The theme will continue to focus on its four subthemes and elaborate its connection with the disease-oriented themes. To strengthen the implementation of the themes’ quality-of-care research in Radboudumc, the theme will intensively spread its knowledge on the state-of-the-art of quality of care research via regular meetings with clinical centers/departments. Since the patients’ perspective is key in this theme, the theme will install a patient advisory board by connecting to the Radboudumc Patient
Advisory Board. The theme will further intensify its efforts to be visible on the international stage by organizing conferences.

9.2.2. Cancer development and immune defense

The fundamental scientific and applied technological methods that are being developed in this theme can be of benefit for many different types of cancer. It is, therefore, important to look for opportunities in various types of cancer. Many successful collaborations already exist across the (cancer-related) themes and these will be further extended to increase the research impact. Furthermore, the theme will intensify the collaboration with bioinformatics. Recently, the CMBI bioinformatics center has been focusing on providing more service to departments with bioinformatics needs, and is thereby intensifying its role as Radboud Technology Center. The increased collaboration will open opportunities for stronger research within the Cancer development and immune defense theme.

9.2.3. Rare cancers

Although sometimes fundamental research is not very visible within this theme, almost all subdomains have strong collaborations with basic research. It is mostly performed in a bottom-up manner on the level of collaboration with individual researchers who participate in other cancer-related themes. The theme will build on this “bottom” of individual collaborations to create a stronger connection with basic researchers and visible collaborations with other cancer-oriented research themes. Importantly, the viability and impact of the theme is supported by the strong political agenda concerning rare cancers in Europe and worldwide. The theme will discuss the affiliation of lung cancer research with the Research Board and other cancer-oriented themes.

9.2.4. Tumors of the digestive tract

The theme will invest major efforts to further improve the integration between basic and clinical research. Current successful examples are the close collaboration between clinicians and physicists of the department of Radiation Oncology, and the introduction of a new fundamental researcher from the department of Cell Biology as a theme member. The theme will explore further collaboration with the department of Molecular Biology, Faculty of Science). Importantly, the Radboudumc strategy aiming at regional networks for both patient care and research supports the theme’s wish to further extend the current research projects with regional partners (for example microbiome and lifestyle, genetics, surgery).

9.2.5. Urological cancers

The theme will continue its excellent and highly relevant research. It will focus on professionalizing the biobanking within Radboud Technology Center and on extending the biobanking of urine samples of other cancer types, together with the other cancer-related themes. It also aims to attract more research grants, among others by making better use of the support from the Radboudumc’s Grant Support Office for writing grants. The theme will make the existing patient participation more visible, e.g., with ‘Prostaatkankerstichting’, ‘Stichting zaadbalkanker’, and for grant applications for the Dutch Cancer Society.

9.2.6. Women’s cancers

To improve coherence in research, future leadership, and development of future collaborative theme-wide research ideas, the theme plans to identify cross-cutting topics that will allow researchers to share expertise, e.g. on deep learning, quality of
Within the Radboudumc strategy aiming at regional networks, the collaboration with Canisius Wilhelmina Hospital concerning breast cancer care is crucial. The theme will, therefore, strengthen ongoing collaborative work in the fields of imaging, radiotherapy, and the Breast Cancer Biobank. Furthermore, the current collaborations will be extended and new collaborations will be initiated with other regional as well as (inter)national partners, by submitting joint grant applications to appropriate calls. Finally, the theme will identify more appealing ways for junior researchers to benefit from being linked to the research theme and interacting with senior researchers.

9.2.7. Infectious diseases and global health
To maintain its strong international research position, the theme will extend the strong link with Clinical Pharmacology that already exists in the research lines HIV, TB and fungal infections to its other fields, in particular to antibiotic research (including antibiotic stewardship, optimal dosing in critically ill patients) and malaria research. Furthermore, the theme has the facilities for phase I studies to test novel antimicrobial agents as part of the Radboud Technology Center for Clinical Studies. The theme will focus on relevant studies rather than acquire more contract research with the sole ambition to generate more income.

9.2.8. Inflammatory diseases
The theme will increase the adoption of modern technologies into research. Genomics and transcriptomics are already frequently used and will be intensified in future research. Also, single cell transcriptomics of immune cells is already performed in selected autoimmune diseases and its use may be extended to other diseases. Recently, high dimensional flow cytometrics of patient cohorts with inflammatory diseases in combination with machine learning (Artificial Intelligence) has become an established technique in the theme. Furthermore, the theme will continue its collaboration with the Renal disorders theme in the field of graft rejection and netosis. Autoimmunity, as a cause of inflammation, will be investigated in collaboration with the theme’s Infectious diseases and global health and Renal disorders. To keep the theme viable, the theme will actively scout and identify research talent and identified talents will be coached and stimulated to follow career and tenure tracks.

9.2.9. Mitochondrial diseases
In view of the departure of a number of leaders of the research staff, the Mitochondrial diseases theme is facing challenges to maintain critical mass and attract talent at multiple career levels. At the full professor level, a new senior clinical researcher has recently been appointed in the chair ‘metabolic diseases’. Additionally, a molecular/cellular preclinical researcher at an associate professor level will be attracted, e.g. via a Hypatia fellowship. Furthermore, the intra-theme collaboration will be stimulated to better exploit overlaps in research interests. This may lead to a widening of the focus of the research theme to metabolic diseases in general.

9.2.10. Reconstructive and regenerative medicine
This theme will intensify its collaboration with the theme Nanomedicine, for example by joint grant applications, by a mutual research agenda, by attracting international and national talents and by the newly recruited chair (ERC Advanced grant). Furthermore, the theme will increase its viability by focusing on specific developments in the three research lines and to strengthen the translational research from molecule to man to
population, whilst accommodating the variation of clinical researchers within the theme. An important part of the strategy to improve viability is to install a chair in regenerative medicine.

9.2.11. Renal disorders

To keep this theme at the forefront in research quality and societal impact, missing expertise on immunology, genetics and bioinformatics will be embedded within the theme. To initiate this, a postdoc within the Radboud Excellence Program will be recruited. The theme also aims to increase success rate for grants by coaching applicants. Twice a year, an afternoon will be scheduled for brainstorm sessions to train applicants and to assist with grant writing. Collaborations within the region will be increased by constructing a roadmap and action plan within the TopFit plan East NL to PREVENT kidney disease. Also, the theme will invest in multi-faculty collaborations financed by the RU and beyond. Preproposals will be submitted in order to combine technological developments from the RU with clinical research objectives to understand, reduce and prevent chronic kidney disease.

9.2.12. Vascular damage

With the recent opening of the Radboudumc Cardiovascular Center, in which all departments offering care for patients with cardiovascular diseases closely collaborate, the link between research and patient care will be further strengthened. The theme will build translational research lines linking excellent preclinical methods to patients and patient material to improve research quality and relevance. The Center also offers an exciting opportunity to improve the involvement of patients in the theme’s research agenda. The Center has a dedicated patient forum that is actively consulted. The next step is to also involve these patients in a structural way in the theme’s research agenda and research choices. The theme will increase its visibility, both nationally and internationally, by organizing a cardiovascular symposium every two years and workshops for young researchers. The theme will continue its intense collaborations with the themes Infectious diseases and global health and Inflammatory diseases.

9.2.13. Nanomedicine

The theme has few clinical researchers formally affiliated, but has many good collaborations with clinical researchers from other disease-oriented themes. The theme will foster and extend the existing collaborations and stimulate new collaborative projects with other research themes to gain more clinical input. In particular, the theme will intensify the link with Reconstructive and Regenerative Medicine, which should ultimately lead to a mutual research agenda and shared grant applications and PhD projects. To this end, Nanomedicine recently initiated a joint, interfaculty grant application for a European COFUND grant in order to hire multiple PhD and postdoc researchers that will be supervised by teams from both themes where possible. Nanomedicine will actively explore further opportunities to intensify the collaboration not only between different themes, but also between the two involved faculties. The theme strongly supports the installment of a new chair in translational nanomedicine, which would certainly increase the clinical involvement in the theme.

On behalf of the RIMLS and RIHS management, staff and researchers,

Prof. René Bindels and Prof. Judith Prins
Scientific Directors of RIMLS and RIHS
Appendix 1
Short Curricula Vitae of the evaluation committee members (in alphabetical order)

Hans Bart
J.A.J. (Hans) Bart is director of the Dutch Kidney Patients Association. He studied Psychology at the VU University Amsterdam (the Netherlands), graduating as a child psychologist in 1983. After his graduation, Bart worked as a policy officer at the Dutch Centre for Migrants (1984-1989), policy officer at the Ministry of Welfare, Health & Culture (1989-1993), head of staff and quality bureau at the Youthcare centre OCK (1993-2000), and Director of the Dutch centre for volunteers in palliative care (2000-2011). Since 2011, he has been director of the Dutch Kidney Patients Association. During his career, Bart followed courses on leadership (Ingedael Indepth 2015; Avicenna 2010, 2006), project management (KMBV 2005; Twijnstra & Gudde 1991), quality and change management (Reed Business-Management in de zorg 2015; Elsevier 2002, Wierdsma en De Caluwé), internal auditing (VOG 1999, 1998), leading professionals (Ned. Studiecentrum 1998; 1994 met Weggeman), and presentation & media courses (Hanneke Groenteman 2012; KMBV-Violet Valkenburg 2004; Baartman 1995). He was a member of the scientific committee of the Kolff battle of the Universities (Dutch Kidney Foundation, Kolff Foundation) in 2018 and a member of the jury for the Vintura Impact in Healthcare prize in the same year. In addition, Bart is founder of the decision aid ‘The Kidney Guide’ (www.nierwijzer.nl), one of the initiators of developing the Patient Reported Outcome Measures (PROMs) on dialysis in the Netherlands (pilot in 2016-2017, launched October 2018), and a member of the ICHOM consortium on chronic kidney disease.

Boudewijn Burgering (chair of subcommittee 1 and 3)
Boudewijn M.T. Burgering is Professor in Signal Transduction at the Department of Molecular Cancer Research of the University Medical Center Utrecht (UMCU). His lab focuses on the role of PI3K signalling in the connection between age and disease (in particular cancer) and on metabolic regulation in cancer & differentiation. Burgering obtained a MSc in Molecular Sciences from Wageningen University (the Netherlands) in 1985 (cum laude). He worked on the molecular cloning of Qla genes at the New York State Department of Health (Albany, NY, USA) before embarking on a PhD on the role of p21ras in signal transduction at the Laboratory of Medical Biochemistry in Leiden (the Netherlands). Next, Burgering moved to the Laboratory of Physiological Chemistry of UMCU to work as a postdoctoral fellow (1991-1996) and assistant professor (1996-2003). In 2003, he was appointed Professor in Signal transduction at the Department of Molecular Cancer Research of UMCU. Since 2011, he has been Head Research Department Metabolic Diseases at UMCU as well as Collaborative Science Chair at the Institute for Stem Cell Biology & Regenerative Medicine (inStem) in Bangalore (India). Since 2014, he has been a visiting professor at the Second College of Clinical Medicine of Guangzhou University of TCM, Guangdong Provincial Hospital of Chinese Medicine, Guangdong Provincial Academy of Traditional Chinese Medicine (China). Since 2016, he has been head of the Department of Molecular Cancer Research of UMCU, director of the research programme ‘Cancer Stem cells & Developmental biology’ of Utrecht University’s Graduate School of Life Sciences, and interim manager Research and Education of the Division Biomedical Research of UMCU. Burgering has seated in a variety of committees and advisory boards, including EMBO (elected member, 2002), the Dutch Cancer Foundation (member of the Research Council, 2004-2010), Dutch consortium on Cancer Research (elected member, 2004), ERC grant review committees
(reviewer, 2011-present), Nature Communications editorial Advisory Panel (member, 2011), ERC Scientific Council (member and the coordinator for the Life Science domain, 2012), Editorial Board for Journal Biological Chemistry (reviewing, 2015), Oncode Research consortium (member, 2017-present), and the Scientific Evaluation Committee of the call for proposals PLBIO18-Cancer Biology and Basic Sciences, Institut National Du Cancer, Paris, France (member, 2017-present). He has been awarded a variety of prestigious grants and awards.

**Rebecca Fitzgerald**
Rebecca Fitzgerald (MACantab, MD, FRCP, FMedSci) is Professor of Cancer Prevention at the University of Cambridge (UK). The focus of her research is to improve methods for early detection of oesophageal cancer through better understanding of the molecular pathogenesis. Her laboratory is based in the University's MRC Cancer Unit. She continues to practice medicine as an Honorary Consultant in Gastroenterology at Addenbrooke's Hospital in Cambridge. Fitzgerald graduated from Cambridge University in 1992, performed a research degree at Stanford University (California, USA, 1995-1997) and then undertook specialist clinical training and postdoctoral research at Barts and The London Hospitals (1997-2001) before moving back to Cambridge in 2001. Rebecca was awarded the prestigious Westminster medal and prize for her first proof-of-concept work on the CytospongeTM and associated assays for diagnosing Barrett's oesophagus in 2004. Since then, this work has received an NHS Innovation prize (2011) and the BMJ Gastro team of the year award (2016). She received a Lister Prize Fellowship in 2008. In 2013, she was awarded an NIHR Research Professorship to facilitate translational research for patient benefit. She was elected a Fellow of the Academy of Medical Sciences in 2013. Professor Fitzgerald enjoys teaching and communicating science to the public. She directs studies for medical students at Trinity College in Cambridge and is a Fellow of the Institute for Learning and Teaching. She is committed to bringing research advances into clinical practice and inspiring other researchers to do likewise.

**George Griffin**
George Griffin (CBE DSc FRCP FMedSci) is Emeritus Professor of Infectious Diseases and Medicine at St George’s, University of London (UK). He read preclinical sciences at King’s College London. In addition, he gained Honours BSc in Pharmacology and Molecular Biology and was awarded the Delegacy Prize for preclinical studies. After PhD at the University of Hull, on muscle growth and biochemistry, he completed clinical studies at St George’s Hospital Medical School. Following House Physician and Surgeon positions, he held a prestigious Harkness Fellowship at Harvard Medical School in the Department of Physiology, where he defined hormonal control of protein synthesis and protein degradation in skeletal muscle. Postgraduate medical education was through academic clinical positions in London, culminating in a Wellcome Trust Senior Lectureship in Infectious Diseases at St George’s. During his time at St George’s, he maintained clinical leadership role and developed an academic Institute of Infection and Immunity of international standing. This institute holds a crucial role in the training of academic clinicians in the area of infection. Griffin has published over 250 peer reviewed scientific papers, principally in the area of host response to infection at cell, molecular and whole-body level. His principal contributions have been the elucidation of the relationship of HIV and TB and the pathophysiology of intestinal disease in HIV-infected humans and the resulting nutritional metabolic consequences on HIV and TB. He has a large commitment to internal medicine and clinical research involving collaboration with units in Ethiopia, Ecuador, Thailand, Kenya and China. Griffin has chaired major Gates, Wellcome Trust and MRC (UK)
committees. Fifteen of his research fellows now hold clinical or basic science chairs in universities in the UK. Griffin was recently awarded CBE for research and its contribution to public health. In addition, following his appointment as vice president (international) at the Academy of Medical Sciences in London, he was elected President of the Federation of European Academies of Medicine in 2018.

Cees Kallenberg (chair of subcommittee 2)
Cees G.M. Kallenberg, MD, is Emeritus Professor of Medicine at the University Medical Centre Groningen (the Netherlands). His main research is on systemic autoimmune diseases, in particular ANCA-associated vasculitides, systemic lupus erythematosus, Sjögren’s Syndrome, and scleroderma. He graduated from the Medical School of the University of Leiden (the Netherlands). Kallenberg was registered as an internist in 1980 and successfully completed his PhD studies on Raynaud's Phenomenon and Systemic Autoimmune Disease in 1982 at the University Medical Center in Groningen. He was appointed as Associate Professor in Internal Medicine - Clinical Immunology in 1985 and as full Professor in 1993. He chaired the Department of Rheumatology and Clinical Immunology at Groningen University until 1 May 2011. The department is a tertiary referral centre and is involved in national and international studies. He gives lectures as an invited speaker on his research topics on all major international meetings, and is editorial board member of several journals in clinical immunology, nephrology, and rheumatology. Throughout the last 28 years, Cees Kallenberg has acquired grants, mostly from the Dutch Kidney Foundation, Dutch Arthritis Association, Dutch Organization of Research (ZonMw, formerly NWO), JK de Cock Foundation, bursaries from the Faculty of Medical Sciences Groningen, but also from abroad, e.g., European Commission (FP7), German Research Foundation (Deutsche Forschungs Gesellschaft), NIH Bethesda USA. In addition, he is a consultant for various companies and scientific councils.

Gemma Kenter
Gemma Kenter is a Professor in Gynaecologic Oncology at the Amsterdam UMC, location VU University Medical Center in Amsterdam (the Netherlands). Her main scientific interest concerns cervical cancer, including immunological aspects and immunotherapy. She studied medicine in Amsterdam and graduated in 1987. She did her specialty training in obstetrics and gynaecology in Leiden (the Netherlands). She was staff member at the LUMC from 1986-2009, first as chief of the outpatient clinic, later as gynaeoncologist. She was trainer from 1996-2009. Since 2005, she has been a full professor in Gynaecologic Oncology. In 2009, she moved to Amsterdam and became head of the Center for Gynaecologic Oncology in Amsterdam, a cooperation between the University Medical Centers and the Dutch Cancer Center. She has been vice-president of the Dutch Society for Obstetrics and Gynaecology, president of the Dutch Gynae- oncology society and chair of the EORTC-cervical cancer tumour group. Currently, Kenter is chairing the HPV committee of the Health Care Council. She will be emeritus as of 7 December 2018.

James Kirkpatrick
Charles James Kirkpatrick (MD, PhD, DSc) is emeritus Professor of Pathology at the University Medical Center in Mainz (Germany). His principal research interests are in the fields of biomaterials in tissue engineering and regenerative medicine, with special focus on human co-culture systems. During the past years, his work has involved bone vascularization, the development of barrier models (e.g., air-blood barrier, blood-brain barrier) to study nanoparticle interactions with cellular systems,
as well as co-culture models for upper respiratory tract regeneration. Kirkpatrick has a triple
degree in science and medicine from the Queen’s University of Belfast (N. Ireland). His academic
appointments were in pathology at the University of Ulm (Germany, 1980-1985), Manchester
University (UK, 1985-1987), the RWTH Aachen (Germany, 1987-1993) and the Johannes Gutenberg
University in Mainz (1993-2015). He is a Fellow of the Royal College of Pathologists (FRCPath),
London (since 1997) and an Honorary Professor at the Peking Union Medical College in Beijing and
the Sichuan University in Chengdu, China (both since 2004). In addition, he has visiting professorships
at the South China University of Technology in Guangzhou, the Nanyang Technological University
(NTU) in Singapore, the Sahlgrenska Academy of the University of Gothenburg, Sweden and the
University of Havana in Cuba. His current research is being carried out at the Goethe University of
Frankfurt, where he holds a Senior Professorship. He is a former President of both the German
Society for Biomaterials (2001-2005) and the European Society for Biomaterials (ESB, 2002-2007). In
2008, he received the ESB’s George Winter Award, and in 2010 he was awarded the Chapman Medal
from the Institute of Materials, Minerals & Mining, London, UK for ‘distinguished research in the field
of biomedical materials’. In 2014, he received the TERMIS-EU Career Achievement Award (awarded
at the TERMIS congress in Genova, Italy).

André Knottnerus (chair of subcommittee 4 and overall chair)

J.A. (André) Knottnerus is emeritus Professor of General Practice and Primary Care Research at
Maastricht University (the Netherlands). His scientific work is focused on clinical epidemiological and
quality of care research, especially in primary and community care. He worked as general
practitioner in Amsterdam and was staff member at the Vrije Universiteit. He was trained as an
epidemiologist at Maastricht University, and delivered his PhD thesis on the development and
application of clinical epidemiological methods in diagnostic research. He was appointed as Professor
of General Practice and Primary Care Research at Maastricht University in 1988. In 1990-1991, he
was dean of the Medical Faculty in Maastricht, and subsequently research executive of the board of
the Maastricht Medical School until 1994. From 1994, he was founding scientific director of the
university’s primary care research institute (until 2000) and the Netherlands School of Primary Care
Research (until 2002). From 2001 to 2010, he was President of the Health Council of the Netherlands
(where he was also responsible for advising the Dutch government on its influenza vaccination
policy) and from 2010 to 2017, Chair of the Scientific Council for Government Policy (WRR). Since
1999, Knottnerus has been editor-in-chief of the Journal of Clinical Epidemiology. In 2004, he was
elected as a member of the Royal Netherlands Academy of Sciences (KNAW), and from 2009 to 2013,
he was chair of the Medical Section of the Academy. He was awarded with a number of national and
international scientific prizes.

Ida Korfage

Dr Ida J. Korfage is an assistant professor at the Department of Public Health of Erasmus MC in
Rotterdam (the Netherlands). Her research interest is in cancer screening (especially colorectal
cancer, cervical cancer, and prostate cancer), health-related quality of life, decisional processes,
advance care planning, behavioural economics, and methodological issues related to these research
topics. Korfage has a MSc in Economics from Erasmus University Rotterdam (1994) and a MSc in
Epidemiology from the Netherlands Institute for Health Sciences in Rotterdam (2002). In 2005, she
obtained a PhD on ‘Localized prostate cancer and quality of life. Screening, treatment and
methodological issues’ from Erasmus MC. In 2006, she registered as Epidemiologist (‘Epidemioloog
B’). Since 2010, she has been an assistant professor at Erasmus MC. Korfage has been a member of the assessment committee of research funding body ‘Evidence based care by nurses’ of Erasmus MC since 2010 and an elected member of the of the International Society of Quality of Life Research Board of Directors since 2016. She has served in the Patient Advisory Panel (PACO) of the Dutch Cancer Society (KWF Kankerbestrijding) since 2016 and as representative of the Patient Advisory Committee in general board meetings of the Dutch Cancer Society since 2018.

Nils-Göran Larsson
Nils-Göran Larsson (MD, PhD) is a professor at the Department of Medical Biochemistry and Biophysics of Karolinska Institutet in Stockholm (Sweden, 2016-2018). Until recently, he was Director of the Max Planck Institute for Biology of Ageing in Cologne (Germany, 2008-2018). Larsson is an internationally recognized expert in the field of mitochondrial function and pathology. His prime focus is on mitochondrial genetics, in particular the inheritance, maintenance and expression of mitochondrial DNA. He obtained his MD in 1984, his license to practice medicine in Sweden in 1990, and his PhD in 1992, all from Gothenburg University (Sweden). In 1994, he became a specialist in Paediatrics (qualification declared by the Swedish National Board of Health and Welfare). Since 2016, he has been professor and senior Consultant at the Department of Medical Biochemistry and Biophysics of Karolinska Institutet. From 2019, he will be an external scientific member of the Max Planck Society (honorary position). Larsson has served on a variety of prestigious committees, including the Nobel Committee for Medicine or Physiology (associate member in 2003-2005, 2006-2008, and 2016; member in 2017-2019; vice-chairman from 2019), the Nobel Assembly at Karolinska Institute (member since 2004), Academia Europaea (member in 2004), Class VII (Medical sciences) of the Swedish Royal Academy of Sciences (member in 2006), and EMBO (member in 2012).

Stéphane Laurent
Stéphane Laurent (MD, PhD, FESC) is Professor of Pharmacology in the Paris Descartes Medical School. He currently works as the head of the Department of Clinical Pharmacology in the Hôpital Européen Georges Pompidou in Paris (France) and as the head of INSERM U 970, team 7 in the Paris Cardiovascular Research Center (PARCC). Laurent’s research interests concern the arterial hypertension and cardiovascular diseases, clinical investigation and pharmacology of large arteries (arterial stiffness, central pulse pressure, carotid intima-media thickness, and endothelial dysfunction). He has served as President of the European Society of Hypertension (ESH, 2007-2009), President of the ARTERY Society (2010-2012), and President of the French Society of Hypertension (2001-2002). Laurent was a member of the ESH Council (2005-2013), currently is a member of the Scientific Council of the French Foundation for Hypertension Research (since 2006), and he is fellow of the ESC. He is co-author of the 2007, 2013, and 2018 ESH-ESC Guidelines for the management of Hypertension, and the 2009 ESH document on the reappraisal of hypertension guidelines. Laurent is Associate Editor of Journal of Hypertension, Deputy Editor of Artery Research, and member of the editorial board of Hypertension.

Ramón Martínez-Máñez
Ramón Martínez-Máñez is full Professor of Inorganic Chemistry at the Department of Chemistry at the Polytechnic University of Valencia (UPV, Spain). In addition, he is head of the Interuniversity Research Institute for Molecular Recognition and Technological Development (IDM) in Valencia and
Scientific Director of the Biomedical Research Center Network in Bioengineering, Biomaterials and nanomedicine (CIBER BBN). He also belongs to the ‘Joint Research Unit in Nanomedicine and Sensors’ in the Hospital La Fe in Valencia and the ‘Joint Research Unit in Disease Mechanisms and Nanomedicine’ in the Centro de Investigación Príncipe Felipe. He is an active researcher in the field of sensing and hybrid organic-inorganic nanostructured gated materials in nanomedicine for delivery applications. He is coordinator of the Interuniversity PhD Programme in Chemistry at the UPV, which obtained the prize of the Social Council of the UPV to the best doctoral programme of the 2017/2018 academic year. He has been visiting researcher at the University of Cambridge (UK). He is Co-Chairman of the journal ChemistryOpen and member of the International Advisory Board of the journals Chem. Asian. J. and ChemPlusChem, published by Wiley-VCH. He has participated in 42 projects in collaboration with national and international companies. Martínez-Máñez holds 29 patents, 17 of which are international. Three of these patents have been transferred to companies. He is co-founder of the spin-off Senolytic Therapeutics SL. Martínez-Máñez received the Research Excellence Award 2016 from Real Sociedad Española de Química and recently the Rey Jaime I Price of New Technologies in 2018.

Ingeborg Meijer (secretary to subcommittees 1 and 4)

Dr Ingeborg Meijer is a biologist and she holds a PhD in molecular medicine from the University of Leiden. She subsequently worked in the biotech industry (Celltech, UK), health research policy (Advisory Council for health research of the Dutch Health Council), and in European STI policy evaluation (Technopolis Group). She still is a (part-time) self-employed experienced policy consultant in research and innovation policy, in particular in the life sciences and health sector. Her work includes strategic studies, support to vision development, research agenda setting, and (SEP) evaluation of innovation programmes, funders and research institutes at national and international level. In 2012, she returned to academia as (part-time) senior researcher at the Center for Science and Technology Studies (CWTS), University of Leiden. Her research focuses on the societal relevance and use of research, interactions with social, cultural and economic stakeholders, especially the development of proxies, tools, and indicators to help in research assessment purposes. Conceptually, the work is aligned with the Standard Evaluation Protocol (SEP2015-2021) of the Netherlands. Societal use of research is also grounded in her European H2020 projects on Responsible Research and Innovation (RRI), such as MoRRI, NewHoRRIzon and SUPER_MoRRI, focusing on the dimensions public engagement, gender equality, citizen science, open access and open data, and on Open science, e.g., the EC Open Science Monitor. In addition, she has taken on board positions in patient organizations and advisory committees to liaise with society more directly. Ingeborg acted as the secretary to the evaluation group of RIHS and the cancer-related topics.

Pierre Ronco

Pierre Ronco is Director of the Renal Division ‘Néphrologie et Dialyses’ and of the Research Unit UMR-S1155 affiliated to Inserm and University ‘Pierre et Marie Curie’ (Sorbonne Université), both located at Tenon hospital in Paris (France). His research focuses on clinical science, renal immunopathology, and rare kidney diseases. Ronco received his PhD in Immunology from University Paris 7 and his MD from the Medical Faculty Saint-Antoine affiliated to Sorbonne Université. Ronco served as President of the Francophone Kidney Foundation and of the Francophone Society of Nephrology, Councillor of the European Society of Nephrology ERA-EDTA and President of the 49th ERA-EDTA congress in Paris (May 2012, 8600 delegates). He has been serving ISN for more than 23
years at various positions and, as Programme Chair or Co-Chair of four World Congresses of Nephrology over three continents (Madrid 1995, Milan 2009, Cape Town 2015, Mexico City 2017) and as an Associate Editor of Kidney International for eight years (1997-2005). He is currently serving as the Editor in Chief of Kidney International since January 2018. He has given more than 10 lectures at ASN annual meetings. He has been awarded international prizes and honours including the Jean Hamburger award (International Society of Nephrology), the prize for outstanding basic research from ERA-EDTA, and an ERC advanced grant (2012). He is an ERA distinguished fellow (FERA) and Doctor Honoris Causa of the UC Louvain University. Ronco is a member of the Academia Europeae, the French Academy of Medicine, and the Royal Academy of Medicine (Belgium).

Sabine Siesling
Sabine Siesling is Professor in Health Technology and Services Research (HTSR) at the University of Twente. In addition, she is senior researcher at the Netherlands Comprehensive Cancer Organisation (IKNL, Utrecht, the Netherlands). Her research focus is on outcomes research and personalized cancer care. She studied Biomedical Science at the University of Leiden (graduation 1996) and as part of her study, she performed an internship at the Humbold University in Heidelberg (Germany). She finalized her PhD on ‘Clinical, genetical and epidemiological aspects of Huntington’s disease’ in 1999, supervised by Prof dr RAC Roos, at Leiden University Medical Centre (the Netherlands). After her PhD, she became clinical epidemiologist and started working at the Comprehensive Cancer Organisation (IKNL). As part of her job, she spent some weeks at the University of Kuopio, Tampere, and Helsinki (Finland), the Instituti di Tumori in Milano and Rome (Italy), the International Agency on Cancer in Lyon (France), and the London School of Hygiene and Tropical Medicine (UK). She is member of the supervisory board of the nationwide network and registry of histo- and cytopathology in the Netherlands (PALGA) and the Advisory Board of the German Ministry of health, Robert Koch Institut, Zentrum fur Krebsregisterdaten. Moreover, she is board member of the NABON (National breast cancer network) and NABON Breast Cancer Audit. Siesling has been board member of the European Network for Cancer Registries (ENCR) and the International Association of Cancer Registries (IACR). She has been president of the Dutch Society of Epidemiologists (VvE) in the period 2016-2018. Her research focusses on the effect of interventions, like cancer care pathways/networks or implementation of new technologies, clinical guideline adherence, personal medicine, risk-based care and follow-up (prediction modelling), on the outcome, quality of care and life using i.e., the data of the Netherlands Cancer Registry. She is involved in several national and international projects, such as the EUROCARE, EUROCOURSE, RARECARE (WP leader) and CONCORD all trying to compare the burden of cancer between countries, and the European Commission Initiative on Breast Cancer (ECIBC) of the Joint Research Centre. She was/is involved in the KWF signalling Committees, Dutch national Cancer Plan, Dutch Health-RI initiative and the Netherlands Breast Cancer Project, which tries to fill the gaps in evidence for systemic treatment regimes, which cannot be obtained by randomized clinical trials by linking retrospective cancer registry data to biobanks.

Arnulf Stenzl
Arnulf Stenzl (MD) is Professor of Urology and Head of the Department of Urology at Eberhard-Karls-University in Tuebingen (Germany). His major research interests are bladder and prostate cancer and reconstructive urology. He graduated from medical school at Karl-Franzens University in Graz (Austria) in 1980. After graduating as a medical doctor, he worked at the Department of Internal Medicine (Nephrology) of ‘Landeskrankenhaus Klagenfurt’ (1980-1981). Next, he was a resident at
the Institute of Pathologic Anatomy (1981-1983), the Department of Surgery (1983-1984), and the Division of Urology of the Department of Surgery (1984-1987) of Karl-Franzens University Graz. Stenzl then moved to the University of California in Los Angeles (USA) to become a resident fellow in General Urology and later a Urologic Oncology Fellow at the Division of Urology. In 1989, he returned to Karl-Franzens University Graz to become an assistant professor at the Division of Urology of the Department of Surgery. In the period 1990-1991, Stenzl was an assistant professor at the Department of Urology, Inselspital, University of Bern (Switzerland). In the period 1991-2002, he was affiliated to the Department of Urology of the University of Innsbruck (Austria) as vice-chairman and later as a professor. Since 2002, he has been Head of the Department of Urology at Eberhard-Karls-Universität Tübingen. He is investigator of numerous clinical trials and has organized numerous national and international symposiums on bladder cancer-related and other urologic subjects. Since 2012 he is also chairman of Scientific Committee of the European Association of Urology.

Linda van den Berg (secretary to subcommittees 2 and 3)
Dr Linda van den Berg is an independent science writer and communications consultant with a background in the life sciences. She obtained a MSc (fundamental biomedical sciences, cum laude) in 2000 and a PhD (behavioural genetics) in 2006, both from Utrecht University (the Netherlands). In the period 2006-2012, she was a Postdoctoral Researcher at VU University Medical Center (the Netherlands), the Broad Institute of Harvard and MIT (USA), and Leiden University Medical Center (the Netherlands). Since 2012, she has worked as a professional science writer and scientific secretary, with a special interest in research quality and science & society. Her company Washoe Life Science Communications offers a variety of communication services to academic institutes, patient organizations, and companies. Since 2015, she has served as an independent secretary to several research assessment committees. Linda acted as the secretary to the evaluator group of RIMLS and the non-cancer topics.
Appendix 2
Programme of the site visit

Sunday 2 December 2018
Afternoon: Arrival members External Evaluation Committee in Hotel Van der Valk
Address: Hertog Eduardplein 4, 6663 AN Nijmegen-Lent.

17.00 Welcome reception by Rector Magnificus Radboud University
18.00 Plenary closed session / preparatory Meeting Review Committee
19.00 Dinner (Committee members only)
20.30 Plenary closed session (continued)

Monday 3 December 2018
Location: Mansion Huize Heyendael

08.30-09.20 Plenary session (Beel room, all committee members; Chair: Knottnerus, both Secretaries) Information on the organisation of Radboudumc (including RTCs, talent/grant support; dean; Directors RIHS, RIMLS; policy advisors).
09.20-09.30 Short break to change rooms

Subcommittees 1 & 2
09.30-10.15 Parallel sessions:
Theme Healthcare improvement science Subcommittee 1, Titus Brandsma room, Members: Knottnerus, Siesling, Fitzgerald, Stenzl, Kenter, Korfage; Chair: Burgering, Secr. Meijer
Theme Infectious diseases and global health Subcommittee 2, Cals room, Members: Griffin, Larsson, Kirkpatrick, Ronco, Laurent, Martínez-Máñez, Bart; Chair: Kallenberg, Secr. van den Berg.
10.15-10.25 Recording input for report
10.25-10.35 Coffee break
10.35-11.20 Parallel sessions:
Theme Cancer development and immune defense Subcommittee 1, Titus Brandsma room
Theme Inflammatory diseases Subcommittee 2, Cals room
11.20-11.30 Recording input for report

11.30-12.15 Parallel sessions:
Theme Rare cancers Subcommittee 1, Titus Brandsma room
Theme Nanomedicine Subcommittee 2, Cals room
12.15-12.25 Recording input for report
12.25-13.15  Lunch

Subcommittees 3 & 4
13.15-13.45  Walking tour over the Radboudumc campus (research facilities)
Two groups separately:
Subcommittee 3: Fitzgerald, Griffin, Larsson, Kirkpatrick, Ronco, Martínez-Máñiez, Bart; Chair Burgering, Secr. Van den Berg

Subcommittee 4: Siesling, Stenzl, Kenter, Kallenberg, Laurent, Korfage; Chair Knottnerus, Secr. Meijer.

Subcommittees 1 & 2
13.45-14.30  Parallel sessions
Theme Tumours of the digestive tract Subcommittee 1, Titus Brandsma room
Theme Reconstructive and regenerative medicine Subcommittee 2, Cals room
14.30-14.40  Recording input for report
14.40-15.25  Parallel sessions
Theme Urological cancers Subcommittee 1, Titus Brandsma room
Theme Renal disorders Subcommittee 2, Cals room
15.25-15.35  Recording input for report
15.35-16.20  Parallel sessions
Theme Women’s cancers Subcommittee 1, Titus Brandsma room
Theme Vascular damage Subcommittee 2, Cals room
16.20-16.30  Recording input for report
16.30-17.15  Parallel sessions:
Closed Session, Subcommittee 1, Titus Brandsma room
Theme Mitochondrial diseases Subcommittee 2, Cals room
17.15-17.25  Recording input for report
17.25-17.40  Break (coffee, tea, beverages, snack)

Subcommittees 3 & 4
17.40-18.10  Parallel sessions
PhD candidates / PhD Council, RIMLS, Subcommittee 3, Cals room, Fitzgerald, Griffin, Larsson, Kirkpatrick, Ronco, Martínez-Máñiez, Bart; Chair Burgering, Secr. Van den Berg.
PhD candidates / PhD Council RIHS, Subcommittee 4, Titus Brandsma room, Siesling, Stenzl, Kenter, Kallenberg, Laurent, Korfage; Chair Knottnerus, Secr. Meijer.

18.10-18.20  Recording input for report

18.20-18.50  Parallel sessions
Postdocs/Talent programme’s fellows, RIMLS, Subcommittee 3, Cals room

Postdocs/Talent programme’s fellows, RIHS, Subcommittee 4, Titus Brandsma room
18.50-19.00  Recording input for report

19.00-19.20  Plenary closed session Committee to wrap-up first day; Chair: Knottnerus, both Secretaries

19.20  Adjourn for dinner (Committee members, President Executive Board Radboud University, Dean, Directors RIHS and RIMLS, policy advisors).

Tuesday 4 December 2018
Location: Mansion Huize Heyendael

08.30-09.15  Plenary closed session, Preliminary considerations, All Members, Titus Brandsma room, Chair: Knottnerus, both Secretaries.

09.15-09.45  Plenary interview Executive Board Radboudumc, All Members, Titus Brandsma room, Chair: Knottnerus; both Secretaries.
09.45-09.55  Recording input for report
09.55-10.00  Short break to change rooms

Subcommittee 3 & 4
10.00-10.30  Parallel sessions
Members PhD Training and Supervision Committee RIMLS, Subcommittee 3, Cals room

Members PhD Training and Supervision Committee RIHS, Subcommittee 4, Titus Brandsma room
10.30-10.40  Recording input for report

10.40-10.50  Coffee break

10.50-11.20  Parallel sessions
Members Internal advisory board RIMLS, Subcommittee 3, Cals room

Members Internal advisory board RIHS, Subcommittee 4, Titus Brandsma room
11.20-11.30  Recording input for report

11.30-12.00  Parallel sessions
Management team RIMLS, Subcommittee 3, Cals room

Management team RIHS, Subcommittee 4, Titus Brandsma room
12.00-12.10  Recording input for report
12.10-13.00  Lunch (and change of rooms)
13.00-14.00  Parallel closed sessions
  Discussion of results and preparation of Assessment Report, Subcommittee 1, Titus Brandsma room
  Discussion of results and preparation of Assessment Report Subcommittee 2, Cals room
14.00-14.05  Short break to change rooms
14.05-15.05  Parallel closed session
  Discussion of results and preparation of Assessment Report RIMLS, Subcommittee 3, Cals room
  Discussion of results and preparation of Assessment Report RIHS, Subcommittee 4, Titus Brandsma room
15.05-15.15  Coffee break
15.15-16.50  Plenary closed session, All Committee members, Titus Brandsma room: general discussion, preparation of assessment report and final presentation; making appointments for finalizing report
17.00-17.30  Presentation of preliminary findings by Chair Evaluation Committee (Attended by Rector Magnificus). Lecture Hall (Hippocrates Hall, route 77).
17.30-18.30  Closure with drinks
Appendix 3
Quantitative data on the institutes’ composition and financing

Table A1: Composition of RIMLS

<table>
<thead>
<tr>
<th></th>
<th>2014 #</th>
<th>2014 FTE¹</th>
<th>2015 #</th>
<th>2015 FTE¹</th>
<th>2016 #</th>
<th>2016 FTE¹</th>
<th>2017 #</th>
<th>2017 FTE¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific staff²</td>
<td>392</td>
<td>133</td>
<td>388</td>
<td>135</td>
<td>364</td>
<td>128</td>
<td>323</td>
<td>115</td>
</tr>
<tr>
<td>Postdocs</td>
<td>125</td>
<td>88</td>
<td>129</td>
<td>84</td>
<td>108</td>
<td>72</td>
<td>91</td>
<td>61</td>
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<tr>
<td>PhD candidates³</td>
<td>366</td>
<td>244</td>
<td>418</td>
<td>282</td>
<td>405</td>
<td>265</td>
<td>415</td>
<td>270</td>
</tr>
<tr>
<td>Total research staff</td>
<td>883</td>
<td>464</td>
<td>935</td>
<td>501</td>
<td>877</td>
<td>466</td>
<td>829</td>
<td>447</td>
</tr>
<tr>
<td>Support staff</td>
<td>248</td>
<td>154</td>
<td>232</td>
<td>142</td>
<td>195</td>
<td>119</td>
<td>186</td>
<td>118</td>
</tr>
<tr>
<td>Total staff</td>
<td>1131</td>
<td>619</td>
<td>1167</td>
<td>643</td>
<td>1072</td>
<td>585</td>
<td>1015</td>
<td>565</td>
</tr>
</tbody>
</table>

All data (FTE and finances) are based on the financial administration database of Radboudumc and Faculty of Science. Since the research themes were formed in 2014, data of 2012 and 2013 are not available.

Note 1: Staff FTE is the nominal time spent on research. More detailed information can be found in the addendum.
Note 2: All research and clinical staff members, such as professor (full, associate, assistant), academic medical specialist, researcher, and other research personnel.
Note 3: Standard PhDs (employed) and contract PhDs (externally or internally funded but not employed).

Table A2: Financing of RIMLS

<table>
<thead>
<tr>
<th></th>
<th>2014 FTE</th>
<th>2014 %</th>
<th>2015 FTE</th>
<th>2015 %</th>
<th>2016 FTE</th>
<th>2016 %</th>
<th>2017 FTE</th>
<th>2017 %</th>
</tr>
</thead>
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<td>Funding</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct funding¹</td>
<td>209</td>
<td>34</td>
<td>230</td>
<td>36</td>
<td>216</td>
<td>37</td>
<td>228</td>
<td>40</td>
</tr>
<tr>
<td>Research grants²</td>
<td>129</td>
<td>21</td>
<td>120</td>
<td>19</td>
<td>96</td>
<td>16</td>
<td>82</td>
<td>14</td>
</tr>
<tr>
<td>Contract research³</td>
<td>281</td>
<td>45</td>
<td>293</td>
<td>46</td>
<td>273</td>
<td>47</td>
<td>256</td>
<td>45</td>
</tr>
<tr>
<td>Total funding</td>
<td>619</td>
<td>100</td>
<td>643</td>
<td>100</td>
<td>585</td>
<td>100</td>
<td>565</td>
<td>100</td>
</tr>
</tbody>
</table>

Expenditure

<table>
<thead>
<tr>
<th></th>
<th>M€</th>
<th>%</th>
<th>M€</th>
<th>%</th>
<th>M€</th>
<th>%</th>
<th>M€</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel costs</td>
<td>41</td>
<td>48</td>
<td>43</td>
<td>48</td>
<td>40</td>
<td>50</td>
<td>40</td>
<td>47</td>
</tr>
<tr>
<td>Material costs</td>
<td>44</td>
<td>52</td>
<td>46</td>
<td>52</td>
<td>41</td>
<td>50</td>
<td>44</td>
<td>53</td>
</tr>
<tr>
<td>Total expenditure</td>
<td>85</td>
<td>100</td>
<td>88</td>
<td>100</td>
<td>81</td>
<td>100</td>
<td>84</td>
<td>100</td>
</tr>
</tbody>
</table>

All data (FTE and finances) are based on the financial administration database of Radboudumc and Faculty of Science. Since the research themes were formed in 2014, data of 2012 and 2013 are not available.

Note 1: Direct funding (lump-sum budget). The detailed calculation of direct funding and other financial sources is explained in the addendum.
Note 2: Research grants obtained in national scientific competition (e.g. grants from NWO and KNAW).
Note 3: Research contracts for specific research projects obtained from external organizations, such as industry, government ministries, European organizations and charities.
Table A3: Composition of RIHS

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>FTE¹</td>
<td>#</td>
<td>FTE¹</td>
</tr>
<tr>
<td>Scientific staff²</td>
<td>949</td>
<td>224</td>
<td>941</td>
<td>229</td>
</tr>
<tr>
<td>Postdocs</td>
<td>32</td>
<td>20</td>
<td>36</td>
<td>23</td>
</tr>
<tr>
<td>PhD candidates³</td>
<td>472</td>
<td>216</td>
<td>503</td>
<td>227</td>
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<tr>
<td><strong>Total research staff</strong></td>
<td>1453</td>
<td>460</td>
<td>1480</td>
<td>478</td>
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<tr>
<td>Support staff</td>
<td>145</td>
<td>62</td>
<td>123</td>
<td>56</td>
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<tr>
<td><strong>Total staff</strong></td>
<td>1598</td>
<td>523</td>
<td>1603</td>
<td>535</td>
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Table A4: Financing of RIHS

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<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FTE</td>
<td>%</td>
<td>FTE</td>
<td>%</td>
</tr>
<tr>
<td>Direct funding¹</td>
<td>209</td>
<td>40</td>
<td>215</td>
<td>40</td>
</tr>
<tr>
<td>Research grants²</td>
<td>83</td>
<td>16</td>
<td>82</td>
<td>15</td>
</tr>
<tr>
<td>Contract research³</td>
<td>230</td>
<td>44</td>
<td>238</td>
<td>44</td>
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<tr>
<td><strong>Total funding</strong></td>
<td>523</td>
<td>100</td>
<td>535</td>
<td>100</td>
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<tr>
<td>Expenditure</td>
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<tr>
<td>Personnel costs</td>
<td>41.5</td>
<td>49%</td>
<td>43.0</td>
<td>49%</td>
</tr>
<tr>
<td>Material costs</td>
<td>43.6</td>
<td>51%</td>
<td>44.4</td>
<td>51%</td>
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<tr>
<td><strong>Total expenditure</strong></td>
<td>85.1</td>
<td>100%</td>
<td>87.4</td>
<td>100%</td>
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</table>
Appendix 4  
Explanation of the categories utilized (scores 1-4)  

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