Erasmus MC
Universitair Medisch Centrum Rotterdam

Research Assessment

Theme Thorax

2013-2018

Report on the research review according to the Standard Evaluation Protocol 2015-2021

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Contents

Preface

On 10 and 11 December 2020, an international committee carried out the SEP evaluation for Theme Thorax of the medical faculty of Erasmus University. The committee members experienced their discussions with the representatives of the departments of Cardiology, Pulmonology and Thoracic surgery as very constructive. Partly due to the thorough self-reporting, the committee members were able to prepare well. Due to the COVID crisis, an on-site visitation was not possible, but because of the good preparation, the conversations went smoothly, without technical hiccups.

The committee assesses the quality of the research in Theme Thorax as very good. In order to meet the challenges of the future, this report will list a number of recommendations that can be considered to make research more sustainable. A number of recommendations are theme-transcending and could possibly lead to an institute-wide response, for example if they are also recognised in other SEP reports. On behalf of the other committee members, I would like to thank the dean, the heads of department and the employees for the friendly and open reception.

Gerard Pasterkamp
Committee chair, Theme Thorax
March 2021

I. Introduction

Assignment to the committee

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

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

Historically, departments are distributed over nine overarching themes:

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

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

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

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

The committee did not attempt to draw a direct comparison between departments within Theme Thorax. Nonetheless, it has taken note of the clinical and research output of the departments and discussed them in relation to each other. The committee emphasises that the assessments performed by the external reviewers of the nine overarching themes are essentially incomparable and should not be used as the basis for central funding strategies; each committee assessed the theme in question on its own merits.

Assessment criteria

The assessment of Theme Thorax was guided by the Standard Evaluation Protocol 2015-2021 (SEP) of the Royal Academy of Sciences and Arts of the Netherlands (KNAW), the Netherlands Organisation for Scientific Research (NWO) and the Dutch Association of Universities (VSNU). The three assessment criteria specified in SEP – (1) research quality, (2) relevance to society and (3) viability – formed the starting point for the assessment. In its report, the committee both qualitatively and quantitatively assesses these criteria, using a four-point scale, ranging from world leading/excellent (1) to unsatisfactory (4) (appendix 3). In accordance with SEP, the

assessment also includes a qualitative appraisal of Erasmus MC's PhD programme, and its research integrity and diversity policies and practices.

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

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

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

Committee composition

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

- Prof. Gerard Pasterkamp (chair), UMC Utrecht, the Netherlands;
- Prof. Elisabeth Bel, Amsterdam UMC, the Netherlands;
- Prof. Vibeke Hjortdal, Copenhagen University, Denmark;
- Prof. Stefan Janssens, UZ Leuven, Belgium;
- Prof. em. Bas Mochtar, Maastricht UMC+, the Netherlands;
- Prof. em. Nico van Zandwijk, University of Sydney, Australia.

Dr Floor Meijer was appointed independent secretary to the committee. A short curriculum vitae of each of the committee members is included in appendix 1.

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

Documentation

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

- Standard Evaluation Protocol 2015-2021;
- Terms of Reference for conducting the site visit;
- A Beginner's Guide to Dutch Academia (The Young Academy, 2018);
- Strategy23 ('Koers23').

Working method

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

Each department was primarily assessed by two of the committee members, both of them specialists in the relevant discipline. These two committee members took the lead in preparing for the assessment of this department. Furthermore, they chaired the online meetings with department staff and

eventually drafted an assessment based on the SEP criteria.

The online site visit of Theme Thorax took place on 10 and 11 December 2020. During the site visit, the committee met with the Executive Board of Erasmus MC as represented by the dean, as well as with representatives of the departments. Each department was given a time slot, which it filled with presentations and interviews with senior, mid-career and junior staff. Committee members also spoke with PhD candidates of the departments during two consecutive speed dates. In its final meeting, the committee jointly scored all of the departments. To conclude the visit, the committee presented its preliminary conclusions to the Executive Board of Erasmus MC and the staff of the departments of Theme Thorax. The schedule for the site visit is included in appendix 2.

After the site visit, the chair and the secretary drafted a first version of the committee report, based on the assessments by the committee members. This draft report was sent to the committee for all members to comment on. Subsequently, the draft report was presented to Erasmus MC for factual corrections and comments. In close consultation with the chair and other committee members, the secretary used these comments to finalise the report. The final report was presented to the Executive Board of Erasmus MC.

Structure of the report

This report contains the committee's findings and conclusions on the three departments constituting Theme Thorax. In accordance with SEP, the committee details its assessments on strategy and targets, research quality, societal relevance and viability in separate chapters for all three departments. Overarching and institutional dimensions (e.g. policies that are developed at Erasmus MC rather than at the departmental level, general practices at Theme Thorax) are assessed in a general chapter that precedes the chapters on the departments. Short bios of the committee members, the assessment scale and the schedule for the digital site visit can be found in the appendices.

II. General findings

Below, the committee summarises how it has valued the research organisation as a whole. The committee would like to emphasise that, although many constructively critical comments have been made, most should be regarded as minor comments and that the overall picture has been positive. The main comments are summarised in the recommendations at the end of this chapter.

Organisational structure

The organisational structure of Erasmus MC is quite complex, with many different layers (departments, themes, Academic Centres of Excellence, research schools etc). It took the committee considerable time to familiarise itself with the different components and particularly with the lines of decision-making and the allocation model for research funding. From the materials provided, it was not altogether clear how decisions are made and how strategy is implemented. Most of these aspects were clarified in the interviews.

Erasmus MC has traditionally been organised in a decentralised manner. It comprises 48 departments, which form the primary units for governance, HR and funding and, as such, the organisational focal point. Departments receive (first stream) research funding directly from the Executive Board of Erasmus MC and make their own decisions on hiring, strategy and finances. The executive power lies with the department head who reports directly to the Executive Board.

Erasmus MC's nine themes were created in 2012 by grouping departments based on existing clinical collaborations. The committee learned that the themes are organisational units only. As such they are not responsible for developing research strategies or distributing funds. Within a theme, the combined heads of departments, together with the theme director, form the Theme Board. The theme director is responsible for (effective) operational management. The theme itself is a remarkably 'light' organisational layer. While some operational research management processes are aligned within Theme Thorax, departments largely operate independently (see below, 'infrastructure').

A recent addition to Erasmus MC's organisational structure, are Academic Centres of Excellence (ACEs). These are virtual, internally confirmed structures - as opposed to externally confirmed Centres of Excellence, which have a different status. ACEs were created as a tool to stimulate collaboration between departments and bring individual staff members together on mutual topics of interest. The committee was informed that ACEs receive no structural funding from the Board and that no limit is set on the number of ACEs that could be established. Currently there are 74 ACEs, 16 of which are relevant for Theme Thorax. The committee considers the lack of structural funding and the proliferation of ACEs somewhat problematic. It was told by staff members that there are considerable variations in the added value of ACEs. While some succeed in forging mutually beneficial relations between staff and departments, others exist in name only and produce relatively modest results. In order to improve efficacy and excellence, the committee recommends limiting the number of ACEs and providing the successful ones with a financial incentive to strengthen viability.

From the interviews, the committee got the impression that most staff members seem satisfied with the decentralised organisational structure and bottom-up communication. Nonetheless, this system has some obvious downsides. The success of strategic choices depends very much on the leadership qualities of individual department heads. While there are no signals of weak leadership at present, the committee recommends to consider installing a committee of experts to guide/ monitor the implementation of strategic choices (and selection of new department heads).

Strategy23

As part of the new institutional strategy for the 2018-2023 period ('Strategy23') Erasmus MC

aims to become the first technical academic medical centre in the Netherlands by convergence with TU Delft and Erasmus University. Technology and dedication are the dual focus points of this new strategy. Becoming a technical MC was described to the committee as a bottom-up decision, not as something that was imposed on the departments by the Erasmus MC Executive Board. Collaborations with TU Delft were pre-existing (although in some departments more so than in others) and there is a widely shared belief that Theme Thorax and its departments will benefit from this convergence.

Also, there is awareness that particular efforts need to be made to change the strategy and focus of a highly decentralised organisation such as Erasmus MC. To ensure that the staff is sufficiently included in upcoming developments, the Executive Board conducts quarterly strategic discussions with department heads, as well as one-on-one conversations with individual department heads.

Funding

At Erasmus MC, budgets for the various core tasks are completely separated. First stream ('direct') funding that Erasmus MC receives from the ministry is allocated to the departments and spent at that level. As elsewhere in the Netherlands, direct funding is under pressure, with (further) budget cuts expected. Department representatives described the first stream research budget, and the way that it is internally distributed within Erasmus MC, as a 'liability'.

The committee was informed that Erasmus MC is looking into implementing a performance-based model for distributing first stream funding to the departments. This is a positive development, that should be accelerated. The current allocation model is largely based on historical context, which favours large established departments over fast-growing newcomers. Up and coming departments that acquire a lot of research grants typically have a hard time finding the necessary internal funds for matching of (the increasing) overhead costs (PhD salaries, material costs, housing etc.). The committee promotes using a clear and mutually agreed upon metric on all research funds that individual departments acquire. In its opinion, variable overhead and internal taxation of external grants could be a disincentive to PI's, who would benefit from a mutually and uniformly negotiated agreement. The committee also remarks that changes in strategy (as described above) require flexibility and a shift in allocated budgets. At the moment, the first stream budget seems to be fixed (and almost completely spent on personnel cost) which makes it difficult for departments to align with novel strategic choices.

Infrastructure

Erasmus MC offers its departments a number of core facilities. These are centrally operated facilities that staff can use for their research purposes, or where they can have specific services performed. Examples are the Erasmus Centre for Animal Research, the Applied Molecular Imaging and GMP facilities. Although providing a cost-effective increase of research infrastructure, these core facilities do not seem to be optimally geared to meet the departments' specific research needs. In addition, the committee noted that governance of the core facilities received mixed reviews from staff members interviewed. Therefore, more engagement of key PI's in the management/budget preparation of core facilities may be needed.

Research support (in the form of research bureaus that facilitate clinical trial management) is mostly organised at department level, with larger (established) departments able to secure better support than smaller departments with more modest first stream budgets. Although collaboration between research bureaus (mutual monitoring of clinical trials, standard operating procedures and guidelines) was noted, infrastructure sharing at theme level should be encouraged. The committee underlines that a closer collaboration of research bureaus will

be cost effective and that shared responsibility for infrastructure does not have to come at the cost of departments' autonomy.

In the review period, central data storage facilities provided by Erasmus MC were limited to the intranet, which offers (limited) protected storage space to each department, with the option of paying for additional storage. The committee was informed that this central infrastructure did not sufficiently suit the needs of the Thorax departments and that departments had to find alternative solutions at their own expense. A very positive development is that an Erasmus MC-wide data management plan with an audit trail and log ('Research Suite') currently is in the final stage of development. A research management software application ('PaNaMa') is simultaneously being finalised. Representatives of the Thorax-departments are confident that these new facilities will meet their future requirements.

Research integrity

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

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

The decentral implementation of the centralised integrity policy is work-in-progress. In anticipation of this policy, departments are responsible for their own research culture. Theme Thorax has appointed its own scientific committee (KWOTT, *Kwaliteit Wetenschappelijk Onderzoek Thema Thorax*), comprised of senior scientists and senior scientific support staff from the three departments. It meets at least four times a year and sets priorities for the departments in terms of meeting the Erasmus MC's Research Integrity policy's requirements. Topics that this scientific committee addressed in the review period are:

- Standard Operating Procedures for all patient-oriented research.
- A Thorax Centre registration system for all patient-oriented research.
- Mandatory BROK registration for all PIs.
- Mandatory research integrity certification for all PhD candidates.
- The implementation of an inter-departmental monitoring system for all investigator-initiated WMO patient-oriented research projects.
- The installation of a (confidential) councillor for PhD candidates.
- Periodical PhD meetings to address research integrity and stimulate multidisciplinarity.

To the committee, the above signals that integrity is well addressed.

Talent management

Erasmus MC has not yet implemented a tenure track programme. This means that the departments, which are responsible for HR, cannot rely on a formal mechanism for attracting, promoting and retaining talented researchers. Interviewed staff members mentioned this as a significant problem, which is also related to the succession planning of heads of department. The committee was informed that a substantial number of group leaders and senior researchers are due to retire shortly, while (strategies to appoint) successors are not always in place. Whether or not young and mid-career staff members have insight in their career possibilities varies from research group to research group. Erasmus MC has established fixed criteria for promotion to assistant, associate and full professor, but fulfilling these criteria does not

always appear to guarantee that promotion is indeed granted. In the experience of staff members, HR decisions are also informed by less formal or less transparent factors. Furthermore, although existing talent and coaching programmes are available within Erasmus MC, these were not known to all, which could mean that not all staff gets the opportunity or is informed to benefit from these programmes.

During the site visit, the dean informed the committee that Erasmus MC is looking into the establishment of a tenure track programme. Recently, a proposal for the contents of such a programme was put forward by the Erasmus MC talent and innovation council and the Executive Board is currently examining funding strategies. The committee encourages this initiative and supports implementation without further delay. In addition, the committee points out that a tendency of "inbreeding" is inherent in the Dutch academic system. It is common for departments to cultivate their own talent from student level up, instead of recruiting (inter)nationally at all career levels. The departments are aware of this tendency and each have a (living) policy plan that addresses talent management.

Diversity

Because of its location in the multicultural city of Rotterdam, Erasmus MC caters to a diverse group of patients and student population. To reflect this diversity in its staff, Erasmus MC aims for a diverse composition of teams in all layers of the organisation in terms of ethnic background, age and gender. In practice, current policies and initiatives to create an inclusive working environment focus mostly on gender. Other aspects of diversity are left largely unexplored and could do with more attention.

In order to support female researchers, Erasmus MC has established policy initiatives such as the Female Talent Class, consisting of various workshops and interventions intended for talented early career researchers, and the Female Career Development Programme, developed for female scientists who have the potential and ambition to reach the position of associate professor (UHD).

The committee applauds Erasmus MC on its attempts to create opportunities for talented women. The prevailing disbalance between male and female staff members, especially at the managerial and full professor levels, is not unique to Erasmus MC. Many institutes face a similar problem. As elsewhere, remedying this situation will require active interventions, as the gender balance will not automatically improve over time. From the interviews and documents, the committee concludes that there is a cohort of young, talented female scientists who should be given ample opportunity to further develop themselves.

PhD training and supervision

Erasmus MC offers three- to four-year (fulltime equivalent) PhD positions, which are most often funded through grants and industry. Projects are either individual or (partially) shared with other PhD candidates. From speaking to a delegation of PhD candidates, the committee concludes that Erasmus MC offers its PhDs a harmonious and safe working environment, in which PhD candidates are given quite a bit of autonomy to pursue their own research interests. This is highly appreciated by PhDs.

Until recently, training and supervision practices were shaped at the decentral level and significantly varied from department to department and from supervisor to supervisor. In recent years, initiatives were taken to streamline procedures and practices across Erasmus MC. The most prominent (and imminent) change is the introduction of a Graduate School, which will be operational in early 2021.This new Graduate School will replace the (five) local research schools, that are currently responsible for the training of Erasmus MC PhD candidates. The committee was informed that the departments of Theme Thorax are most actively involved in the research schools COEUR, NIHES and MolMed. The courses offered by these schools will be

integrated in the three tracks of the Graduate School (Clinical Sciences, Health Sciences, Biomedical Sciences), where they will become available to all 1500 Erasmus MC PhD candidates. The current coordinator of COEUR will be the overall coordinator of PhD education in the Graduate School. While representatives of Theme Thorax are not averse to centralisation, and indeed pointed out some clear benefits, they do see a risk of the specific cardiovascular interest disappearing within the larger whole. This, according to the committee, is something to keep a keen eye on.

A second initiative aimed at streamlining the PhD programme, is the introduction of the central database system Hora Finita (operational as of late 2019) in which the status of all PhD projects is registered. The committee notes that, before the introduction of Hora Finita, Erasmus MC did not centrally keep track of completion times, success rates and next destinations of PhDs. Therefore, it was not possible to assess quantitative aspects of the PhD programme for the 2013-2018 period. The introduction of Hora Finita should be considered a positive development, although PhD candidates did mention that there are opportunities to improve the user-friendliness of the software. This is something for Erasmus MC/the Graduate School to look into.

A soft guideline (rather than a strict requirement) is that PhD candidates obtain a total of 30 European Credits (EC) over the course of their project. These credits can be earned by taking courses, attending lectures and conferences and teaching undergraduate students. A one-day course on research integrity is mandatory for all Erasmus MC PhD candidates. Candidates who conduct animal experiments are required to follow a course on laboratory animal science, while candidates who are involved in patient-related research take part in a course on good clinical practice. PhD candidates that the committee spoke with feel that the quality of the training is adequate. There is a broad range of courses and they are well organised. However, PhD candidates mentioned that supervisors could be more informed about the available courses. It would be appreciated if they could offer targeted advice on which courses to follow. Furthermore, it would be appreciated if the Graduate School could offer career orientation activities, as not all supervisors touch upon this subject with their PhDs.

All of the PhDs that participated in the review have a personal training and supervision plan (TSP), usually drawn up by the PhD candidate him/herself, sometimes with help from the supervisor(s). In some cases, this was done retrospectively, after the introduction of Hora Finita, as this system demands having a TSP. It is not (yet) common that the TSP is updated annually or taken as the starting point for yearly progress meetings, but it is believed that this will become the norm for future cohorts. Such a development has the full support of the committee.

The PhD candidates that the committee spoke with are generally very satisfied with the quality of supervision, praising the accessibility and general helpfulness of individual supervisors. Having two supervisors seems to be the norm, although some of the PhDs that the committee spoke with have three or even four. One suggestion that was made, is to increase the frequency of meetings with the full supervision team.

A general point of attention is that PhDs tend to rely on informal sources of information. Often, they receive information from their more advanced fellow PhD candidates rather than through 'official' channels. Thesis requirements are an example of the opacity of information available to PhD candidates; PhDs indicated that they are unsure which criteria their dissertations should meet, or where this information is available. While the committee recommends improving communication on requirements, it positively assesses the fact that publication rules for graduation are interpreted with flexibility.

The time that PhD candidates spend on their PhD varies from 30-40 hours a week to more

than 50 hours. Satisfaction with work-life balance seems to vary quite a bit. Some PhDs indicated that the workload, in combination with high expectations, can be a bit overwhelming, especially at the beginning of the project. Offering time management tools to PhD candidates could prove helpful in the first year of the PhD track.

General facilities available to PhD candidates were a final subject that the committee discussed with PhDs. It was clear that not all PhDs are satisfied in this respect, which is mostly due to the recent introduction of flexible office space: PhDs work on flexible desks in large open offices. Although this facilitates meeting people outside of the circle of direct colleagues, it also makes it much harder for PhDs to focus. The committee asks Erasmus MC to look into alternative solutions.

General recommendations

1. There is a considerable number of ACEs and their added value varies from case to case. Just like the themes, they are not empowered by budget that will allow them to steer strategic choices. The committee concluded that ACEs seem to have only partially fulfilled their original goal and advises to reduce the number of ACEs in line with the strategy and focused target areas of clinical research.
2. With respect to centrally operated core facilities, the committee recommends intensified engagement of key PI's in discussions on management and, most importantly, on cost calculation.
3. The autonomously operating departments and research groups do not have the means to install a tenure track for gifted researchers themselves. In order to safeguard future research quality, Erasmus MC is advised to establish a formal tenure track programme at the central level.

III. Pulmonary Medicine

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

Mission and strategy

The Department of Pulmonary Medicine performs fundamental, translational and clinical research to improve treatment and develop new treatment strategies for patients with pulmonary diseases. Its mission is to unravel the physiological mechanisms involved in the development and progression of pulmonary diseases. This knowledge allows the department to continuously improve existing treatment and develop novel treatments for diseases that are currently incurable.

Research is organised in five established research lines that focus on specific (groups of) pulmonary diseases or on general principles involved in multiple diseases (immunology, epidemiology). These lines are:

1. Pulmonary Oncology
2. Molecular Immunology
3. Interstitial Lung Diseases
4. Immune Pathology of Asthma
5. Epidemiology of asthma/COPD

A sixth, 'clinical' research line combines three topics (infectious diseases, lung transplantation, pulmonary hypertension) that the department hopes to develop into mature research lines in the coming years.

The committee established that the Department of Pulmonary Medicine is in transition. After a period of rapid growth and a leadership change, the department is setting out a new path for its research. The current department head, who took office in 2018, initiated a long-term strategy plan, which is now in a final stage of preparation. The objective of this strategy is to strengthen the link between fundamental/translational research lab and the clinic. In order to bridge the gap between research and clinic, the department organises monthly 'bridge meetings', which involve all clinical, translational and fundamental researchers. As part of the transition, internal and external collaborations are also being strengthened. Research lines are becoming more and more aggregated, and some less well-developed research topics are gradually abandoned. In order to integrate the different research lines, the joint focus will be on the immunological aspects of different lung diseases.

The committee applauds the recent developments, which are likely to strengthen the department in coming years. The 'Big Picture' that was presented to the committee – integrating (all) tertiary pulmonary care with basic/translational science – is ambitious and enticing. Giving a prominent role to immunology seems sensible given the department's strong expertise in this field. Even so, the committee is concerned that the research activities of the department are still spread over too many sub-areas (cf. 'viability').

The committee was informed that the research strategy under development incorporates objectives from the Erasmus MC-wide Strategy23, in particular the e-health applications for patients with IPF/sarcoidosis. It was also mentioned that aligning with the Erasmus MC's objective of becoming a technical MC will require some action on the part of the department. Connections to TU Delft were not yet in place and the committee recommends to establish these where possible.

The department (co)chairs several ACEs: Thoracic Oncology (coordinator), Interstitial Lung Diseases and Sarcoidosis (coordinator), Pulmonary Hypertension (co-coordinator together with the Department of Cardiology), Respiratory Infections (coordinator), Tumour Immunology and Immune Therapy. From the interviews, the committee established that most of these ACEs are fruitful and lead to valuable cross-fertilisation. However, some of them are somewhat dormant and do not produce many results. The combination of

leadership of a research line and coordinating an ACE with similar focus will almost certainly add value. Thus, Erasmus MC expertise is best used to strengthen the most important research lines of the department. The committee feels that ACEs might become even more effective if financial incentives would be included.

The department's research is supported by its Clinical Research Bureau and research advisor, both of which are strong assets according to the committee. The Clinical Research Bureau assists in setting up, conducting and monitoring investigator-initiated pilot studies, while the research advisor assists the department head in setting out the research strategy. She is also involved in grant writing and securing appropriate research infrastructure.

Research quality

The Department of Pulmonary Medicine covers the full spectrum of research from bench to bedside: fundamental, translational and clinical research, up to phase III clinical trials. Overall, the level of research is very high. Several of the department's senior researchers are recognised as international experts in their fields, as evidenced by high impact publications and obtained prizes and awards. Two renowned (part-time) professors from Ghent University significantly contribute to the international standing of the department. The department's Mean Normalised Citation Score (MNCS) is high and has increased over the review period, as has the annual number of publications. The committee appreciates that the department emphasises quality over quantity and made a conscious decision not to write reviews.

The department has the ambition to develop towards international excellence in eight different areas, but the question is whether this aim is too ambitious. The committee notes that currently not every research line is well-established. While the research lines in oncology, immunology, interstitial lung diseases and epidemiology should be considered 'world-leading', three relatively modest clinical research groups (infectious diseases, lung transplantation, pulmonary hypertension) are still in the development phase and lower the total score of the department. The department may consider to put emphasis on those areas that are internationally recognised and/or are aligned with the Erasmus' strategy.

Over the review period, the department became increasingly dependent on contract research, which amounted to 67% of the total funding in 2018. Direct funding is very limited (2% in 2018), which is a result of the Erasmus MC allocation model. This is mostly based on historical data, not on current performance, and by consequence clearly disadvantages up and coming departments. The department aims to accrue more national (Longfonds, ZonMw) and European (ERC, Horizon) grants, which could mitigate the financial needs, especially if Erasmus MC is prepared to match acquired grants with a PhD or postdoc position.

Relevance to society

On the whole, the department's societal relevance is very good. The committee has seen examples of research projects with a prominent impact on society, i.e. development of a novel immunotherapeutic approach to malignant mesothelioma; home-monitoring and e-health applications for IPF/sarcoidosis. Both of these projects have received societal recognition in the form of publicity, awards etc. The NELSON study, a landmark study on the low dose spiral CT screening of risk groups for the development of lung cancer, was initiated in Erasmus MC and attracted major international attention. The outcomes of this study are being translated into the practice of lung cancer screening.

Worth mentioning is that the department has well-established relationships with multiple patient organisations (e.g. asbestos victims society, Longkanker Nederland). These are involved in the design of new projects and the evaluation of ongoing projects. The

department also plays a leading role in regional and national collaborations, such as the Comprehensive Cancer Network Zuid Holland (IKNL). Currently, the department does not seem to be targeting specific economic, social medical, or cultural groups, which is something to consider for the future.

Viability

The department demonstrates a very good viability. Over the review period, the department has seen considerable growth in terms of research (staff, grants, output, research lines, impact). The change of leadership and preparation of a research strategy have brought new energy and *élan*, even though plans were somewhat delayed because of the move to a new building and the Covid-19 pandemic. The committee was also pleased to hear of the arrival of a talented established researcher from Maastricht UMC, who joined the Pulmonary Oncology line as group leader after the former leader became head of department. Her research profile will allow a broadening of thoracic oncological research and practice.

The committee has high hopes for the new research strategy, which is likely to capitalise on the potential of the department and its researchers. Even so, the committee warns against being overly ambitious and trying to keep too many plates spinning at the same time. Increasing the number of successful research lines to eight will be extremely difficult in the current funding situation and may hamper the department in the long term, which is why the committee recommends focusing on existing strengths and building up the research from there. Crucial to the current success is the strong link with Ghent University. The two part-time Belgian professors who contribute significantly to the department's output should be encouraged to continue their active role in the department. The committee identified two main threats to the future viability of the department that should be addressed both at department and Erasmus MC level. The most important one is the funding situation, notably the lack of direct funding and the dependency on contract research. In the committee's opinion, the department should strive to maintain the current level of second stream funding (including international projects), while the Erasmus MC Board needs to consider matching this support and to contribute to the significant overhead cost of the translational research carried out within the department.

A second threat is the lack of transparent tools for rewarding and retaining talented staff. Erasmus MC does not have a tenure track system in place, which means that there are no formal guarantees for promotion. In practice, talented researchers seem to depend on luck and connections to get promoted to associate and – eventually – full professor. In order to safeguard the quality of future research, Erasmus MC will need to offer its staff clear career perspectives. At department level, this also means that promising staff should be properly supported in applying for personal grants (e.g. Veni, Vidi, Vici).

Finally, the committee congratulates the department on its good gender balance. However, other dimensions of diversity (e.g. race, ethnicity, religion, socio-economic status etc.) may deserve more attention.

Recommendations

1. Finalise the restructuring of the department and stimulate cross-fertilisation between the main research themes (with immunology as connector).
2. Restricting the number of active research lines to four or five is advised. This does not mean that scientific reports on adjacent research areas cannot get out but it will help to increase focus and contribute to appropriate oversight.
3. Governance and decision-making is complex and affected by multiple factors (Strategy23 aspirations, ACEs, current expertise, multiple research lines). A transparent pathway for setting priorities and distribution of research funds is needed.

4. Contribution to (international) registries and biobanks is encouraged.
5. Strive to become a partner in a European Horizon consortium.

IV. Cardio-Thoracic Surgery

Research quality	Very Good (2)
Relevance to society	Excellent (1)
Viability	Good (3)

Mission and strategy

The mission of the Department of Cardio-Thoracic Surgery is to improve prognostication, clinical outcomes and decision-making in cardio-thoracic interventions. It does this by combining translational research with the development and application of innovative statistical methods and clinical decision-making applications for patients with congenital heart disease, heart failure & structural heart disease, thoracic aortic disease, and pulmonary diseases.

Research is divided into four main research lines:

1. Congenital heart disease
2. Heart failure/structural heart disease
3. Aortic pathology
4. Pulmonary diseases.

All four research lines interact with a fifth research line: clinical decision-making (perioperative aspects, patient prognosis, innovative statistical methods, shared decision-making and translational research). In the committee's opinion, the department would benefit from focusing on those research lines that can meet international competition.

The Department of Cardio-Thoracic Surgery is a very small and primarily clinically oriented department. Historically, its research has always emerged from clinical practice and was done as a secondary task in staff members' spare time. Apart from one full professor with a research appointment, the department has never had any dedicated research staff and research budgets were limited. A research strategy plan was not in place for the review period.

A welcome development is that the department recently implemented its first formal research strategy (2019-2024). This new strategy will hopefully give the department's staff members the guidance and strategic dots on the horizon that they say they need. The committee also noted that since 2018, the management organises weekly meetings with the leaders of the research lines in order to facilitate strategic and operational decision-making processes.

The committee was pleased to learn from presentations given by staff members that there are successful collaborations with TU Delft and that there is therefore clear alignment with Erasmus MC's Strategy23. The committee stresses that such collaborations have great potential and could change the future of thoracic surgery. Nevertheless, the committee prefers to see these collaborations embedded in departmental strategy. Currently, interaction with TU Delft seems to be mainly the result of initiatives by individual researchers. A more deliberate departmental approach could potentially produce even better results.

Similarly, there does not seem to be a specific policy towards collaborating with other departments and within ACEs. The department prides itself on collaborating with other departments 'on its own terms' and highly values its autonomy, but decisions about partnerships seem to be made in an ad hoc manner. Collaborative efforts seem limited at strategic level but functioning in practice at junior level. Targeted action is required to make the most of existing (and future) collaborations within Erasmus MC, such as the promising collaborations with the Departments of Cardiology and Paediatric Cardiology on congenital heart disease.

Research infrastructure is referred to as a weakness in the SWOT analysis of the department. Unlike the other two departments in this review, the Department of Thoracic Surgery cannot independently bear the cost of establishing and maintaining its own research office and data management facilities. The department therefore relies on central Erasmus MC facilities. According to management, the use of these facilities is associated with

significant delays and communication issues, which were said to frustrate processes and add to the already considerable administrative burden on staff.

In solving research infrastructure problems, the committee envisions a clear role for Theme Thorax. More integrated solutions at theme level could prove most (cost) effective for all departments involved. This also applies to lab space and support staff. The committee questions the use of individual staff establishing their own labs while they could use the existing lab space of other departments and of the department stretching itself financially in order to to have (within the existing staff support team) a recently re-appointed research coordinator and research nurse. Merging activities seems a sensible way forward.

Research quality

Research results are very good, especially when considering that research has always been a secondary activity for the department, for which time and funding are very limited. Over time, the department has developed its original research lines on congenital heart disease and heart failure/structural heart disease and expanded into the areas of aorta pathology and pulmonary disease.

The committee found that, overall, the research has high clinical relevance, is evidence based and adopts interesting new perspectives. Two clear highlights are the research line on congenital heart disease, which produced interesting papers of which the most cited from 2014 was cited up to 85 times (Scopus), and the research line on clinical (shared) decision-making, that has very clear clinical impact. During the site visit, the committee met with talented young clinicians from both these research lines, whose research efforts made a highly favourable impression. The (established) research line on heart failure/structural heart disease is also doing well, while the newer research line on pulmonary diseases looks promising, with several enthusiastic new staff members working on this topic.

Over the review period, the mean normalised citation score was impressive, particularly up to 2015 (as a result of two senior research leaders participating in different international clinical practice guideline committees). Research has clearly had an impact on the academic community, as was also demonstrated by awards, prizes, citations in other scientific journals, and implementation of national and European guidelines.

The department seems to require an adequate funding policy and earning capacity. The self-evaluation report identified obtaining sufficient internal and external funding to be able to sustainably consolidate all five research lines as a major challenge. Over the review period, direct funding decreased substantially, and it is expected to diminish further in coming years as a result of central budget cuts. This means that the department will become more reliant on research grants and contract research. It will therefore have to improve its earning capacity.

Relevance to society

The societal relevance of the department's research is excellent. In the review period, the department has done (potentially) impactful work on e.g. male/female differences of diseases, cost-effectiveness, health technology assessment and applied shared decision-making research, with the aim of achieving outcomes that really matter to patients. The department's research on congenital heart disease, which covers the whole bandwidth from neonate to Tx, has particularly added to its (inter)national visibility. A strength is that patient representatives and patient organisations are closely involved in much of the research that is being done at the department.

In particular, the committee is impressed by the department's strong track record on shared decision-making. The department is a believer in patient empowerment and has initiated several research projects aimed at improving clinical decision-making by developing, testing and test-implementing online decision aids and information portals in clinical practice to

support shared decision-making for heart valve disease, congenital heart disease and aortic aneurysm. This was done in close cooperation with patient representatives and involved all relevant national stakeholder organisations. For much of its research products (e.g. shared decision-making tools, clinical decision models) the final step of implementation into clinical practice seems challenging, mostly because of financial constraints. The committee suggests to follow the departments' own suggestion and collaborate with experienced "implementers" and continue to work on achieving the acknowledgement (also financially) for the multifaceted care of cardiothoracic surgery that not only entails the surgical procedure.

Viability

The committee concludes that the department has done quite well over the review period. Its research lines expanded considerably and produced results that are meaningful for the scientific community, individual patients and society at large. Consolidation of this growth and success will, however, require making informed strategic choices and laying these down in a clear plan for the future – something that employees have a strong need for. The committee notes that there are some concerns with respect to leadership, governance, funding, research infrastructure and facilities. These will need the management's urgent attention in order to help the department move forward.

First, the committee notes that the department head will retire shortly, as will three senior staff members. The procedure for succession of the department head will start soon and will follow the formal format with attention for the Erasmus MC strategy. The committee was assured that the outgoing department head will be replaced in line with the needs of the department as well as the institutional strategy. From the interviews, it became clear that the department currently lacks mid-career researchers who will be able to replace retiring senior staff. Moreover, while there is an abundance of young research talent, junior staff are not systematically prepared for the next steps in their career. A tenure track programme is not in place at Erasmus MC, and neither is a formal mentoring programme. In the committee's opinion, providing young talent with secure appointment, solid career prospects, dedicated time and support for research will be crucial for safeguarding future research quality. As it stands, staff members note that it is very difficult to combine their highly demanding clinical duties with structural research efforts. Burnouts were mentioned as a serious and universal problem that affects both young and older staff. In this respect, the committee was glad to hear that three new surgeons will start in early 2021. Their appointment is expected to lead to a more balanced workload.

Second, the committee feels that the future funding situation of the department is worrisome, especially with first stream funding expected to decline further. To mitigate this threat, the committee encourages the department to engage in new collaborations within the theme. This could help the department to obtain the necessary grants to strengthen its research lines. More integrated solutions within Theme Thorax could also help the department deal with a third point of attention, i.e. the observed weaknesses with respect to the research infrastructure and access to (central) facilities.

The committee concludes that there seems to be a strategic discrepancy between the challenges that are anticipated and seen, and the instruments and ideas that the department intends to use to solve these challenges. Careful realignment seems required. The upcoming change of leadership will likely be a catalyst for such a process. The succession of the department head is both a challenge – in the sense that the current head is held in high regard and it will be difficult to find a suitable successor – and an opportunity. A strategically chosen new department head could help to improve synergy across departments, sharpen the dots on the horizon and open up new pathways. According to the committee, this holds especially true if the procedure for succession is aligned with that in the

neighbouring Department of Cardiology, for which a new head will also shortly be appointed.

Recommendations

1. Further develop the research strategy in order to embed young staff members in a transparent and supportive environment and give them direction and focus. This will help to create stability and longevity.
2. Aim for more collaboration within the theme, as this could help the department in obtaining grants and in further strengthening its research output.
3. Develop a considered HR-strategy, which offers genuine perspectives to promising young researchers. The department is in need of research-minded top surgeons to fill future leadership positions.
4. Make a strategic plan for a new head of department which fulfils the recommendation of research viability of the department. This is a succession issue which creates synergy between congenital cardiac surgery, adult cardiac surgery and thoracic surgery and the concomitant research lines.
5. Make sure that collaboration with the Department of Cardiology will also be implemented with the new head of cardiology and all research lines as mentioned in mission and strategy for cardiology.
6. Develop a strategy to make sure that research products are implemented in clinical practice by merging with TU Delft, biomedical engineering, Erasmus MC biobank, and the common trial bureau.
7. Aim for better integration and alignment with incipient common research activities in cardiology and TU Delft will benefit funding success rate.

V. Cardiology

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

Mission and strategy

The Department of Cardiology is a large department with a significant research component, which employs 42 key research staff members. The department's somewhat generic mission is to make a significant scientific contribution to reducing the burden of cardiovascular disease by 25% over the next five to ten years. The department aims to achieve this by performing translational research, clinical studies and population-based research in close collaboration with (inter)national partners and patient advocacy groups in five key areas: ischemic heart disease, congenital heart disease, acquired structural heart disease, heart-rhythm disorders and heart failure.

The Department of Cardiology has seven fundamental/translational research lines which are highly interconnected. Together with the head of department, the leaders of these seven lines set out research policies for the department. The research lines are:

1. Intervention Cardiology
2. Heart Failure
3. Congenital Cardiology
4. Cardiovascular Epidemiology
5. Electrophysiology
6. Experimental Cardiology
7. Biomedical Engineering

The committee notes that five out of the seven research lines coincide with sub-specialties of cardiology. They do not seem to connect with or lead into strategic targets, which is a missed opportunity.

The scope of departmental research is broad. From the interviews, it was clear that the department has deliberately chosen to cover all aspects of modern cardiology in its research. Experimental Cardiology, Biomedical Engineering and Cardiovascular Epidemiology are all long-standing core research interests of the department, while the Clinical Unit Interventional Cardiology has also traditionally put a strong mark on departmental research. In the past ten to fifteen years the department has intentionally broadened its scope by expanding into the areas of Congenital Cardiology, Electrophysiology and Heart Failure.

The structure of the research organisation seems rather complex, with many different layers. The committee notes that the seven research lines are all embedded in several ACEs, in which various departments collaborate on a common disease entity. Moreover, the department plays a leading role in the recently established Erasmus MC Cardiovascular Institute, which currently comprises 16 out of 74 ACEs. The department is also a driving force behind COEUR, Erasmus MC's cardiovascular research school.

Because of all the different organisational components, the committee found it rather difficult to fathom how governance functions in practice. From speaking to department representatives, it concludes that there is a bottom-up culture, which relies heavily on mutual trust. Research lines and their underlying groups communicate and interact (by way of bi-weekly digital meetings) but appear autonomous when it comes to strategy, decision-making and talent management. Individual PI's operate quite freely. By consequence, the future of a research line seems to depend on the individual strength of a PI and not on group strategy. Although this structure seems to function satisfactorily for all, it comes with a risk. Research is sensitive to economic cycles that will also affect departments in an academic hospital and upcoming challenges may demand a clear governmental structure and subsequent prioritisation.

The department head was involved in the development of the Erasmus MC-wide Strategy23 and the committee notes that

there is wide support within the department for exploring innovative techniques, even if this was not directly visible from the documentation. Collaborations with TU Delft are in place, perhaps most manifestly so for the research line in Electrophysiology, Biomedical Engineering and the Atrial Fibrillation ACE. These provide opportunities to further develop the innovative techniques required for future cardiology. Contrary to the ongoing valuable collaborations with TU Delft, the committee misses a comparable partnership or alliance with cardiac surgery in the pursuit of hybrid technological innovations in structural and valvular heart disease.

The department maintains a number of its own research facilities, including the Thorax Centre Trial Bureau which helps to perform heart failure trials (both investigator-initiated and industry-driven research) in phases II, III and IV. In addition, it makes use of a number of Erasmus MC core facilities – to varying levels of satisfaction. A core facility that was described as (cost) effective, is the Erasmus MC Biobank, which has recently replaced the biobanking infrastructure that was created and maintained by the Cardiovascular Epidemiology research line. There are some concerns on other core facilities, most notably the large animal lab which is threatened with budget cuts, and central IT- and data storage services which do not match the department's needs.

Research quality

The quality of the department's research is very high. All seven research groups are (inter)nationally recognised for their good to excellent performance, as evident from a highly satisfactory and stable overall mean normalised citation score. The majority of publications is published in journals ranked in the top 20% in their field, and a significant fraction of these papers are published in the top 10%. Staff members have been awarded with prestigious personal fellowship grants.

Specifically, Congenital Cardiology is a growing and internationally reputed research line with an excellent performance. Staff members of this group increasingly turn out important papers and guidelines and are members of relevant boards. Another highlight is the Biomedical Engineering (imaging) group, which appears financially sustainable and is world leading in technology development, even if it does not publish in high-impact journals.

Other research lines are also generally performing well, although the position of Heart Failure is perhaps weaker than that of the other lines. As the youngest and smallest of the groups, this line seems to lack empowerment, even if the department has tried to improve its financial position. It is advisable to further develop this line of research by setting clearly defined research targets and priorities, especially in view of the swelling tsunami of heart failure in the first world. The success of the Congenital Cardiology and Biomedical Engineering lines could serve as a good example for the other five groups, and especially for the Heart Failure line.

In 2018, first stream funding made up a little over half (52%) of the department's annual research budget, followed by contract research (28%) and research grants (17%, mostly from Dutch Heart Foundation, ZonMW, NWO). At present, first stream funding within Erasmus MC is divided based on historical data and not based on future perspectives, challenges and opportunities in an aging cardiovascular population. The committee strongly encourages Erasmus MC to change this allocation model. This comment also applies to the positioning of staff members, which seems based on historical achievements of the seven research groups.

Relevance to society

The societal relevance of the research is very good. All seven research lines are directly involved in the clinical and pre-clinical/translational aspects of underlying pathophysiology, diagnosis and therapeutic measures in cardiovascular morbidity, which is an increasing societal problem in both the first

world and developing world. The department's research has significantly contributed to the progress made during the last decade, most prominently with respect to advances in outcomes of patients with acute myocardial infarction, congenital heart disease and acquired valvular heart disease. Clinical (shared) decision-making research in these areas is translated to – and implemented in – clinical practice.

Especially in the field of congenital heart disease, the department serves as an example for other Dutch and international cardiology departments. Translation to clinical application is strengthened by the existence of a large animal facility, epidemiological research and also by collaborations with TU Delft. The committee was particularly impressed by the fact that technology driven research groups have acquired significant expertise in IP protection and private-public partnerships.

Furthermore, it should be mentioned that some research units actively develop connections with patient advocacy groups (e.g. Harteraad). Patients are actively involved in the type of treatment they receive.

Viability

Overall, the viability of the department is very good. The department has a lot of independent, strong PIs, its research lines are doing well and good internal and external collaborations are in place. But there are also some issues that will have to be dealt with to ensure future viability, both at departmental and Erasmus MC level. Perceived challenges lie mainly in the field of strategy development, talent management, research funding and facilities.

As mentioned previously, strategy development seems to take place at several levels within the department. This may come at the cost of overall decisiveness and effectiveness. Moreover, the committee was surprised by the lack of emphasis on strategic collaborations with the Department of Thoracic Surgery and with TU Delft in strategic plans for the future. Only one out of five domains on which the 2020-2030 research agenda will focus specifically lists collaboration with cardiothoracic surgery. Similarly, just one mentions cooperation with TU Delft. This concern of the committee was toned down following the fruitful discussion with cardiology management. The committee foresees that a strong integration and alignment with incipient research initiatives in cardiothoracic surgery and TU Delft will benefit funding success rates and the visibility of cardiovascular research at Erasmus MC.

From the interviews, the committee established that talent management differs between research groups. Career perspectives for talented young researchers seem more pronounced in some groups than in others. In the committee's opinion this underlines the necessity of the introduction of an Erasmus MC-wide tenure track system. In a department where survival of a research line/topic largely depends on the grit and perseverance of the individual PI, transparent career pathways are especially important.

Among senior (post-PhD) researchers the gender balance is skewed in favour of men (69/31). The committee learned that most of the women in senior roles within the department have benefited from taking part in an Erasmus MC-wide female talent programme. As positive as this may be, the committee agrees with female researchers who indicated in the interviews that broader initiatives and policies are needed to overcome this inequality.

The funding model is problematic. The committee notes that the research budget is predominantly tied to permanent staff, which limits the ability to move resources according to strategy, the demand for new expertise or the support of pilot studies to facilitate larger grant applications. Freeing up the necessary funds for large grants that come with matching requirements is difficult. Furthermore, it is important that strategic plans for the future take potential budget cuts into account. To mitigate such cuts, the department is advised to increase internal alignment and create a

shared decision structure regarding focused strategy and future investments. Finally, it should be acknowledged that an envisioned growth of research activities in the domain of heart failure may have consequences for historically allocated budgets.

As elsewhere at Erasmus MC, some of the (core) facilities are under pressure. In the committee's opinion, the large animal facility is crucial for translation of experimental devices or advanced therapeutic medicinal products to clinical application and has added value for collaborations with TU Delft. This facility should therefore be maintained. The committee further recommends investing in expertise or collaborations to expand knowledge in bioinformatics (and AI) and big data management, as this will strengthen the international position in development of prediction models and in analysis of big data. The future of research school COEUR is currently unclear because of the establishment of the Erasmus MC Graduate School. The committee recommends that COEUR's educational programme is embedded in the Erasmus MC Graduate School in its entirety.

Recommendations

1. The research programme as a whole as well as the underlying research lines would benefit from setting clear strategic targets and laying out how exactly the department will work towards reducing the burden of cardiovascular disease by 25%, and what will be the focus in times when resources are not unlimited.
2. The department is advised to consider future shifts in success rates and societal demands between research themes. At present budget seems to be divided based on history and not based on future perspectives, challenges and opportunities in an aging cardiovascular population.
3. The research agenda 2020-2030 will focus on five domains of which only one specifically lists collaboration with cardiothoracic surgery and one with TU Delft. Greater integration and alignment with incipient research initiatives in cardiothoracic surgery and TU Delft will benefit funding success rates and (international) visibility of cardiovascular research at Erasmus MC.
4. The large animal facility is crucial for translation from experimental device or advanced therapeutic medicinal products to clinical application and has added value for collaborations with TU Delft (see also general comment).
5. Invest in expertise or collaborations to expand knowledge in bioinformatics (and AI) and big data management.
6. Prepare for potential budget cuts and demand for efficiency: increase the alignment and create decision structure between research units regarding focused strategy and future investments.

Appendices

1. Curricula Vitae of committee members

Gerard Pasterkamp (chair) is professor Experimental Cardiology and scientific medical manager of the division LAB at UMC Utrecht. His research interests are in the field of cardiovascular biology and innovation in biomarkers and drug targets. The research group houses the largest atherosclerotic plaque biobank worldwide: Athero Express including >4000 patients. This biobank has generated new insights into determinants of plaque destabilisation. The laboratory also invests in the excavation of genetic determinants of atherosclerotic plaque characteristics. Gerard Pasterkamp coordinates national and EU based consortia with the aim to unravel biomarkers and mechanisms of atherosclerotic disease. His translational profile is noted in the private public consortia he is involved in. He is supervising three public private grants that have been rewarded with the aim to develop novel biomarkers and imaging technology to detect cardiac ischemia and endothelial dysfunction. In 2018, Gerard Pasterkamp obtained a LeDucq grant together with Prof G. Owens (Virginia University) on the role of smooth muscle cell plasticity in the atherosclerotic plaque.

Elisabeth Bel is professor of Pulmonary Diseases at Amsterdam UMC (University of Amsterdam/AMC) and has been Chairman of the Department of Pulmonology in 2007-2017. She obtained her PhD in 1990 on asthma, cum laude, and has since specialised further in the same topic. Currently, she is one of the world leading scientists in the field of severe, refractory asthma. Prior to her appointment at the UvA, Elisabeth Bel was affiliated with the Leiden University Medical Centre (LUMC) as staff pulmonologist, associate professor and Chair of the Outpatient Clinic of the Division of Internal Medicine. She completed a fellowship at the University of Virginia Department of Allergology and was founder of the Multidisciplinary Centre for Asthma and Allergy at LUMC. Since 2000 she has served on the editorial board of the American Journal of Respiratory and Critical Care Medicine, was associate editor of the European Respiratory Journal (2012-2017) and chaired the Longfonds Science Committee (2007-2014). She has been member of the Science Committee of the European Respiratory Society (ERS) since 2002 and was elected first female president of the ERS in 2014-2015.

Vibeke Hjortdal is professor of Cardiothoracic Surgery at the Department of Cardiothoracic Surgery, Copenhagen University Hospital, Rigshospitalet. She holds a PhD and is a Doctor of Medical Sciences, both from Aarhus University (AU). Her primary field of research is pathophysiology in congenital heart diseases with a special interest in the inter-relationship between cardiac and pulmonary function at rest and during exercise and long-term outcome, lymphatic function in univentricular hearts, and neurodevelopmental outcome from fetus to adult. Vibeke Hjortdal pursues a translational approach, where clinically relevant questions are studied through basic science, clinical projects and epidemiology. Vibeke Hjortdal has published more than 300 peer reviewed publications and more than 10 textbook chapters, has been invited lecturer more than 50 times and is reviewer at many high impact international journals.

Stefan Janssens obtained his medical degree in 1984 from the University of Leuven, Belgium, summa um laude, and finished his clinical cardiology fellowship at Gasthuisberg University Hospital, Leuven, Belgium. He subsequently obtained an international John E. Fogarty fellowship from the NIH (Bethesda, MD, USA) to continue his studies in cardiovascular medicine at Massachusetts General Hospital, Harvard University in Boston from 1989-1992 and was appointed Professor of Medicine in 2002 at KU Leuven and Chairman of the Department of Cardiovascular Diseases in 2010. His research interests focus on molecular mechanisms and translational studies in acute coronary syndromes and heart failure.

Bas Mochtar was a consultant cardiothoracic surgeon at the Thorax Centre of Erasmus MC (1981-1998). Here, he was one of the team members who started a heart transplantation programme in the Netherlands. He obtained his PhD on clinical orthotopic heart transplantation in 1991. The research resulted in publications on immunology in this field at Erasmus MC. In 2000, he was appointed full professor in cardiothoracic surgery at Maastricht University Medical Centre, where he fulfilled this position in training residents and promoting PhD candidates. Introducing a team approach in new surgical techniques (hybrid AF ablation, minimal invasive aortic and mitral valve procedures) resulted in successful programmes. His last research was on monitoring of hemostatic disturbances in cardiopulmonary bypass patients. After retirement in 2016, he has special interest in the medical history of South East Asia and joined the Netherlands Society of Medical History.

Nico van Zandwijk is professor emeritus (University of Sydney) and was director (until January 2017) of the Asbestos Diseases Research Institute (ADRI). He is currently involved in early clinical trials, testing microRNA mimics and CAR T-cells in patients with malignant pleural mesothelioma at Concord Repatriation General Hospital (Sydney Local Health District). He is affiliated with the University of Sydney (Professor Emeritus) and is involved in translational research (Thoracic Oncology).

2. Schedule of the site visit

Thursday 10th of December 2020

Time	Topic
08:00-08:30	Welcome & general introduction by the Dean Attendees: Secretary, committee members and dean, heads of department, theme director(?)
08.30-08.45	Introduction and preparation **Pulmonology** Attendees: Secretary and committee members
08.45-09.45	**Department of Pulmonology session 1** Management/Leading staff Attendees department:
09.45-10.00	Debriefing first session Pulmonology Attendees: Secretary and committee members
10.00-10.15	Committee members: break
10.15-11.15	**Department of Pulmonology session 2** Academic staff Attendees department:
11.15-11.30	Debriefing second session Pulmonology Attendees: Secretary and committee members
11.30-12.00	Feedback with committee members and discuss concept report Pulmonology Attendees: Secretary and committee members
12.00-13.00	Committee members: break
13.00-13.15	Introduction and preparation **Cardiology**
13.15-14.15	**Department of Cardiology session 1** Management/Leading staff Attendees department:
14.15-14.30	Debriefing first session Cardiology Attendees: Secretary and committee members
14.30-14.45	Committee members: break
14.45-15.45	**Department of Cardiology session 2** Academic staff Attendees department:
15.45-16.00	Debriefing second session Cardiology Attendees: Secretary and committee members
16.00-16.30	Feedback with committee members and discuss concept report Cardiology Attendees: Secretary and committee members
16.30-17.00	Debriefing/discussion day 1 Attendees: Secretary and committee members

Friday 11th of December

Time	Topic
08.00-08.30	Questions by committee to dean about initial findings Attendees: Secretary, committee members and dean
08.30-08.45	Introduction and preparation **Cardiothoracic Surgery** Attendees: Secretary and committee members
08.45-09.45	**Department of Cardiothoracic Surgery session 1** Management/Leading staff Attendees department:

09.45-10.00	Debriefing first session Cardiothoracic Surgery Attendees: Secretary and committee members
10.00-10.15	Committee members: break
10.15-11.15	**Department of Cardiothoracic Surgery session 2** Academic staff Attendees department:
11.15-11.30	Debriefing second session Cardiothoracic Surgery Attendees: Secretary and committee members
11.30-12.00	Feedback with committee members and discuss concept report Cardiothoracic Surgery Attendees: Secretary and committee members
12.00-13.00	Break committee members
13.00-13.05	General introduction of online speed date session by secretary Attendees:
13.05-13.30	Speed date round 1
13.30-13.55	Speed date round 2
13.55-14.30	General session PhD-students and committee members
14.30-14.45	Debriefing session PhD-students by committee members Attendees: Secretary and committee members
14.45-15.30	Preparation for giving general feedback Attendees: Secretary and committee members
15.30-15.45	Break committee members
15.45-16.15	Feedback session Heads of department, Dean and committee Attendees: Secretary, committee members, heads of department, dean
15.15-16.30	Time for questions by Heads of department and Dean Attendees: Secretary, committee members, heads of department, dean
16.30-17.00	Final appointments/conclusion of site-visits Attendees: Secretary and committee members

3. SEP Assessment Scale

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

4. Quantitative data

Pulmonary Medicine

Composition of the Department of Pulmonary Medicine

	2013		2014		2015		2016		2017		2018	
	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff	18,00	10,36	14,00	10,10	10,00	9,09	14,00	9,33	15,00	7,12	12,00	7,59
Support staff	6,00	1,78	7,00	2,75	5,00	3,20	11,00	5,51	13,00	4,14	11,00	4,48
Total staff	**24,00**	**12,14**	**21,00**	**12,85**	**15,00**	**12,29**	**25,00**	**14,84**	**28,00**	**11,26**	**23,00**	**12,07**

Financing of the Department of Pulmonary Medicine

	2013		2014		2015		2016		2017		2018	
Funding	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%
Direct funding	6,12	50%	4,76	37%	3,07	25%	1,61	11%	1,36	12%	0,30	2%
Research grants	1,92	16%	1,83	14%	0,50	4%		0%	1,11	10%	3,70	31%
Contract research	4,10	34%	5,71	44%	6,96	57%	12,29	83%	8,78	78%	8,07	67%
Other		0%	0,54	4%	1,76	14%	0,93	6%		0%		0%
Total Funding	**12,14**		**12,85**		**12,29**		**14,84**		**11,26**		**12,07**	

Cardio-Thoracic Surgery

Composition of the Department of Cardio-Toracic Surgery

	2013		2014		2015		2016		2017		2018	
	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE
Scientific staff	4,00	2,34	3,00	2,67	3,00	3,00	6,00	3,48	12,00	7,02	9,00	6,95
Total research staff	4,00	2,34	3,00	2,67	3,00	3,00	6,00	3,48	12	7,02	9,00	6,95
Support staff							**1,00**	**0,65**	**8,00**	**2,26**	**2,00**	**0,75**
Total staff	**4,00**	**2,34**	**3,00**	**2,67**	**3,00**	**3,00**	**7,00**	**4,13**	**20,00**	**9,27**	**11,00**	**7,70**

Financing of the Department of Cardio-Thoracic Surgery

	2013		2014		2015		2016		2017		2018	
Funding	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%
Direct funding	2,05	87%	2,00		2,00	67%	2,31	56%	5,52	60%	3,42	44%
Research grants	0,30	13%		75%		0%	0,65	16%	1,14	12%	2,70	35%
Contract research		0%	0,67	0%	1,00	33%	1,18	29%	2,61	28%	1,58	21%
Other		0%		25%		0%		0%		0%		0%
Total Funding	**2,34**		**2,67**	**0,00**	**3,00**		**4,13**		**9,27**		**7,70**	

Cardiology

Composition of the Department of Cardiology

	2013		2014		2015		2016		2017		2018	
	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE	#	FTE
R&E Staff	74,00	47,01	64,00	43,05	69,00	43,37	61,00	42,14	65,00	44,59	65,00	45,33
R&E support staff	34,00	17,42	28,00	11,63	23,00	11,31	23,00	11,83	59,00	11,34	55,00	11,49
Total R&E staff	108,00	64,43	92,00	54,68	92,00	54,68	84,00	53,97	124,00	55,93	120,00	56,82

Financing of the Department of Cardiology

	2013		2014		2015		2016		2017		2018	
Funding	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%
Direct funding	32,58	51%	23,41	43%	21,86	40%	21,12	39%	23,17	52%	22,87	52%
Research grants	11,46	18%	12,55	23%	13,65	25%	11,84	22%	13,30	19%	12,02	17%
Contract research	20,39	32%	18,71	34%	19,17	35%	21,03	39%	19,19	28%	20,03	28%
Other		0%		0%		0%	0,03	0%	0,27	0%	1,90	3%
Total Funding	64,43		54,68		54,68		53,97		55,93		56,82	