technopolis group

February 2021

International Evaluation of Scientific Institutions Activity

Panel Report: Medicine and Health Sciences

Professor Roland Pochet (chairman), Professor Bill Baltzopoulos, Professor Aleksandar Dimovski, Professor Anita Aperia, Professor Didier Stricker, Professor Herman Autrup

February 2021

International Evaluation of Scientific Institutions Activity

Panel Report: Medicine and Health Sciences

Professor Roland Pochet (chairman), Professor Bill Baltzopoulos, Professor Aleksandar Dimovski, Professor Anita Aperia, Professor Didier Stricker, Professor Herman Autrup

Table of Contents

1 Introduction 4

2 Institution reports 5

M_1 Latvian Biomedical Research and Study Centre 5

2.1 Institute data and description 5

2.2 Expert Panel evaluation 6

M_2 Limited liability company "Riga East University Hospital" 13

2.3 Institute data and description 13

2.4 Expert Panel evaluation 14

M_3 Pauls Stradins Clinical University Hospital Research Institute 19

2.5 Institute data and description 19

M_4 Latvian Institute of Organic Synthesis 25

2.6 Institute data and description 25

2.7 Expert Panel evaluation 25

M_5 Latvian Academy of Sport Education (LASE) 31

2.8 Institute Data and Description 31

2.9 Expert Panel evaluation 31

M_6 Riga Stradins University Platform of Medicine 38

2.10 Institute data and description 38

2.11 Expert Panel evaluation 39

M_7 Riga Stradins University Public Health Platform 46

2.12 Institute data and description 46

2.13 Expert Panel evaluation 47

M_8 University of Latvia Medicine and Health Science Cluster 52

2.14 Institute data and description 52

2.15 Expert Panel evaluation 53

3 Summary of findings across the set of institutional evaluations 59

3.1 The general level of quality of research 59

3.2 Key strengths and areas of particular interest 61

3.3 Main weaknesses 62

3.4 Conclusions 63

3.5 Recommendations 64

Appendix A Feedback on Panel Assessment 66

A.1. Feedback received from Pauls Stradins Clinical University Hospital Research Institute 66

Figures

Figure 1 Latvian Biomedical Research and Study Centre – Scores 6
Figure 2 Limited liability company "Riga East University Hospital" - Scores 14
Figure 3 Pauls Stradins Clinical University Hospital Research Institute – Scores 20
Figure 4 Latvian Institute of Organic Synthesis – Scores 26
Figure 5 Latvian Academy of Sport Education – Scores 32
Figure 6 Riga Stradins University Platform of Medicine – Scores 39
Figure 7 Riga Stradins University Public Health Platform – Scores 47
Figure 8 University of Latvia Medicine and Health Science Cluster – Scores 53

1 Introduction

International Evaluation of Scientific Institutions Activity analysed the research performance and international competitiveness considering also socio-economic impact and development potential of the institutions. Results of the evaluation can serve as input in policy making and will enable the institutions to improve their performance based on the recommendations.

The Medicine and Health Sciences panel evaluated eight institutions:

- Latvian Biomedical Research and Study Centre (M1)
- Riga East University Hospital (M2)
- Pauls Stradins Clinical University Hospital (M3)
- Latvian Institute of Organic Synthesis (M4)
- Latvian Academy of Sport Education (M5)
- Riga Stradins University Platform of Medicine (M6)
- Riga Stradins University Public Health Platform (M7)
- University of Latvia Medicine and Health Sciences Cluster (M8).

The Panel evaluated the institutions using the following criteria:

- Quality of the research
- Impact on the scientific discipline
- Economic impact
- Social impact
- Research environment and infrastructure
- Development potential.

The evaluation of each institution involved documentary review and institutional visits by Panel Members. The final evaluation of each institute is collective view of the Expert Panel.

Experts were provided with summary data tables for each institution that aggregated data from self-assessment reports in the following manner:

- FTE academic and research personnel 2018 – sum of all academic and research personnel in full-time equivalent in 2018 excluding other acting academic and acting academic research personnel, research attending staff, research technical staff and all level students
- Total number of self-reported outputs 2013-2018 – sum of i) Articles in peer reviewed scientific edited journals and conference proceedings included in WoS or SCOPUS; ii) Articles in peer reviewed scientific edited journals and conference proceedings not included in WoS or SCOPUS; iii) Monographs; iv) Patents (Latvia) as well as v) Patents (Europe and international)
- Total funding – sum of i) Total state funding (Base funding plus Competitive state budget funding plus EU Structural Funds plus Other national funding); ii) Total international funding (EU Framework Programmes plus Other international funding); and iii) Private funding.

The analysis of each institution by the Panel is presented in following sections.

Feedback on Panel assessment received from the institutions is published in the Appendix A.

2 Institution reports

M_1 Latvian Biomedical Research and Study Centre

2.1 Institute data and description

Latvian Biomedical Research and Study Centre (BMC)	
Primary field of science	Medical and health Sciences
Corresponding fields of science	Biological sciences Basic medicine Health biotechnology
Related fields of science	Veterinary science
No. FTE academic personnel 2018	0
No. FTE academic research personnel 2018	71.93
Total number of FTE academic and research personnel 2018	71.93
Articles in peer reviewed scientific edited journals and conference proceedings included in WoS or SCOPUS in period 2013-2018	302
Articles in peer reviewed scientific edited journals and conference proceedings not included in WoS or SCOPUS in period 2013-2018	13
Monographs in period 2013-2018	1
Patents Latvian in period 2013-2018	83
Patents (Europe and international) in period 2013-2018	12
Total no. of self-reported outputs in period 2013-2018	411
No. of WoS or Scopus outputs in period 2013-2018 per researcher in 2018	4.2
No. of all outputs in period 2013-2018 per researcher in 2018	5.71
No of PhDs completed in period 2013-2018	15
No. of PhDs in period 2013-2018 per researcher in 2018	0.21
Total funding in period 2013 -2018 (Euros)	28,392,508
Total funding in period 2013-2018 per researcher in 2018 (Euros)	394,724

The Latvian Biomedical Research and Study Centre (BMC) is focused on molecular biology and biomedicine and is one of the leading research institutes in Latvia. Established in 1993 it performs basic and applied research in five fields: human genetics and disease mechanisms, cancer research, biotechnology and structural biology, molecular microbiology and virology, molecular pharmacology and drug targets. BMC's strategic goal is to use its scientific capabilities to support the development of the molecular diagnostics, personalized medicine, innovative drugs and therapies, and become an internationally recognised research institute. It has an annual budget of around €5M, and, in 2018, employed 114 FTE research staff organised in 10 research groups and supported by five core facilities. It collaborates with many

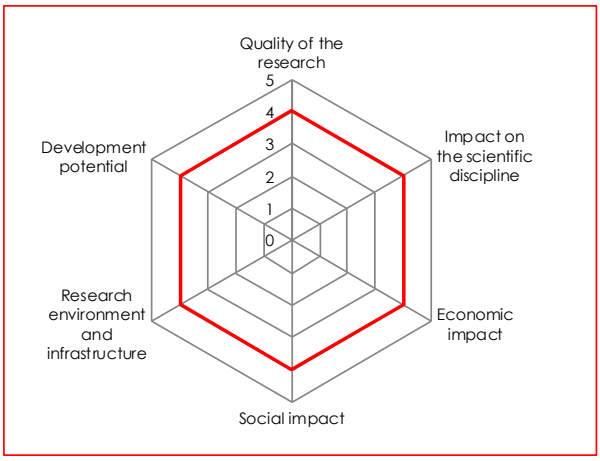
other research institutes, departments and groups across Latvia to conduct research and educate undergraduate and post-graduate students and has partnerships and links with national and international businesses.

2.2 Expert Panel evaluation

The figure below presents the scores assigned by the Expert Panel in Medicine and Health Sciences to BMC

Figure 1 Latvian Biomedical Research and Study Centre – Scores

Criteria	Scores
Quality of the research	4
Impact on the scientific discipline	4
Economic impact	4
Social impact	4
Research environment and infrastructure	4
Development potential	4
OVERALL SCORE	**4**



Overall score

Score: 4 - very good level of research

The panel of experts have assigned the institute an overall score of 4. This is based on panel assigning a score of 4 to all of the criteria. BMC scored 4 overall in the 2013 evaluation although at that point it did not score 4 for every criteria. BMC has made significant improvements over the 6 years, including acting on the recommendations of the previous panel and this is recognised by the scores of 4 for all criteria. However, an overall score of 5 has not been achieved; it is a very high bar to become a global leader and as yet BMC does not lead enough international grants and consortia. BMC's scientific leadership is affected by the lack of an in-depth common research programme in Latvia to bridge the gap between basic and clinical research to enable BMC and medical doctors to conduct research collaboratively, in particular a programme that enables MDs to conduct PhDs with BMC.

In the 2013 evaluation of Latvian research institutions, the Latvian Biomedical Research and Study Centre (BMC) was evaluated as amongst the best institutions. BMC took heed of the 2013 recommendations and established an International Scientific Advisory Board that meets every two years to assess and advise the institute. This Board is definitely an important step forward and will continue to help BMC improve the quality of its research. An effort in governance and management was also made by concentrating existing equipment in dedicated core facilities, providing specific training (in bioinformatics and through interactions with the Institute of Mathematics and Informatics of the University of Latvia) as and opening a Biomedical Technology Complex in 2016 that host animal facilities, cell culture and Bioinformatics Core Facility.

Quality of Research

Score: 4 - very good

The research performance is very good based on the research outputs achieved during the last 6 years within four directions of research: human genetics, cancer and biotechnology, structural biology and virology. BMC's publication output and citation levels are among the best in Latvia in medicine and health sciences. In human genetics and disease mechanisms, through the Latvian Genome Database (LGBD), BMC occupies a very good position at the international level evidenced by participation to large genome consortium (see Nature and Science publications). In cancer, the work of Prof. Jekaterina Erenpreisa and her team has gained a worldwide recognition and Prof. Line's group has established a Cancer Antigen Collection for the discovery of autoantibodies biomarkers. The Biotechnology and Structural Biology group has also a very good international position within the Virus-like particles and their use for the construction of vaccines and new vaccines have been created in collaboration with Swiss and U.K. researchers and are in the technology transfer phase.

Impact on the scientific discipline

Score: 4 - very good

In terms of bibliometric measurements, BMC has for Latvia, the highest average citation number per publication (n = 24.07) of the institutes covered by this panel and is in the top two institutes for citation impact scores. Numerous BMC members are chairs of several national committees such as the Latvian Research Council and the Genome Research Council and as such take part, de facto, in defining the national research and innovation strategy. BMC researchers are also active players internationally. They are, for example, contributing to the development of European infrastructures through their participation at BBMRI-ERIC (a European research infrastructure for biobanking) and Instruct-ERIC (a pan-European research infrastructure in structural biology) so making high-end technologies and methods available to all European researchers and both of these ERIC consortia belong to ESFRI (European Strategy Forum on Research Infrastructures).

Economic impact

Score: 4 - very good

BMC has an economic impact in the health sector through having an outward-looking mindset and being active in translational medicine. They have the highest total number of patents among the institutes considered by the expert panel and the second highest international patents. More specifically they are identifying biomarkers and translating this knowledge into diagnostic and therapeutic tools such as genetic tests. A hallmark of this economic impact in the field of genetic testing is the translation of the HLA-DQ2 and DQ8 tests for celiac disease performed by the BMC spin-off company GenEra Ltd. This test is highly demanded by gastroenterologists and now routinely used to exclude the diagnosis of celiac disease in Latvia. Another important economic activity is the introduction of new class of vaccines in collaboration with industrial partners. For instance, Virus-like Particles based vaccines have been constructed for a number of human and animal conditions, with some being provided to companies for further commercialisation - including a vaccine against cat allergy to Hypopet AG, Switzerland, a vaccine against atopic dermatitis in dogs to Saiba, GmbH, Switzerland and vaccine against peanut allergy to Allergy Therapeutics, UK.

We note that the collaborations to develop these vaccines are contract research arrangements and BMC needs to ensure it capture an appropriate level of value from this work for itself (and by extension Latvia) to reinvest in further research.

Social impact

Score: 4 - very good

BMC generates social impact in a number of ways. Firstly, it participates in the education and development of biomedical students at the graduate and postgraduate levels. BMC allows students to perform Bachelors, Masters and PhD degrees (although they are formally registered with universities) with a high degree of quality and evaluation. BMC is organising training and support activities, creating a Student Council and a Junior Faculty for young BMC scientists. BMC is currently making proposals to the University of Latvia for developing new academic study program for the Medical Faculty. It also conducts outreach activities for schools and the general public to encourage the next generation of scientists. Secondly, it supports improvements in healthcare practice through its research. In addition to the diagnostics tests and the vaccines described in the economic impact section above, it has developed other diagnostic tests for hospitals and is involved in the Latvian Childhood Cancer Initiative which is aiming to sequence the whole genome of children with cancer in Latvia and create a databank to support further research, understanding and ultimately therapeutics.

Research environment and infrastructure (Score: 4)

Score: 4 - very good

In general, the high-quality research outputs and the outward-looking orientation of the researchers and managerial staff is testament to a good quality research environment and infrastructure. The majority of outputs are published in English in indexed journals, which are increasingly open access or are moving towards a policy of open access.

BMC is well-managed institute. As a standalone institute it has a strong management team that manages operations to deliver this plan effectively.

BMC long term strategy is to deliver competitive research on the international stage. This will greatly depend on its ability to form strong affiliations/cooperation with the wider biomedical research community in Latvia (and beyond), in particular with academic hospitals ensuring research is driven by clinical need and developments and generating new funding options. This demands a constant process of review and refresh of its research direction and institute's objectives - exploring recent research and clinical developments and considering the on-going development of the next generation of scientists. It is the leadership's responsibility to prevent stagnation and provide guidance for research direction. Failing to do this will have damaging consequences.

As a relatively small standalone institute, BMC manages its operations effectively. It uses its base funding, infrastructure funding and competitive funding to support its research staff and finance its core research facilities. Most of its staff are employed directly by the institute giving the institute freedom to make staffing and research decisions. BMC currently has a suitable mix of junior and senior staff although this is at risk if they do not attract sufficient PhD students on an on-going basis.

In terms of physical facilities, BMC has 9.000 square meters of laboratory and office space with high-tech equipment and facilities concentrated in five core facilities that are centrally funded and managed: 1) Genome Center, 2) Cell Biology and Microscopy, 3) Laboratory animal, 4) Biotechnology and 5) Bioinformatics. The facilities align with similar facilities internationally. The development of the new animal facility was well conducted and looks well managed as is the equipment for the storage of samples for the biobank. The bioinformatic department is now composed of seven members and reached critical mass to develop the tools for treating/analysing/interpreting the data for high impact results and publications and to be internationally competitive in the field of big data and machine learning. The re-organisation and the management team and processes behind it, have resulted in a higher score for this

criterion than in the 2013 evaluation. In addition, processes have been in place to support the development of students and junior staff to ensure the future of BMC.

Development potential

Score: 4 - very good

Considering the effectiveness of BMC management and researchers to deliver high-quality research outputs, provide a well-managed Biobank, support a spin-out and collaborate with biotech companies, the potential of BMC to develop further is high. The institute's management has shown it is willing and able to learn from others and develop the institution as evidenced by its actions since the 2013 evaluation. It has the potential to increase its research quality, become more internationally active (in research and funding terms), lead international consortia (EU projects in particular) and increase its impact. It can and does attract good quality students and researchers but it needs to continue to develop its human resources management and implement a modern career progression system to develop the high-quality researchers and leaders of the future and continue the focus on reaching critical mass in its targeted fields. BMC's SWOT analysis was open and realistic but, as described above, weaknesses and threats need to be addressed by being as proactive and confident in implementing its strategy as possible. The external environment in Latvia and internationally will shift and change and strong leadership is required to implement a strategy focused on relevant biomedical research that the researchers believe in. A strategy does need to be adjusted at times but this is not the same as a reactive approach where research activities are entirely driven by the external funding landscape. Again, as described above, a strong voice and a clearly articulated strategy can also be an influencer of national and international research agenda and funding policies.

Potential to offer doctoral studies

BMC has the potential to offer doctoral studies. BMC's research is of a sufficient quality and scale, and in important and relevant research domains, to support doctoral studies. It already enables and supports PhD students to conduct research (15 successful PhDs in the period 2013-2018) but it does not award degrees as it is not a university.

The majority of its PhD students are registered at the University of Latvia but it also works with Riga Stradins University and Riga Technical University. BMC has succeeded in having a high percentage of students obtaining UL Foundation individual stipends and it is to be commended for their establishment of the Student Council and Junior Faculty and research outreach programme to stimulate the researchers of the future. BMC's research domains offer the potential for some level of interdisciplinarity (bioinformatics with cancer research, for example) but it would also be beneficial to widen the interdisciplinarity to other medical and non-medical research fields and clinical research.

Attracting new students to BMC is a priority to ensure it has high-quality researchers and leaders of the future. It would be beneficial for BMC to have greater control over the doctoral studies process. We address the issue of joint doctoral programmes in Panel M summary in Section 3.

Alignment with Smart Specialisation Strategies

- BMC aligns with the RIS3 strategy as it falls directly into the knowledge specialisation area of biomedicine, medical technologies, bio-pharmacy and biotechnologies and the knowledge-intensive bio-economy. It is advancing science and technical knowledge and human capital in these domains.
- BMC contributes to the Smart Specialisation Strategy of Latvia by performing good quality research and so supporting the strengthening of the research, development of technology and innovation eco-system in Latvia. Furthermore, it does molecular biology and

biomedicine and so directly aligns with one of the knowledge specialisation areas of the RIS3 strategy.

- BMC also takes relevant actions to commercialise its research and thus contributes to the RIS3 priority of development of high added value products as well as demonstrating the usefulness of new knowledge in meeting economic and societal needs.
- BMC provides PhD training and research opportunities for young scientists and thus also supports the priority of research human capital development in Latvia.

Conformity with state scientific and technology development

BMC contributes significantly to the objectives of Latvia's scientific and technological development as defined in key policy documents (e.g. Science, Technological Development and Innovation Guidelines 2014-2020, Education Guidelines 2014-2020 and other) in a number of ways:

- It is a strong international player delivering high quality research and so strengthening the research, development of technology and innovation eco-system in Latvia.
- Its research is in the important field of biomedicine that underpins future developments in high-value knowledge-intensive products and services and improved healthcare and, ultimately, improved public health.
- It has an outward-focus and is proactive in translating its research for practical use. For example, it patents many of its research outputs, has its own spin-off company and collaborates with large and small, national and international companies.
- Within Latvia it collaborates with universities and other research institutes and enables access to its facilities.
- It trains and supports Masters and PhD students (although it doesn't award degrees) in biomedical science and so supports the development of human capital in science, technology and innovation. It provides attractive research opportunities and environment for young scientists and is implementing processes to improve the training and support for young scientists.
- The institute's management has shown it is willing and able to learn from others in terms of (for example) research focus, staff development and organisational structure in order to improve and develop.

Recommendations

BMC is a high-quality research institute in Latvia. To ensure it retains this status it needs a long-term plan to ensure its research quality and facilities can be maintained and it can access sufficient human and resources to do so. Therefore the Panel recommends that:

Research infrastructure

- Develop a strategy for the long-term sustainability of the core facilities, in particular managerial competence for accessing funding for the animal facilities, the biobank and the bioinformatics facility.
- Research in the field of targeting drugs and structure evolution of virus (such as COVID-19) would greatly benefit from access to a cryogenic electron microscope (a cryo-EM) - a key research tool determining and understanding the structure of biomolecules. Considering the high initial cost (7 millions USD), high operational running costs and requirement of a specialised laboratory environment that minimises vibrations, we recommend that 4 Latvian Institutes (BMC, LIOS, University of Latvia and RSU) that would benefit most from access to a

cryo-EM collectively develop a plan to procure and operate an instrument and make it available, open access, to other Institutes/universities.

- Support and advocate with colleagues in other institutes for the introduction of the infrastructure for Phase I clinical studies I in Latvia. This is an issue across the institutes in the Panel and is presented in more detail in Section 3.

Research staff

BMC would benefit from increased access to skilled researchers both in the life science and medical fields at the PhD and post-doctoral level. This will not only ensure the longevity of the institute, but also increase research links and connections between the life science and medical communities - particularly in the early stages of people's careers when new ways of thinking and working and the personal connections made are often long-lasting.

This can be achieved through a number of routes:

- Work with the Faculty of Medicine of the University of Latvia and Riga Stradins University Platform of Medicine to develop a training and doctoral programme for MDs. We emphasise that this is a PRIORITY for Latvia and we address it further in Section 3.
- Give serious consideration to creating a strong and formal collaboration with a university (most likely the University of Latvia) to increase and improve access to research staff and maximise the use and impact of the BMC's research infrastructure through closer coordination of laboratory and clinical research. This would strengthen both institutions and provide a route to addressing other recommendations. A formal collaboration could enable BMC to award degrees (or at least have greater control over the degrees it supports), increase PhD student numbers through direct access to the undergraduate population in both life science sand medicine and access research support systems. For the University of Latvia it would enable access high-quality research infrastructure to increase the attractiveness of relevant under graduate and postgraduate degree programmes and increase learning about managing and operating high-quality research infrastructure. Furthermore it should bring efficiency gains to the operation of research infrastructure. The disadvantages and risks of doing so should also be considered, these may include a decrease in agility and flexibility to make decisions.

Leadership and management

- Implement the International Advisory Board's biannual recommendations in particular consider that funding aligns with a clear strategy. As for most institutes in Latvia, a more proactive approach to implementing a strategy is necessary. This means not simply being reactive to national and international funding calls but learning how to maximise use of EU competitive funding to implement the strategy and using the strategy to influence and drive national and international research agenda. Similarly, in accordance with the Scientific Advisory Board (SAB), group leaders need to take more responsibility for their area of activity at BMC and increase internal collaboration.
- Improve the management of the new Project & Development Unit to be well adapted to the new EU Horizon Europe Programme and to aim for leadership (i.e. being coordinator) of new EU calls for research. The number of initiatives or projects where BMC researchers are playing a leading role is still poor. Although the success rate in EU grant applications was decreasing within Horizon 2020 Framework Programme, the recent access to MGI sequencing technology, attractive research cohorts and ERDF grants will improve this situation. The number of initiatives or projects where BMC researchers are playing a leading or coordinating role is still poor.

Funding

BMC can build on its research quality to widen its funding base. It should increase efforts regarding:

- Apply and reapply for ERC grants. The ERC's mission is to encourage the highest quality research in Europe through competitive funding and to support investigator-driven frontier research across all fields, on the basis of scientific excellence. Being 'investigator-driven', or 'bottom-up', in nature, the ERC approach allows researchers to identify new opportunities and directions in any field of research, rather than being led by priorities set by politicians. This ensures that funds are channelled into new and promising areas of research with a greater degree of flexibility. Getting an ERC grant will immediately identify the researcher and his/her institute as excellent in their field. These grants are highly competitive and hard to win but the institute should target a few key researches and support them to apply.
- Apply and take the lead of ITN Marie Curie MSCA-ITN-2015-EJD - Marie Sklodowska-Curie Innovative Training Networks (ITN-EJD). EJDs have the objective of promoting international, inter-sectoral and multi/inter-disciplinary collaboration in doctoral-level training in Europe through the creation of joint doctoral programmes, leading to the delivery of joint, double or multiple doctoral degrees. Such grants not only increase international collaboration but will attract international researchers as they offer the potential of providing a high salary for doctoral researchers.
- Apply for Erasmus+ grants (https://ec.europa.eu/programmes/erasmus-plus/projects/eplus-project-details/)

M_2 Limited liability company "Riga East University Hospital"

2.3 Institute data and description

Riga East University Hospital (REUH)	
Primary field of science	Medical and health sciences
Corresponding fields of science	Clinical medicine Health sciences
Related fields of science	Nanotechnology Health biotechnology
No. FTE academic personnel 2018	0
No. FTE academic research personnel 2018	0.39
Total number of FTE academic and research personnel 2018	0.39
Articles in peer reviewed scientific edited journals and conference proceedings included in WoS or SCOPUS in period 2013-2018	474
Articles in peer reviewed scientific edited journals and conference proceedings not included in WoS or SCOPUS in period 2013-2018	187
Monographs in period 2013-2018	15
Patents Latvian in period 2013-2018	6
Patents (Europe and international) in period 2013-2018	0
Total no. of self-reported outputs in period 2013-2018	682
No. of WoS or Scopus outputs in period 2013-2018 per researcher in 2018	1215.38
No. of all outputs in period 2013-2018 per researcher in 2018	1748.72
No of PhDs completed in period 2013-2018	16
No. of PhDs in period 2013-2018 per researcher in 2018	41.03
Total funding in period 2013 -2018 (Euros)	2,405,586
Total funding in period 2013-2018 per researcher in 2018 (Euros)	6,168,169

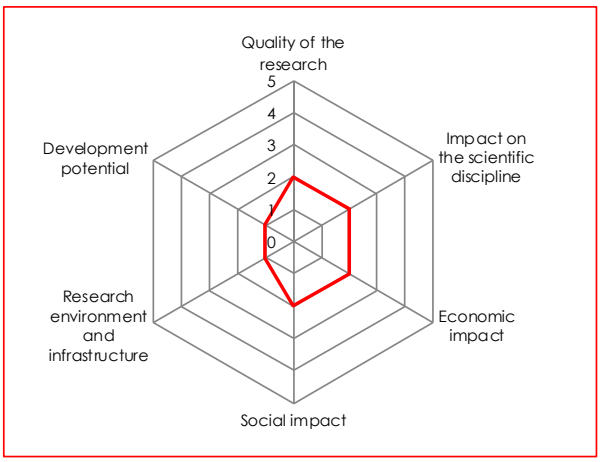
Riga East University Hospital (REUH) is a referral hospital and the largest of the two university hospitals in Latvia. It has comprehensive coverage in term of healthcare provision, covering most clinical specialties except paediatrics and it is a key location for clinical trials in Latvia due to its access to patients. According to its self-assessment, it formally has almost no academic or research staff although it has a strategic partnership with the University of Latvia and regular collaborations with Riga Stradins University and its staff often have posts in more than one institution. It also works with many Latvian universities to provide medical training. REUH has developed four strategic directions for research: 1) oncology and haematology; 2) inflammation, including the mechanisms and management of inflammatory disorders; 3) autoimmunity; 4) metabolic disease; 5) functional diagnostics and new diagnostic methods, including in gastroenterology, hepatology, neuropathology.

2.4 Expert Panel evaluation

The figure below presents the scores assigned by the Expert Panel in Medicine and Health Sciences to Riga East University Hospital (REUH).

Figure 2 Limited liability company "Riga East University Hospital" - Scores

Criteria	Scores
Quality of the research	2
Impact on the scientific discipline	2
Economic impact	2
Social impact	2
Research environment and infrastructure	1
Development potential	1
OVERALL SCORE	**2**



Overall score

Score: 2 – adequate level of research

The overall score awarded is 2 indicating an adequate level of research. The panel awarded this score considering that the majority of research activity and research publications, particularly those published in international journals, deal almost exclusively with multiple-centre treatment studies i.e. where the hospital provides one of a number of clinical environments and patients for treatment studies but the research is led by university-based researchers and not REUH staff. Furthermore REUH reports having almost no dedicate research staff (reporting 0.39 of an FTE) indicating that research is not a priority and the large research outputs reported are predominantly the result of the hospital's role in the multi-centre trials.

Quality of Research

Score: 2 - adequate

As noted above, the research that is published in international journals deals almost exclusively with multiple-centre treatment studies. These studies are often of very good quality, but REUH does not play a leading role in them. Research based on original questions arising from within REUH has not been of sufficient quality to be published in international journals. Our site-visit confirmed the impression that scientific research is not a high priority at REUH, as its major focus is the delivery of healthcare, and therefore MDs and medical students are fully occupied with clinical work and research has to be performed in their 'spare time'.

Impact on the scientific discipline

Score: 2 - adequate

Following on from the comments above, while REUH is an attractive partner for the multi-centre treatment studies, it is currently not a leader of these international collaborative studies on drug development and therefore its impact as an institution on the scientific discipline is rather limited.

Economic Impact

Score: 2 - adequate

While REUH as a good quality hospital will undoubtedly have an economic and social impact for Latvia, very limited information was provided on the impact of their research activities. The REUH self-assessment considered economic impact only in terms of research income, suggesting a lack of understanding of the impact of research and no further information was forthcoming during the visit.

The panel notes that the hospital provides international studies on drug development with a well-controlled patient material and that these studies are generally well sponsored from drug companies and provide a source of income but it is not clear how much of this revenue (or the profit from this activity) is re-invested in research. Some of these trials are conducted with Latvian companies and will be expected to have economic benefits for them if and when treatments make it to market (while noting that not all new healthcare interventions will make it to market).

Social impact

Score: 2 - adequate

As above, while the clinical service provide by REUH appears to be of high standard and will have a high impact on public health and welfare, limited information was provided on the social impact of the research. The clinical staff communicate with patient organisations and the general public and plays an important role in distributing information about prevention and early detection of diseases. Interaction with the Ministry of Health concerning these issues should be encouraged.

Research environment and infrastructure

Score: 1 - poor

The structure and management of REUH is centred on the delivery of healthcare and the management of and infrastructure for academic /research is vague and not clearly defined and as such lags far behind the structure and environment in academic hospitals in most European countries.

The self-assessment refers to a research not being a key strategic objective of REUH but notes that there is a separate strategy. This strategy is focused on clinical trials of pharmaceuticals, supporting research led by academics and participating in research projects in partnership with universities and other Latvian research institutes. The visit confirmed to the panel that research is not a key objective of the hospital and while it supports research led by universities and institutes by providing access to patients and healthcare facilities, it does not appear to be proactive in the identification of research questions or designing and leading research projects. Furthermore types of these studies are often carried out in practice by nurses and sometimes medical students, and so do not contribute to building a strong research culture within the hospital.

There are only very small number of staff dedicated to scientific research work (less than 5 and only 0.39 FTEs reported in the self-assessment) with most of these being dual appointments with universities. MD PhD training does not align with current European standards (i.e. the Bologna process) and in many cases appears to be an 'add-on' to MDs' clinical practice and in some cases simply a part of the medical career trajectory rather than part of a research-focused career pathway. Also, the number of patients in the out-patient clinic is very high, much higher than what would be expected for a highly specialised academic hospital. As a consequence,

the MDs and the medical students will be fully occupied with clinical work with little time for research.

In summary, REUH does not have a clear organisational structure for research or a strong and clearly communicated strategy for research that drives the research undertaken. Research choices would appear to be rather ad hoc and made by individual staff and by the demand for multi-centre clinical studies.

Development potential

Score: 1 - poor

The panel's visit to REUH and the material provided visit demonstrated that while the practice of medicine is in line with West European standards, the scientific research performance is not, especially when considering the role of a university hospital.

The current quality of clinical research is well below average European standards, with the exception of the capacity to perform clinical follow-up studies, but the high standard of the clinical service, including interesting referral cases, access to facilities such as the biobank, and access to high-quality medical students through participation in their training, provides, in principle, the basis for development and improvement. However this improvement would require a completely new scientific research infrastructure, clarity over the role of university hospitals within the Latvian research system and the introduction of a proper PhD programme following the Bologna Process. At the current time the panel does not take the view that REUH recognises the need to make these types of changes. Limited changes have been made since the previous evaluation and the visit demonstrated quite limited enthusiasm for high-quality research initiated by staff.

The development potential of REUH is hindered by its own internal attitude towards research but also by structural issues in the Latvian medical research eco-system. The role of REUH as a university hospital within the eco-system is unclear and its status as a commercial entity creates barriers to accessing research funds and participating as a full partner in research projects.

Potential to offer doctoral studies

REUH currently does not award PhDs but supports the PhD programmes provided by the university medical schools and supports their own clinical staff to undertake PhDs. However, the current PhD programmes for MDs, undertaken at both university hospitals evaluated, do not follow the Bologna process, and are rather at the level of a Masters programme. As already noted, the MD-PhD students have little time for research and so rarely meet with their supervisors and do not develop high-quality research propositions or undertake sufficiently high-quality research. This creates the risk that MDs with PhD do not continue as researchers but return to largely clinical careers. An overhaul of MD-PhD training is required for both university hospitals and the panel makes recommendations below.

Alignment with Smart Specialisation Strategies

- The scientific research at REUH aligns with the RIS3 knowledge specialisation area: biomedicine, medical technologies, bio-pharmacy and biotechnologies and while this research is advancing the knowledge base and research human capital to some degree it is not of sufficiently high quality to truly support RIS3.

Conformity with state scientific and technology development

- REUH plays an important role in the education of medical doctors and other medical professionals in Latvia and supports the delivery of good quality healthcare to Latvian citizens. This is its key role, but it does also contribute to scientific research and international

treatment studies and in doing so, contributes to the development of human resources in science and technology to some degree. However as stated above, this role could be greatly enhanced.

Recommendations

The panel makes (mainly) the same recommendations for both university hospitals (REUH and PSCUH).

Clinical research is the weakest link in Latvian medical research system. Well qualified physician-scientists are essential for the quality of medical research and crucial for the improvement of healthcare. The most relevant questions in basic medical research are generally derived from clinical practice. As long as the basic scientists in Latvia have to import ideas, questions and topics that they choose to research study from abroad, it will be difficult for them to reach the top international standard. The emergence of precision medicine will, for example, require a detailed understanding of disease mechanisms to determine the best treatment for each individual patient. Countries known for their outstanding medical research are also known for the high scientific standard in clinical medicine. During the last 30 years 20% of the Nobel laureates in Physiology or Medicine have been physician-scientists.

The development of an infrastructure for academic activities in the university hospitals and the PhD training of MD students in a clinical setting have been neglected across Latvia. These important parameters lag almost 50 years behind the standards set for infrastructure and PhD training in most West European countries. This is a serious drawback for all medical research programs in Latvia as clinical practice needs to provide both a location for research but also the source of interesting and important research questions arising from clinical practice. It is often the unexpected clinical observations, made by scientifically trained clinicians and communicated to experimental researchers, that lead to the most important and often unexpected medical breakthroughs. Without a significant change in approach research will remain focused on late-stage multi-centre treatment studies led by others.

To improve clinical research in Latvia, the link between the universities and the university hospitals must be strengthened and the role of the university hospitals clarified. The university hospitals would need support both from the universities and the Ministry of Science and Education. An International Advisory Board with in-depth experience in the organisation, administration and performance of outstanding clinical science, covering universities, research institutes and hospitals (i.e. the whole medical research eco-system) might be useful to support a process of change.

At the same time the PhD programme for medical students that are in the second, clinical, phase of their medical academic training must follow the Bologna process. This includes having relevant training courses, having adequate time with qualified supervisors from both the hospital and a university or research institute and paid time for undertaking research. Only a number of selected students should be selected for these high-quality PhD programmes. Those who perform particularly well in their PhDs in such a system are usually interested to follow a research as well as a clinical career and should be supported to do so. This require opportunities for postdoctoral training, in Latvia but also abroad. And incentives and an attractive research system to return to.

Scientifically well-qualified physicians should have the possibility to spend up to 30% of their time for scientific research work and be free from clinical duty during this time without reduction in salary. These clinical-science positions should be awarded for a limited number of years but could be reapplied for.

Finally, the question needs to be addressed as to how each university hospital should interact with the universities in terms of the provision of high-quality PhD programmes, academic

research positions and strong collaborative research links. The development of a high-quality PhD programme requires close working with a university which implies a one-to-one relationship which is not the case at present, although a solution for Latvia, as a small country with a small and reasonably well-connected medical research eco-system, might be the development of a common medical PhD programme across all relevant institutions. Where research in general is concerned, the question of how each of the two university hospitals considered in this evaluation (plus the paediatric university hospital) can be aligned with the various university medical departments needs to be addressed.

In the near-term:

- The current research activity in clinical studies / multi-centre treatment studies at REUH should continue and be encouraged. As a good quality multi-disciplinary hospital it is well suited for these studies.
- REUH implement a process to involve all research-active staff in the development of a research strategy and implementation plan.
- Consider establishing a multidisciplinary and international Scientific Advisory Board to act as regular advisor and 'critical friend' to the research leadership team.
- REUH could work with MoES (and the Ministry of Health if necessary) to re-assess the guidance that does not allow it to access public funding for research. This would appear to be a problem that could be resolved.
- Initiate a collaborative process between the two (or all three) university hospitals, the medical departments of the relevant universities, as well as BMC and LIOS to start to explore how a Bologna compliant PhD programme for medical PhDs might be developed. This process could also serve as a practical starting point for re-assessing the relationships and relevant roles of these organisations within the eco-system.

M_3 Pauls Stradins Clinical University Hospital Research Institute

2.5 Institute data and description

Pauls Stradins Clinical University Hospital Research Institute (PSCUH)	
Primary field of science	Medical and health sciences
Corresponding fields of science	Basic medicine Clinical medicine Health sciences Health biotechnology Other medical sciences
Related fields of science	Basic medicine Clinical medicine Health sciences Health biotechnology Other medical sciences
No. FTE academic personnel 2018	0
No. FTE academic research personnel 2018	14
Total number of FTE academic and research personnel 2018	14
Articles in peer reviewed scientific edited journals and conference proceedings included in WoS or SCOPUS in period 2013-2018	407
Articles in peer reviewed scientific edited journals and conference proceedings not included in WoS or SCOPUS in period 2013-2018	394
Monographs in period 2013-2018	28
Patents Latvian in period 2013-2018	6
Patents (Europe and international) in period 2013-2018	0
Total no. of self-reported outputs in period 2013-2018	835
No. of WoS or Scopus outputs in period 2013-2018 per researcher in 2018	29.07
No. of all outputs in period 2013-2018 per researcher in 2018	59.64
No of PhDs completed in period 2013-2018	36
No. of PhDs in period 2013-2018 per researcher in 2018	2.57
Total funding in period 2013 -2018 (Euros)	23,963,269
Total funding in period 2013-2018 per researcher in 2018 (Euros)	1,711,662.07

Pauls Stradins Clinical University Hospital (PSCUH) is one of the two University hospitals in Latvia. All major specialties except paediatrics are represented. It is a referral hospital, and the only hospital in Latvia where transplantations are carried out. PSCUH, which has approximately 3,000 employees, is the largest clinical medicine research institution in Latvia and has more than 100 years of academic experience. The hospital is well equipped with regard to physiological laboratories, that are used for both diagnostic and scientific research purposes. It has 14 FTE research staff and 66,4 FTE reported as acting academic research personnel and have interest in several research directions on: personalised medicine; regenerative medicine; heart and

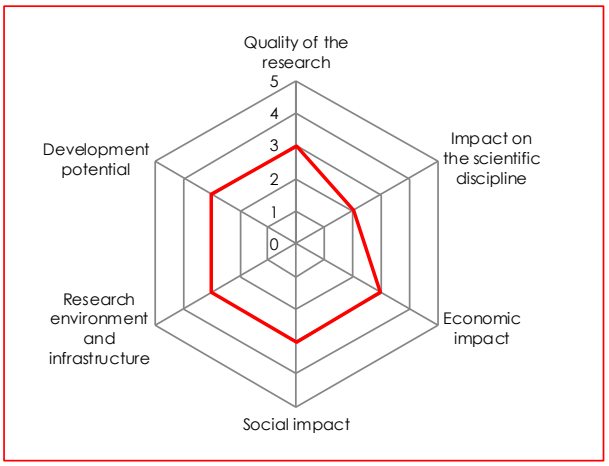
cardiovascular diseases; disabling diseases, endocrine diseases; peripheral vascular diseases; oncology; and orphan diseases.

Expert Panel evaluation

The figure below presents the scores assigned by the Expert Panel in Medicine and Health Sciences to Pauls Stradins Clinical University Hospital (PSCUH).

Figure 3 Pauls Stradins Clinical University Hospital Research Institute – Scores

Criteria	Scores
Quality of the research	3
Impact on the scientific discipline	2
Economic impact	3
Social impact	3
Research environment and infrastructure	3
Development potential	3
OVERALL SCORE	**3**



Overall score

Score: 3 – good level of research

The overall score awarded to PSCGUH is 3, indicating a good level of research with valuable knowledge being created and professional application of appropriate research design and techniques of investigation (in particular in the field of cardiology and cardiovascular diseases) and a good level of social and economic impact in Latvia. However, PSCUH is, most often, not the lead researcher /author on its research output and therefore its own direct impact on the scientific discipline is limited. At present, while there is development potential, significant efforts will need to be taken by the leadership to develop a strategy for research and drive change and improvement in the institute's research. Currently the scientific infrastructure and the research environment lag far behind of what should be expected for a leading European academic hospital and needs to be strengthened. The clinical workload is higher than what would be expected for a highly specialized academic hospital, and research is generally carried out in their spare time.

Quality of Research

Score: 3 - good

PSCUH is the largest clinical medicine research institution in Latvia and has more than 100 years of academic experience. The quality of science at PSCUH Research Institute is good with pockets of higher quality research. PSCUH has focused its research on a few areas which is a good policy, taking into account the weakness of the research infrastructure, the weak PhD training program and the low support from the University. The scientific focus is on new pharmacotherapy and medical technologies with the development of new diagnostic methods in the field of cardiology and cardiovascular diseases being one of the areas that has received international recognition. More generally PSCUH is an attractive partner in

international collaborative follow-up clinical studies where the efficacy of drugs and therapeutic regimes is tested in large patient groups. Many of these studies have resulted in publication in top-ranked clinical journals such as Lancet and NEJM although PSCUH does not lead this research and is not the first or last authors on these publications.

Impact on the scientific discipline

Score: 2 - adequate

The impact on the scientific discipline is varied in line with the variability of the quality of the research. As noted above, the cardiovascular research and the development of new medical devices and diagnostic procedures in cardiovascular diseases is of high quality and correspondingly internationally recognised. However, the overall impact of PSCUH on the scientific discipline is limited as much of its research is not led by PSCUH staff.

Economic Impact

Score: 3 - good

The economic impact of a leading university hospital in most countries is firstly based on the capacity to reduce health costs for individuals, the government and society. Secondly, economic impact can arise from the commercialisation of research outputs within the country. On the former, PSCUH research outputs have reduced the morbidity in cardiovascular diseases in Latvia and offer the potential to attract cardiovascular patients from abroad. On the second, PSCUH has patented some of its research outputs although only within Latvia which limits commercialisation opportunities.

As a clinical university hospital, PSCUH receives funding from pharmaceutical industry and clinical research organisations to participate in clinical trials. As the majority of trials are international studies this brings revenue into Latvia, but it is not clear how much of this revenue (or the profit from this activity) is re-invested in research for longer-term future impact.

Social impact

Score: 3 - good

PSCUH has, as a leading academic hospital, a strong impact on public health. PSCUH provides secondary and tertiary healthcare services to approximately 250.000 out-patients yearly and organizes patient-oriented events. Social impact from research arises when PSCUH's research informs clinical practice and there is evidence of this in areas such as reduced mortality in cardiovascular disease, improved patient rehabilitation after surgery and increased quality of life for many patients with chronic disease.

Research environment and infrastructure

Score: 3 - good

The research environment and infrastructure is regarded as good. The clinical facilities at PSCUH are able to support high-quality multi-centre clinical trials and the ability to support PSCUH-led research, but the overall research infrastructure is limited by a number of structural /organisational issues.

An academic hospital needs both a clinical and an academic infrastructure that are closely connected and with academic research activities clearly 'protected'. Currently the scientific infrastructure and the research environment lag far behind of what should be expected for a leading European academic hospital and needs to be strengthened.

24 professors and 9 associate professors are employed at PSCUH. They receive their salary for their clinical work, which for many, or maybe all of them, is a full-time job. Designing, leading

and conducting research and training of PhD students does not appear to be among their official duties. The panel notes that 90% of academic employees are clinical administrators and/or technicians. This is in contrast to academic hospitals in countries that have an international leading position in medical research where eminent clinicians generally have contracts that include both clinical work and research. Therefore, the clinical workload is higher than what would be expected for a highly specialized academic hospital, and research is generally carried out in their spare time.

Medical students are based at the universities and assigned to PSCUH (or REUH) for their clinical training. The students can choose to enrol in a PhD programme, but resources provided for the programme are almost non-existent, and therefore it is not a particularly attractive offer. A lack of researchers at the PhD level has a direct effect on the ability to undertake high-quality research in the future and, combined with a high clinical workload, reduces opportunities to implement a high-quality research strategy.

In summary, the panel deduced that the academic activity is currently without any clear strategy for research and PhD curricula. MDs with academic status (Professors and Associate. Professors) have little or no time specifically assigned for research and the hospital lacks a PhD program that follows the Bologna process. These essential parameters will need a complete overhaul to make PSCUH a leading European academic hospital.

Development potential

Score: 3 - good

PSCUH has in its clinical work and its role in international follow-up studies demonstrated that it has the potential to develop into an academic hospital of high international status, expanding on its role in international trials and developing itself as a leading regional research player. PSCUH is, according to the self-assessment report, aware of many of its weaknesses, and has an ambition to become a leading European academic hospital and a very positive attitude towards research. This is a good starting point for a development that would require a number of difficult and maybe for some of the employees painful decisions. PSCUH has already developed a consortium with the leading biomedicine and health research institutes in Latvia (BMC, LIOS, the universities and university hospitals) and recognises the need to work in early-stage clinical trials (I to III) to further develop, test and ultimately exploit their own research outputs. This requires significant changes to the biomedicine and health research infrastructure within Latvia and not just within PSCUH. These are presented in the recommendations section below.

Potential to offer doctoral studies

PSCUH does not award PhDs but supports the PhD programmes provided by the university medical schools and supports their own clinical staff to undertake PhDs. However, the current PhD programmes for MDs, undertaken at both university hospitals evaluated, do not follow the Bologna process, and are rather at the level of a Masters programme. As already noted, the MD-PhD students have little time for research and so rarely meet with their supervisors and do not develop high-quality research propositions or undertake sufficiently high-quality research. This creates the risk that MDs with PhD do not continue as researchers but return to largely clinical careers. An overhaul of MD-PhD training is required for both university hospitals and the panel makes recommendations below.

Alignment with Smart Specialisation Strategies

- PSCUH contributes to the Smart Specialisation Strategy of Latvia by performing good quality research and so supporting the strengthening of the research, development of technology and innovation eco-system in Latvia. Its research directly aligns with the RIS3 knowledge

specialisation area: biomedicine, medical technologies, bio-pharmacy and biotechnologies and PSCUH is advancing science and technical knowledge and human capital in this knowledge domain.

- PSCUH is taking action to protect its intellectual property (in the form of patents) with a view to commercial exploitation.

Conformity with state scientific and technology development

PSCUH contributes to the objectives of Latvia's scientific and technological development as defined in key policy documents (e.g. Science, Technological Development and Innovation Guidelines 2014-2020, Education Guidelines 2014-2020 and other) in a number of ways:

- PSCUH plays an important role in the education of medical doctors and other medical professionals in Latvia and supports the delivery of good quality healthcare to Latvian citizens.
- PSCUH, as a good research player, contributes to scientific research, new biomedical knowledge that underpins future developments in healthcare and high-value healthcare products and services. For example, it plays a role in international treatment studies and in doing so, contributes to the development of human resources in science and technology and creates knowledge and opportunities in Latvia to benefit from successful new treatments.

Recommendations

The panel makes the same recommendations for both university hospitals (REUH and PSCUH), although the panel notes that PSCUH starts from a better position than REUH.

Clinical research is the weakest link in Latvian medical research system. Well qualified physician-scientists are essential for the quality of medical research and crucial for the improvement of healthcare. The most relevant questions in basic medical research are generally derived from clinical practice. As long as the basic scientists in Latvia have to import ideas, questions and topics that they choose to research study from abroad, it will be difficult for them to reach the top international standard. The emergence of precision medicine will, for example, require a detailed understanding of disease mechanisms to determine the best treatment for each individual patient. Countries known for their outstanding medical research are also known for the high scientific standard in clinical medicine. During the last 30 years 20% of the Nobel laureates in Physiology or Medicine have been physician-scientists.

The development of an Infrastructure for academic activities in the university hospitals and the PhD training of MD students in a clinical setting have been neglected across Latvia. These important parameters lag almost 50 years behind the standards set for infrastructure and PhD training in most West European countries. This is a serious drawback for all medical research programs in Latvia as clinical practice needs to provide both a location for research but also the source of interesting and important research questions arising from clinical practice. Without a significant change in approach research will remain focused on late-stage multi-centre treatment studies led by others.

To improve clinical research in Latvia, the link between the universities and the university hospitals must be strengthened and the role of the university hospitals clarified. The university hospitals would need support both from the universities and the Ministry of Science and Education. An International Advisory Board with in-depth experience in the organisation, administration and performance of outstanding clinical science, covering universities, research institutes and hospitals (i.e. the whole medical research eco-system) might be useful to support a process of change.

At the same time the PhD programme for medical students that are in the second, clinical, phase of their medical academic training must follow the Bologna process. This includes having relevant training courses, having adequate time with qualified supervisors from both the hospital and a university or research institute and paid time for undertaking research. Only a number of selected students should be selected for these high-quality PhD programmes. Those who perform particularly well in their PhDs in such a system are usually interested to follow a research as well as a clinical career and should be supported to do so. This require opportunities for postdoctoral training, in Latvia but also abroad. And incentives and an attractive research system to return to.

Scientifically well-qualified physicians should have the possibility to spend up to 30% of their time for scientific research work and be free from clinical duty during this time without reduction in salary. These clinical-science positions should be awarded for a limited number of years but could be reapplied for.

Finally, the question needs to be addressed as to how each university hospital should interact with the universities in terms of the provision of high-quality PhD programmes, academic research positions and strong collaborative research links. The development of a high-quality PhD programme requires close working with a university which implies a one-to-one relationship which is not the case at present, although a solution for Latvia, as a small country with a small and reasonably well-connected medical research eco-system, might be the development of a common medical PhD programme across all relevant institutions. Where research in general is concerned, the question of how each of the two university hospitals considered in this evaluation (plus the paediatric university hospital) can be aligned with the various university medical departments needs to be addressed.

In the near-term:

- The current research activity in clinical studies / multi-centre treatment studies at PSCUH should continue and be encouraged. As a good quality multi-disciplinary hospital it is well suited for these studies.
- Consider establishing a multidisciplinary and International Scientific Advisory Board to act as regular advisor and 'critical friend' to the research leadership team.
- Initiate a collaborative process between the two (or all three) university hospitals, the medical departments of the relevant universities, as well as BMC and LIOS to start to explore how a Bologna compliant PhD programme for medical PhDs might be developed. This process could also serve as a practical starting point for re-assessing the relationships and relevant roles of these organisations within the eco-system.

M_4 Latvian Institute of Organic Synthesis

2.6 Institute data and description

Latvian Institute of Organic Synthesis (LIOS)	
Primary field of science	Medical and health sciences
Corresponding fields of science	Basic medicine
Related fields of science	Chemical sciences
No. FTE academic personnel 2018	0
No. FTE academic research personnel 2018	143.4
Total number of FTE academic and research personnel 2018	143.4
Articles in peer reviewed scientific edited journals and conference proceedings included in WoS or SCOPUS in period 2013-2018	451
Articles in peer reviewed scientific edited journals and conference proceedings not included in WoS or SCOPUS in period 2013-2018	26
Monographs in period 2013-2018	0
Patents Latvian in period 2013-2018	23
Patents (Europe and international) in period 2013-2018	48
Total no. of self-reported outputs in period 2013-2018	548
No. of WoS or Scopus outputs in period 2013-2018 per researcher in 2018	3.15
No. of all outputs in period 2013-2018 per researcher in 2018	3.82
No of PhDs completed in period 2013-2018	36
No. of PhDs in period 2013-2018 per researcher in 2018	0.25
Total funding in period 2013 -2018 (Euros)	75,029,453
Total funding in period 2013-2018 per researcher in 2018 (Euros)	523,218

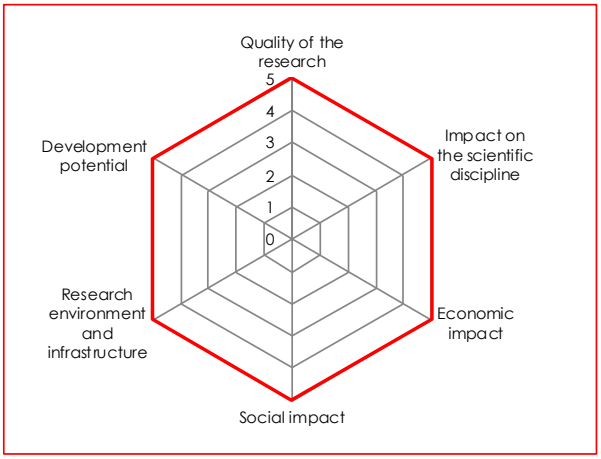
Latvian Institute of Organic Synthesis (LIOS) is focused on drug discovery based on expertise in medicinal organic chemistry, in vitro and in vivo pharmacology biophysical chemistry. Established in 1957 it is one of Latvia's leading research institutes. LIOS's strategic goals are to become the leading EU research centre of drug discovery and to create a fully integrated drug discovery and preclinical development platform in Latvia. It has an annual budget of around €15M, and, in 2018, employed 143 FTE research staff organised in 18 research units supported by centrally managed service units providing technical capabilities and dedicated technical staff. Founded during the Soviet era, it was tightly integrated into the medical and pharmaceutical research of that time and had strong links with pharmaceutical producers. These industrial links and an outward-facing research culture continue to this day and it is the birthplace of 18 original and more than 70 generic medicines.

2.7 Expert Panel evaluation

The figure below presents the scores assigned by the Expert Panel in Medicine and Health Sciences to the Latvian Institute of Organic Synthesis (LIOS).

Figure 4 Latvian Institute of Organic Synthesis – Scores

Criteria	Scores
Quality of the research	5
Impact on the scientific discipline	5
Economic impact	5
Social impact	5
Research environment and infrastructure	5
Development potential	5
OVERALL SCORE	**5**



Overall score

Score: 5 – outstanding level of research

The panel of experts have assigned the institute an overall score of 5. This is based on panel unanimously assigning a score of 5 to all of the criteria. LIOS scored 5 overall in the 2013 evaluation although at that point it did not score 5 for every criteria. LIOS has made improvements over the last six years, improving the quality and impact of its research and its impact on the scientific discipline. The panel unanimously recognised the excellence in all the criteria and were pleased by the outstanding preparation of the visit. The introduction was clearly presented and focused using precise data and avoiding vague responses. This reflected both a high level of professionalism and motivation.

Quality of Research

Score: 5 - outstanding

The research performance is outstanding based on the research outputs achieved during the last 6 years. The panel was very impressed by the research outputs reviewed. The institute's research is high quality, of an internationally comparable standard, and with a high degree of originality in the research questions. The research is predominantly focused on drug discovery and processes for drug manufacturing, but also includes more basic research into the organic chemistry and synthetic methodologies that underpin it as well as complex computational modelling in medicinal chemistry and high-quality skills in a wide range of analytical techniques. As in the past, the research continues to lead to the creation of new medicinal compounds and national and international patents. The panel notes that requirements for patenting, both by the institute itself and by their industrial partners, limit publication of a portion of the research outputs, nevertheless, an analysis of publications clearly demonstrate an increase in the quality of the research compared to the previous assessment period.

Impact on the scientific discipline

Score: 5 - outstanding

With the high quality of its research, LIOS is clearly making important contributions to the scientific discipline and its citation levels and impact factors of the journals it publishes in have increased. 80% of its funding is won competitively, it is an active partner in international

collaborative research projects, bidding for more than 60 EU projects and winning and participating in 11 - a high success rate, it attracts international researchers into Latvia and is a regular partner for the highly science driven pharmaceutical sector.

Economic impact

Score: 5 - outstanding

The economic impact of LIOS's research is outstanding. Its research is directly focused on providing new candidate pharmaceutical compounds for further development and testing by the pharmaceutical industry with the potential to lead to commercially successful drugs and therapeutic treatments. LIOS is well-connected with industry, working with the top 10 pharmaceutical companies worldwide conducting collaborative research and delivering research services (e.g. GMP[1] compliant testing services). This illustrates the high confidence given by these companies to LIOS and demonstrated by considerable levels of private sector funding they provide (27% of total funding in 2013-2018). The institute is active in patenting and licensing its candidate drugs (23 national and 48 international patents in 2013-2018) and, although timescales to market in the pharmaceutical sector are long, earlier outputs are generating revenues of €42 million for original medicines and €30 million for generics.

Social impact

Score: 5 - outstanding

LIOS's research activities address major societal health challenges. In particular within anti-microbial resistance, cardiovascular diseases, cancer, brain diseases and rare diseases. The successful pharmaceutical products created from its research outputs have a social impact in the treatment of diseases and health conditions. For example, two antibacterial drug candidates will be delivered to the clinical trials and a new cardioprotective drug candidate has been developed in cooperation with a commercial partner (creating revenue for LIOS) but also with the potential for future health benefits. LIOS also works to promote and share its knowledge internationally and within Latvia, organising events, has collaboration, collaborating with State Police and Customs laboratories, interacting with policy makers (cf Alliance4Life), engaging with the general public (e.g. 1.200 visitors at the Researchers Night, guided tour for more than 150 pupils), publishing books on science history and membership of 16 national and international societies and associations.

Research environment and infrastructure

Score: 5 - outstanding

LIOS provides a world class infrastructure for its researchers not only in terms of physical environment and equipment but also in managing research and motivating and supporting its staff.

The panel could appreciate the different buildings (some are new and newly equipped) of the LIOS campus and the outstanding research equipment. The institute has made for €20 million investment in research infrastructure and has secured a further €8.5 million. Research staff have access to essential scientific information (budget €300,000/year) and provides access to high quality technical and analytical facilities (e.g. 13,000 NMR samples run annually) that is centrally managed and funded.

[1] Good Manufacturing Practice

LIOS is managed professionally with a clear and focused research strategy, a well-define approach to research funding and strong human resource support. It established internal research grants (budget: €2.52 million) and internal motivation schemes (budget: €280k) to increase scientific excellence by fostering grant application writing, leading projects and high-quality research published in high-quality journals (researchers can be awarded bonuses up to €15k per person. LIOS also invests time and resources in complying with ERA-priorities such as gender equality, mobility of research staff, open transparent merit-based recruitment (OTMR).

Development potential

Score: 5 - outstanding

The quality of LIOS's research, its ability to attract competitive and industrial funding and overseas researchers, and the infrastructure to support this research is already high, but it acknowledges that it cannot stand still to remain at this level. It has an ambitious strategy to become the leading EU research centre of drug discovery and a clear and focused set of measures to try to achieve this. Its SWOT analysis identifies strengths but also where improvements need to be made (such as better internal coordination and collaboration, being the lead partner in more international projects, lack of experience in spin-offs, gender imbalance in senior staff). It has allocated time and resources to improve, its internal grant scheme is able to support new research directions for example, and its staff profile, including project leaders, is suitably young to build the research leaders of the future – 50% of the research staff are below 34, and 36% of project leaders below 34. Importantly one of the three elements of its strategy is dedicated to career development.

Potential to offer doctoral studies

LIOS already enables and supports PhD students to conduct research (36 successful PhDs in the period 2013-2018) and supports many more Masters students – supporting around 50 students in any one year who are supervised by LIOS staff. It already provides internal funding from its own resources to support students of up to €100k each. It does not award degrees as it is not a university but partners with Latvia University, Riga Technical University and Riga Stradins University. It has the potential to offer doctoral studies - its research is of a sufficient quality and scale, and in relevant and interesting research domains, to support doctoral studies.

Alignment with Smart Specialisation Strategies

LIOS aligns with the RIS3 strategy as its field of research is in the knowledge specialisation area of biomedicine, medical technologies, bio-pharmacy and biotechnologies and the knowledge-intensive bio-economy. It is advancing science and technical knowledge and human capital in these domains.

- LIOS contributes to the Smart Specialisation Strategy of Latvia by performing high quality research and supporting the strengthening of the research, development of technology and innovation eco-system in Latvia. Furthermore, it does so molecular biology and biomedicine and so directly aligns with one of the knowledge specialisation areas of the RIS3 strategy.
- LIOS works regularly and closely with the pharmaceutical industry within Latvia and internationally, ensuing its research is commercialised bringing income to the institute to be re-invested in research, creating actual, and potential for future, revenue for Latvian companies and creating social value in the form of new drugs and healthcare treatments.
- LIOS provides PhD training and research opportunities for young scientists and thus also supports the priority of research human capital development in Latvia.

Conformity with state scientific and technology development

LIOS clearly contributes to the objectives of Latvia's scientific and technological development as defined in key policy documents (e.g. Science, Technological Development and Innovation Guidelines 2014-2020, Education Guidelines 2014-2020 and other) in several ways:

- It is conducting international level high-quality research and strengthening the research, development of technology and innovation eco-system in Latvia.
- Its research is in the important field of biomedicine, drug development in particular, that underpins current and future developments in high-value knowledge-intensive products and services that support improved healthcare and, ultimately, improved public health.
- It has a strong outward-facing culture and is extremely proactive in working with the pharmaceutical industry to commercialise its research outputs for practical use.
- Within Latvia it collaborates with universities and other research institutes and enables access to its facilities.
- It trains and supports Masters and PhD students (although it doesn't award degrees) in biomedical science and so supports the development of human capital in science, technology and innovation. It provides very attractive research opportunities and environment for young scientists and is implementing processes to improve the training and support for young scientists.
- The institute's management understands that to remain a high quality research institution that it needs to continue to develop and improve its research, taking new research directions when required and ensuring its infrastructure to kept updated.

Recommendations

LIOS is one of the highest high-quality research institute in Latvia but excellence is not permanent and therefore the institute needs to continue to adapt and develop. The Panel recommends that:

Research infrastructure

- Investing in new research tools and capabilities to stay cutting-edge, such as the cryogenic electron microscope (a cryo-EM) (as described under Institute MI – BMC) and research on new therapies such as CRISP-CAS.
- LIOS research leaders and managers staff could initiate a high-level task force aiming to determine the best way to design and implement an infrastructure and capabilities for phase 1 clinical trials in Latvia.

Leadership and management

- LIOS, as for all the other institutes, would greatly benefit from an external international advisory panel of experts to provide external review and guidance and act as a 'critical friend', reviewing plans, research strategies, outputs, finances, training and education, communication and visiting the institute once every two years to provide their assessment of research quality, the quality of organisational structure/management and make provide advice and recommendations.
- As a high-quality research institute, LIOS can improve its visibility among policy-makers and influencers to, on one hand, influence policy-making within its field of expertise and, on the other to keep rapidly up to date with information on EU budgets, calls and grants. It could have stronger interactions with for example:

- The office of European Parliament in Latvia[2]
- Latvian MEPs involved in Health and Research budget. For instance, Mr. Ivars Ijabs ITRE (Committee on Industry, research and Industry) member and Mr. Roberts Zile, ERC (European Research Council) vice-president.
- the Latvian ambassador, Imants Liegis nominated to represent Latvia at EU (COREPER) and
- the Latvian EU commissaire, Mr. Valdis Dombrovskis[3].

Funding

- Excellence strategy and sustainability can only be achieved if sufficient funding is available. Therefore LIOS should anticipate the drop in EU budget for research in the funding period and, without delay, initiate a Foundation based on donation (that may be tax deducible) aiming to support research projects.

[2] https://www.europarl.europa.eu/latvia/

[3] https://www.fonds.lv/lepojamies/mecenati/atbalstitaji/valdis-dombrovskis/

M_5 Latvian Academy of Sport Education (LASE)

2.8 Institute Data and Description

Latvian Academy of Sport Education (LASE)	
Primary field of science	Medical and health sciences
Corresponding fields of science	Educational sciences Other social sciences – sports sciences
Related fields of science	Health sciences Other social sciences – adapted physical education
No. FTE academic personnel 2018	42
No. FTE academic research personnel 2018	11
Total number of FTE academic and research personnel 2018	53
Articles in peer reviewed scientific edited journals and conference proceedings included in WoS or SCOPUS in period 2013-2018	54
Articles in peer reviewed scientific edited journals and conference proceedings not included in WoS or SCOPUS in period 2013-2018	99
Monographs in period 2013-2018	12
Patents Latvian in period 2013-2018	3
Patents (Europe and international) in period 2013-2018	0
Total no. of self-reported outputs in period 2013-2018	168
No. of WoS or Scopus outputs in period 2013-2018 per researcher in 2018	1.02
No. of all outputs in period 2013-2018 per researcher in 2018	3.17
No of PhDs completed in period 2013-2018	12
No. of PhDs in period 2013-2018 per researcher in 2018	0.23
Total funding in period 2013 -2018 (Euros)	1,891,371
Total funding in period 2013-2018 per researcher in 2018 (Euros)	35,686

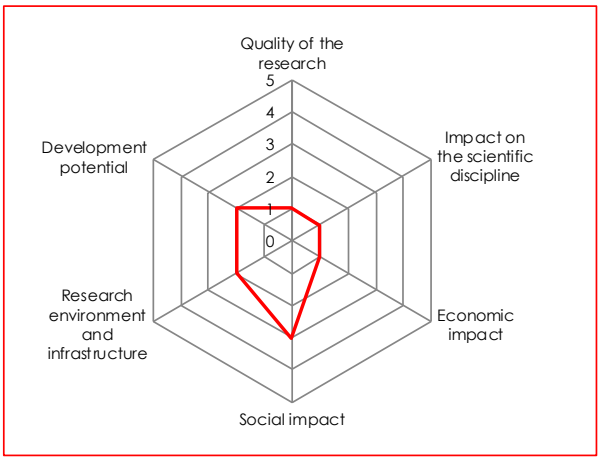
The Latvian Academy of Sport Education (LASE) is a specialist academic and professional state higher education and science institution and its main focus is on education and training. It is the only institution of sport science, exercise and health in Latvia with a large number of academic staff that has been providing the physical education and coaching courses in Latvia and the sport science support for Olympic sports. The four key scientific research directions of LASE are a) Sport, sport education and socialization, b) Promotion of public health – physical activity as a means of preventing non-communicable illnesses in people of various ages, c) High achievement sport and d) the socio-economic aspects of sport.

2.9 Expert Panel evaluation

The figure below presents the scores assigned by the Expert Panel in Medicine and Health Sciences to the Latvian Academy of Sport Education (LASE).

Figure 5 Latvian Academy of Sport Education – Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	1
Economic impact	1
Social impact	3
Research environment and infrastructure	2
Development potential	2
OVERALL SCORE	**2**



Overall score

Score: 2 – adequate level of research

The overall score awarded is 2 to indicate an adequate level of research conducted at LASE. It has been making progress in improving the research infrastructure and facilities through some diligent and focused investment of European structural funding and an organisational re-structuring of research units and laboratories and the launch of a new research centre. This is recognised by the award of a score of 2 for the quality of research environment and infrastructure. The quality of research outputs is still at national level and a greater effort is required to build on progress and improve the quality of the research conducted and the impact of the work. To recognise the potential of the Academy the panel awarded a score of 2 for development potential and it is important that the Latvian State support the further development of this institution as the social impact of the work on sport, health and physical activity are very important for society and this is recognised by the award of 3 for Social Impact.

Quality of Research

Score: 1 - poor

The overall quality of the profile of the research by the institution is expressly national and although there were increases in PhD completions, participation in conferences and external collaborations since the last evaluation, the research output quality requires further improvement to reach international standards. Research by the institution contains few significant new scientific discoveries in sport sciences, exercise and physical activity and some notable results are only published sporadically. The institution is involved in a limited number of significant or major international debates of the scientific community. It focuses mainly on introducing regional and some international research trends in Latvia. The publications are mainly in local and regional journals with no contributions to high quality international journals. A clear indication of this limited contribution to the international research knowledge base is the fact that 6 out of the 14 (43%) of the key publications published after 2013 and listed in the self-assessment (Section 3.3: most important/impactful publications by academic personnel and researchers) are conference presentations in local or regional conferences and not full research papers in international journals. There are some collaborations with other local and regional universities in more recent years but these activities are mainly focused on teaching and educational aspects with no major contributions to the research performance of the institution. Although the lack of basic state funding is a key factor in the quality of the research

performance, the institution has a large number of academic staff that have limited or no notable research outputs. The evaluation of the institution in the global research environment in the self-assessment report has a very local context only and does not consider the international position of the institute. For example, there are now academic quality rankings for Sport Science departments worldwide with 372 universities and some 400 sport-related units that are selected and ranked.[4] The Sport Science universities/departments are ranked by several indicators of research performance, including papers indexed in Web of Science, total citations, citations per paper, papers published in top 25% journals, and percentage of internationally collaborated papers. The Lithuanian Sports University, and University of Tartu units are ranked in the positions between 201-300, but LASE is not listed at all in these subject-specific rankings of academic research quality in Sport Sciences.

Impact on the scientific discipline

Score: 1 - poor

The institution continues to be very active in the promotion of sport science within Latvia through successful collaborations with Olympic Sport Associations and within the Baltic States as a key player in the Baltic Sport Science Society conferences. However, the impact of the research at an international level continues to be fundamentally limited as indicated by the low number of international level research outputs and their limited citations. The impact of the research by the institution has improved over recent years but remains overall limited and the institution is not as a strong national player compared to other universities in similar fields in the wider health science areas. The publishing strategy and scientific impact of the institution's research work are predominantly geared towards the national scientific community and have limited impact at the international level. The impact of LASE on supporting Olympic sports and athletes should be extended to other important areas of national science, technology and innovation development policy, as well as education development policy. The focus should continue to be not only on competitive sports but to specific contributions or impact in other important areas such as sport development and physical activity interventions through interdisciplinary collaborations with other relevant university units in Latvia that add specific value and benefits for society and health.

Economic impact

Score: 1 - poor

The institution is working on some important economic sector areas such as sport, physical activity and health but there is only limited evidence that the economic impact of the research is relevant to economic actors (with a particular focus on the national economy) and there are no significant interactions with the non-academic or industrial sectors. The subject area of the institution is important for the economy in general but the research work is not making any tangible and significant contributions to economic impact. There are some interactions of the institution with the private sector for the provision of services (e.g. Olympic Sports athletes and physical condition of airline pilots) and links with some local equipment manufacturers but significant links with the industrial sector in sport, exercise and health sciences are yet to be established.

Social impact

Score: 3 - good

[4] For example: http://www.shanghairanking.com/Special-Focus-Institution-Ranking/Sport-Science-Schools-and-Departments-2018.html

The subject area of the institution and research are very important for the health and wellbeing of Latvian Society. There are interactions with other European institutions for various projects (e.g. VSPORT+, EUPAS-MOS), participation in various EU expert groups (e.g. Human Resources Development and Skills and Human Resources Development in Sport XG HR, Health-enhancing Physical Activity XG-HEPA) and cooperation with a large number of Latvian sports federations, local governments, sports clubs, Olympic centres, and other relevant sport organisations. These are mostly implemented via student research projects and student practice placements and seminars and conferences for the education and professional development of coaches, teachers and sport managers. The overall level of interactions of the institution with the public sector and the public are at a level expected of recognised academic institutions.

Research environment and infrastructure

Score: 2 – adequate

The long-term research strategy to enhance the quality of scientific research and innovation is very clear and includes 16 objectives that are appropriate and relevant. The human resource development strategy includes relevant actions for promotion of doctoral researchers to academic staff, renewal and succession planning of ageing academic staff and development of opportunities for the attraction of outstanding young scientists. However the teaching load of staff is high which reduces the time available to focus on research. There has been recent investment through ERDF structural funds and there has been a very notable improvement in research infrastructure with new and modern laboratories and scientific equipment installed that allow kinematic, biomechanical and electromyographic analysis of human movement. Although these improvements as part of the LASE modernisation strategy provide a strong basis for future developments, there is no clear description of the management structure for research in LASE as a whole or within the research laboratories and the mapping or alignment of the four key LASE research directions to the structure of two units comprising a new research centre (HCSRC) and the scientific laboratories is not clearly apparent. The availability and quality of support services and technical staff is not described in detail. Overall, the research environment and infrastructure of the institution are improving but they are still not comparable to other national and international units in similar areas in Health Sciences in Latvia or Sport, Exercise and Physical Activity internationally. The institution's research environment is still evolving to achieve a level that is expected in the international scientific community of a respected institution in the given discipline and despite the improvement in the research environment and infrastructure the research outputs are mainly based on basic descriptive research work that is not comparable to higher national or international standards.

Development potential

Score: 2 – adequate

LASE has the potential to become a strong national player in the scientific areas of sport, physical activity and health. The institution's future strategy is detailed and appropriate and based on a realistic assessment of its strengths and weaknesses, opportunities and threats that mainly relate to lack of financial support and incentives to attract promising young scientists to the area, especially given the ageing of the active scientific staff. The ability to attract students, doctoral candidates, and foreign researchers and to raise funding that is awarded competitively are quite limited but the four main LASE research themes and directions are orientated towards topical issues in sport and physical activity. The institution is capable of being a visible local player in its area of research, which can be expected to contribute to the activities of the international scientific community. The development requires continued funding which is a weakness and a threat given the lack of basic state funding and the limited external research funding. The expertise of the Academy is very relevant to many other sectors

(industrial, health, etc), so collaborations beyond sport sciences should be established and fostered especially with other relevant units in Latvian universities.

Potential to offer doctoral studies

LASE already awards PhDs (most, in the assessment period, were to their own teaching staff) but, as described above, the quality of the research currently is low and the ability to support and award high quality PhDs is dependent on improved research quality. Nevertheless, there is the potential to offer improved doctoral studies in future. There are plans for a doctoral programme in collaboration with other regional institutions within the framework of the Baltic Sport Science Association. Collaboration with other local universities in Riga that have more experience in doctoral programmes and offer doctoral training and support will be a distinct advantage and will benefit closer links of LASE PhD researchers with a larger community of postgraduate students.

Alignment with Smart Specialisation Strategies

The Latvian Academy of Sport Education has identified potential contributions to some investment priorities of the Smart Specialisation Strategy, namely Modern Education through the promotion of physical activity and increased use of alternative transportation to work by using environmentally friendly modalities such as walking or cycling and reducing car usage. The provision of a modern education system in sport and health is also an area where the Academy can make a valuable contribution. Throughout the world these days the notion that 'Exercise is Medicine' is now accepted as an important element of public health education and interventions to enhance quality of life and wellbeing in the normal population and as people age and help in the prevention and management of obesity and other chronic diseases. Sports Science also has the potential to contribute to technological products and ICT solutions and developments for monitoring physical activity, training and performance. LASE has the potential to contribute to all these areas, but the link is currently rather tenuous as they have limited links with medical schools, engineering and ICT departments and industrial partners so further important contributions to RIS3 are possible but will require a more specific and focused strategy and action plan for these developments that must be embedded in the overall strategic plans of LASE.

Conformity with state scientific and technology development

The Latvian Academy of Sport Education has the potential to contribute to Scientific and Technological Development Innovation actions as explained above based on the Smart Specialisation Strategy priorities and specialisation areas and in particular to public health which is one of the priority directions in science for the period 2018-2021 as well as Modern Education and ICT in the sport technologies areas. However, this potential requires better links and cooperation with the industrial and technology transfer sectors and collaborations with other relevant universities and units in the Latvian Higher Education sector as part of a more ambitious, purposeful, resolute and focused LASE research and impact strategy.

Recommendations

- The research vision and strategy is rather generic but includes a large number of appropriate general objectives, but the leadership and operational management and processes of the structures must be defined clearly and linked to or aligned with the four identified key research directions to ensure the strategy can be, and is, implemented.
- The research structures (research centre and scientific laboratories) need to be aligned better with the four main research directions with a research team headed by a research leader in each of the four key research directions. Each research team in the four areas need to devise a detailed research plan covering the next five years with the main vision

and directions of research in these areas and specific targets for research work, funding and collaborations and by considering the general research objectives identified in the LASE research strategy. The research plans in each area need to identify Key Performance Indicators (KPIs) such that are achievable and measurable that must be monitored and evaluated before the next assessment. These can include for example numbers of submissions and publications of papers to high quality recognised international sport science journals (Q1 or Q2 level sport science journals), numbers of submissions and grants to national and international funding organisations, numbers of papers and grants with international collaborators etc.

- LASE researchers must target high quality (Q1 or Q2) sports science journals for both forming research priorities in the Academy and publishing research in these journals that include a number of journals in psychology, sociology, physical education and pedagogy as well as natural sciences in sport sciences such as Physiology, Biomechanics, Sports Medicine etc. The list of Sport Sciences journals and their quality rankings (Q1-Q4) are listed in a number of links, for example: https://www.scimagojr.com/journalrank.php?category=3699&page=1&total_size=125
- The amount of effort and time to produce its own journal is appreciated but the focus in such a local journal detracts from the efforts to target internationally recognised high-quality journals and improve research quality.
- The impact of LASE's research can be increased by extending its focus from supporting competitive sports and athletes to other important areas of national science, technology and innovation development policy, as well as education development policy – such as wider sport development and physical activity interventions through interdisciplinary collaborations with other relevant university units in Latvia that add specific value and benefits for society and health.
- Although the Academy expressed a strong preference to remain an independent higher education institution, the Panel's view is that a merger or stronger formal links with one of the main universities will improve the research environment, the research management and governance and the research potential and quality in general. Therefore, the Panel recommends that these options are given serious consideration by the Academy and the Ministry
- The teaching load of academic staff must be reduced by consolidation or revision of the curriculum and support for staff to be involved in research teams and devise personal research plans that align with the general research objectives and are based on collaborative work with other researchers in LASE and the other universities in Latvia.
- Academic staff and doctoral students will benefit from a researcher development programme that will enhance their research skills and abilities. Although this is difficult to develop and manage in an independent institution, other institutions in Latvia have such programmes and LASE can collaborate with them to provide generic research support and development opportunities to its doctoral students and staff. Even if the Academy remains independent, closer links and collaboration with local universities will enhance its research potential and development.
    - External funding from competitive sources must be targeted but this requires planning and support for staff to develop high quality grant proposals. This is difficult to achieve without a strong academic profile so local and international collaborations are necessary for involvement in high quality grant proposals to national, regional and European sources that will be difficult to target successfully in isolation and independently without collaborations.

M_6 Riga Stradins University Platform of Medicine

2.10 Institute data and description

Riga Stradins University Platform of Medicine (MP)	
Primary field of science	Medical and health sciences
Corresponding fields of science	Basic medicine Clinical medicine Health biotechnology Other medical sciences
Related fields of science	Physical sciences Biological sciences Medical engineering Nano-technology Health sciences Veterinary science Philosophy, ethics and religion
No. FTE academic personnel 2018	38.2
No. FTE academic research personnel 2018	64.7
Total number of FTE academic and research personnel 2018	102.9
Articles in peer reviewed scientific edited journals and conference proceedings included in WoS or SCOPUS in period 2013-2018	977
Articles in peer reviewed scientific edited journals and conference proceedings not included in WoS or SCOPUS in period 2013-2018	379
Monographs in period 2013-2018	48
Patents Latvian in period 2013-2018	40
Patents (Europe and international) in period 2013-2018	4
Total no. of self-reported outputs in period 2013-2018	1448
No. of WoS or Scopus outputs in period 2013-2018 per researcher in 2018	9.49
No. of all outputs in period 2013-2018 per researcher in 2018	14.07
No of PhDs completed in period 2013-2018	95
No. of PhDs in period 2013-2018 per researcher in 2018	0.92
Total funding in period 2013 -2018 (Euros)	43,251,105
Total funding in period 2013-2018 per researcher in 2018 (Euros)	420,322

Riga Stradins University Platform of Medicine (RSU MP) is one of three research platforms at Riga Stradins University, a recently created organisational structure to coordinate and manage research within the university. The MP is the second largest research institute in Latvia in Medical and Health Sciences and has the highest volume of research outputs in terms of (self-reported) publications in peer-reviewed journals in Scopus and Web of Science. The MP conducts fundamental, applied and clinical research in General Medicine, Dentistry and Pharmacy and provides services and expertise to healthcare providers, industry and other research institutions. The platform is a complex organisation, consisting of three faculties, four research institutes, three departments, eight shared laboratories and infrastructure at twelve clinical institutions

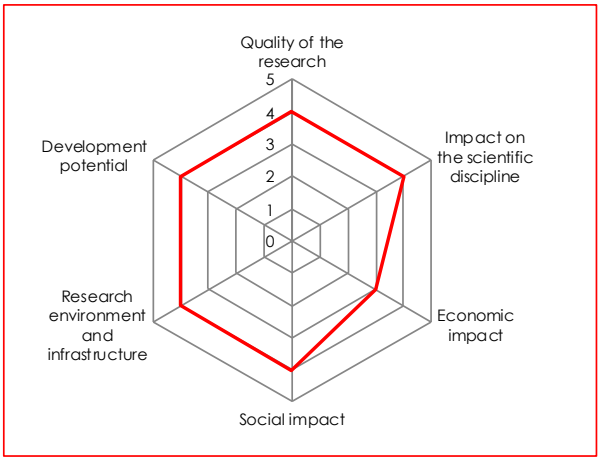
(though the panel notes that the description of the MP constituent parts varies in different documents). In the period 2013-2018 it had an average annual research budget of around €7.2M and, in 2018, this supported 103 FTE research staff. The MP's vision is to be a leading medical and health education and research centre in Baltic region that conducts excellent internationally recognized research with high social impact in its main research directions: General Medicine, Dentistry (including, oral and maxillofacial surgery) and Pharmacy.

2.11 Expert Panel evaluation

The figure below presents the scores assigned by the Expert Panel in Medicine and Health Sciences to Riga Stradins University Platform of Medicine (MP).

Figure 6 Riga Stradins University Platform of Medicine – Scores

Criteria	Scores
Quality of the research	4
Impact on the scientific discipline	4
Economic impact	3
Social impact	4
Research environment and infrastructure	4
Development potential	4
OVERALL SCORE	**4**



Overall score

Score: 4 - very good level of research

The panel of experts have assigned the institute an overall score of 4. This is based on panel assigning a score of 4 to all of the criteria except the economic impact criterion which was scored 3. The MP largely (but not entirely) aligns with the RSU Division of Medicine that received an overall score of 3 in the 2013 evaluation, with higher scores received in in 2020 in particular for research quality and research impact.

Since the previous evaluation, MP has invested in and improved its research infrastructure and strengthened its research management and administrative support systems, including a technology transfer office (TTO), improving support to researchers for grant submission preparation, project implementation and research exploitation. It has also introduced a motivation system that stimulates involvement of researchers in grant and competitive project proposal submission and realisation activities. These changes have contributed to the considerable improvements in research quality and research impact.

The panel notes that scores for such a large and complex research institute that includes a wide range of sub-fields are, by necessity, a judgement as to the average performance across research groups with varying levels of performance.

Quality of Research

Score: 4 - very good

The MP conducts research in various disparate fields within: General Medicine (focused on oncology, microbiology and virology), Dentistry and Pharmacy and in each of these fields, fundamental, applied and clinical aspects are covered. Research is conducted across numerous institutes, laboratories and research centres. Such a broad spectrum of activities makes it difficult to assess one score and there are disparities in the quality of output produced. Nevertheless, since the 2013 evaluation, many more publications are in international journals and citation levels have increased, with this increase underpinned by the introduction of motivation structures for researchers. Furthermore, the participation of MP in international networks and with international organisations is evidence that the research is of an international standard.

Amongst the best research produced by the MP is the development of new antibacterial agents (Re-introduction of Phage Therapy in Military Medicine, NATO-STO activities HFM-ET-174, HFM-RTG-313), studying the efficacy of bacteriophage therapy in cases of resistant bacterial disease - this is a particularly good niche that would benefit from increased research activities and funding. In dentistry, excellent management, in particular due to Prof. Urtane, has wisely invested clinical revenues in research equipment and consequently attracted excellent PhD students. This has enabled the Institute of Stomatology to occupy a leading position in research in dentistry and stomatology in Latvia that is internationally recognised.

Impact on the scientific discipline

Score: 4 - very good

Both the large number and wide spectrum of publications (237 according to SCIVAL and 293 according to WoS) and the citation impact scores (FWCI and CNCI)[5] above 1.0 are indicate an internationally comparable research quality. These bibliometric data indicate numbers which are good but not exceptional: FWCI score is 1.54 which corresponds to the 5th position out of the eight institutions considered by the Expert Panel and a CNCI of 1.42 which is the 4th position out of six institutions (for which there were data). However, there are some particularly high-quality publications: two publications emerged and should be highlighted as high impact both for Latvia and internationally. The first is a phase III clinical trial published in Feb 2019 in the best journal for Medicine: The New England Journal of Medicine (Impact Factor = 70,7 H index = 933) indicating the excellence of i) the research made and 2) the Latvian co-author. The second is an excellent provocative article published in 2017 in the British Medical Journal already cited 261 times.[6] Contrary to this, and considering the time and money invested, the Panel does not view the launch of a local journal "Acta Chirurgica Latviensis", with an impact factor of 0,25, as a wise investment towards the of becoming an international leader in the field. The MP also participates in a number of European and international networks and organisations, including an ERA-NET, ESFRI, EATRIS-ERIC, BBMRI, COST Actions, and Horizon 2020 activities, demonstrating the international level of its research, but has not yet led any Framework Programme Research and Innovation Action projects.

Economic impact

Score: 3 - good

In medical research the development and commercialisation of new treatments can have both social and economic impact – in terms of improved healthcare and, for some treatments,

[5] Field-Weighted Citation Impact (FWCI) from SCIVAL and Category Normalised Citation Impact (CNCI) from Web of Science (WoS)

[6] The latter publication was of great interest as it demonstrated that most of the oncology drugs entering the market are without evidence of benefit on survival or quality of life and has as such has the potential to have high societal impact

revenue from new healthcare products and services. The MP is involved in a fairly large number of clinical trials, most of which are multi-centre trials led by other organisations, however in 2018, the MP signed its first contract to lead a clinical trial. It also conducts contract research for international multi-national corporations in healthcare and for Latvian companies. Both the clinical trials and the contract research provide potential routes to future economic impact (but timescales from research to impact are long) and, in the short term, provide additional income to the institute. The MP is also contributing to the development of the national dental care industry and has reinforced cooperation between its research and industry. The MP is in the process of commercialising a number of research outputs (e.g. an infertility test and a personality test) and is seeking to improve its capabilities in this regard through, for example, strengthening its Technology Transfer Office.

Social impact

Score: 4 - very good

The MP generates and contributes to social impact in a number of ways. As the largest provider of PhDs in medicine and health science in Latvia (95 successful PhDs in the period 2013-2018) MP is supporting the provision of the next generation of researchers in the field and expertise to support improved healthcare in the longer-term. MP's academic and research staff are active in knowledge and sharing and the provision of advice and recommendations to the Latvian Parliament, to different Ministries, to professional associations, to EC Joint Research Centre and to the WHO. MP participates in various national knowledge dissemination and awareness-raising events such as: "Academia-Industry Brokerage Event", "Bringing RSU Innovations to Market" and "Science Meets Parliament". MP regularly participates in "Researchers' Night", organises public lectures, promotes awareness raising activities, e.g., "Country comes to city", Open Days and "Health train". The MP also contributes to wider cultural impact on society via the work of the RSU Institute of the History of Medicine, and the Museum of the History of Medicine.

Research environment and infrastructure

Score: 4 - very good

There have been investments and efforts to improve the research infrastructure within the MP (largely through use of European Structural Funds) enabling the introduction of two Core Facilities and provision of service-oriented management of them: (1) Science Hub "Kleisti" houses Institute of Microbiology and Virology, Laboratories of Biochemistry, Clinical Immunology and Immunogenetics and Biomechanics and (2) the infrastructure of the Institute of Oncology. The implementation of such core facilities provides a cost-effective means for making state-of-the-art instrumentation and services available to researchers, to enable researchers to move their research programmes in new directions by facilitating and supporting interdisciplinary strategies. In addition, the equipment of Institute of Stomatology was modernised since the last assessment (investing €2.3M) and a further €2M was invested into scientific and technological equipment of other departments of MP. The panel also notes that the Institute for Occupational Safety and Environmental Health (IOSEH) gave a very good impression in terms of equipment and infrastructure with potential to improve its publication activity which is, at present, rather low. Pharmacy research at MP would benefit from access to a cryo-EM (as recommended in Section 3).

While the MP is large and fairly complex organisational structure, the Expert Panel was impressed by the excellent management team behind this and their introduction of a research department to oversee the research and support and motivate researchers. The management team is made up of highly competent persons having a strong background in public policy and science strategy. The MP also has access to the wider support facilities of the university

(the Doctoral Department and Doctoral School, Technology Transfer Office, Development and Project Department, etc). The improvements since the 2013 evaluation indicate that the management has been effective. There is an increasing focus on the exploitation of research outputs although there is still some way to go.

Since the 2013 evaluation the MP has increased its publications in international journals and is moving away from publishing national journals with low readership that are usually in the Latvian language. In doing so it is increasing access to its research outputs and, as most international journals are increasingly open access (or are moving towards open access), the MP is itself moving towards ensuring open access of its research results. In addition, RSU (and therefore MP) has a strategy for open access publications as well as its own open access repository for publications and data storing.

Development potential

Score: 4 - very good

The MP has a strategy for the future and vision to be a regional centre of excellence. There is a strong leadership team under the Vice-Rector for Research and high development potential to continue on its path of improvement in research quality, impact and international collaboration. MP recognises its areas of specialism (albeit within a broad portfolio of research activities) and its SWOT analysis is realistic. Importantly it identifies, as do the Expert Panel, that continued improvement requires strong application of a modern career progression system for researchers. The current system not only risks losing existing research talent but also does not sufficiently attract international talent (in terms of PhD students and already active researchers) that could foster and enhance research excellence and innovation.

The strengths and impact of the MP in the coming years will depend increasingly on i) its ability to form strong affiliations with other life sciences institutions in Latvia and in other countries ii) its constant process of renewal, exploring recent developments in research and considering the next generation of young scientists.

With a likely decrease in the EU budget for research in the next Framework Programme and more particularly within the EU Structural Funds, the developmental potential will not be realised unless the institute can secure funding from alternative sources, for example, making greater use of its capacity to generate revenue from clinical trials in phase II and III.

Potential to offer doctoral studies

The MP, as part of Paul Stradins University, is already the largest provider of PhDs in medicine and health science in Latvia. It has sufficient scale and quality of research to continue to do so. However improvements can also be made.

Doctoral programmes are defined by the overarching RSU Development Strategy and Study Program Fragmentation Reduction and Study Internationalization Plan. Its development started in 2019. However, changes in the PhD programme are insufficient, educational efforts at both the medical school and residency levels remain short sighted and a substantial transformation is needed particularly with regard to research training of medical students and young physicians. In preclinical departments the PhD training program generally appears to follow the Bologna process. This is not the case for the vast majority of the medical students enrolled at the university and stationed at the clinical departments, where the PhD programs barely reach European standards for a Master of Science degree. The educational efforts for medical students in clinical training and young medical residents will be of great importance for the development of medical research in Latvia, but is currently short sighted and a substantial transformation of joint training in clinical and basic research is urgently needed – at RSU MP but also across the institutes assessed by the Panel. This is discussed in more detail in Section 3.

Alignment with Smart Specialisation Strategies

- MP aligns with the RIS3 strategy as it falls directly into the knowledge specialisation area of biomedicine, medical technologies, bio-pharmacy and biotechnologies and the knowledge-intensive bio-economy. It is advancing science and technical knowledge and human capital in these domains.
- MP contributes to the Smart Specialisation Strategy of Latvia by performing good quality research and so supporting the strengthening of the research, development of technology and innovation eco-system in Latvia. It does so in the field of biomedicine and so directly aligns with one of the knowledge specialisation areas of RIS3.
- MP also takes some actions on to commercialise its research and this can contribute to the Strategy's priority of development of high added value products.
- As the largest provider of PhD training in biosciences it provides research opportunities for young scientists and so supports the priority of research human capital development in Latvia.

Conformity with state scientific and technology development

MP contributes to the objectives of Latvia's scientific and technological development as defined in key policy documents (e.g. Science, Technological Development and Innovation Guidelines 2014-2020, Education Guidelines 2014-2020 and other) in a number of ways:

- It is a strong international research player delivering high quality research in the important field of biomedicine that underpins future developments in healthcare and high-value healthcare products and services. It has made considerable investments to develop its facilities and infrastructure, including investing its own internal funds.
- It trains large numbers of undergraduates, Masters and PhD students in biomedical science and, in particular, is the largest provider of PhDs in biomedicine in Latvia, and so supports the development of human capital in science, technology and innovation.
- The MP is based within a university enabling links between biomedical research and medical and scientific education at all levels, with for example, undergraduate students participating in research projects.
- It is increasing its focus on the relevance and exploitation of its research outputs, working with industry and patenting its research outputs (though largely at the Latvian level).
- It collaborates with the three Latvian university hospitals and is involved in many clinical trials with the potential for both healthcare and economic benefits.
- Its activities are in line with the overarching development activities of RSU concentrating on four different policy goals: 1) Increase in investments in research and development activities. RSU invested its own resources in the research infrastructure that serves MP projects; 2) Increase competitiveness of the science by introducing reward activities to stimulate the competitiveness; 3) Increase the number of students in STEM. MP has a stable flow of students in STEM and RSU has developed favourable conditions for foreign students into the program; 4) Improvement of cooperation between business and science. MP is actively involved in contracting with private companies and EU projects. MP is involved in 120 projects with private companies.

Recommendations

Research infrastructure

- Develop a strategy for the long-term sustainability of the core facilities. Justification: Core facilities sustainability is a priority because without technical expertise, there is no core

facility. Core personnel are an indispensable part of the value proposition. They provide unique skills, expertise, and experience that foster relationships and build trust and confidence in researchers as they explore new and innovative technologies and applications. They are critical gatekeepers in efforts to address rigor and reproducibility issues plaguing the research enterprise. By ensuring that core directors and staff are leaders in their fields and effective communicators and partners in the research ecosystem, the institution can be confident that faculty are getting the expert advice they need.

- To keep competitiveness high and in particular for MP and its new vaccine project, access to a cryo-EM and effective computational image analysis techniques (cf Nat Rev Drug Discov. 2018 Jul;17(7):471-492) should be achieved to maintain competitiveness in the field of drug discovery and central to determining the high-resolution structures of many viral assemblies as well as those of assembly intermediates (cf Nat Chem Biol. 2020 Mar;16(3):231-239). As the Panel recommends elsewhere, a plan to procure, house, operate and financial support this equipment should be developed in partnership with BMC and LIOS.
- Support and advocate, with colleagues in other institutes for the introduction of the infrastructure for Phase I clinical studies I in Latvia. This is an issue across the institutes in the Panel and is presented in more detail in Section 3.
- Further developing the Technology Transfer Office (TTO) by seeking out best practice elsewhere (e.g. www.ec.europa.eu/jrc/tto-circle, www.astp4kt.eu, www.praxisauril.org.uk, www.autm.net) and ensuring that the TTO role is broad enough to identify and support the most appropriate route to protecting and commercialising intellectual property – this includes not only helping researchers protect their IP, but also helping them to identify the best routes to commercialisation (including but not limited to spin-outs) and developing maintaining (as a TTO) close links to industry to support further research and commercialisation opportunities.

Leadership and management

- Establish an International Scientific Advisory Board to provide external review and guidance to the MP. Such a board would review documentation on plans, research strategies, outputs, finances, training and education, communication and visit the MP once every two years to provide their detailed assessment of research quality, the quality of organisational structure/management and make provide advice and recommendations. The regular assessment and visits (every 2 years) enables the institute's response to prior recommendations to be reviewed and assessed. It also enables the development of a relationship with the institute whereby the Scientific Advisory Board becomes a valued 'critical friend' – with sufficient refresh of its membership to ensure robust assessment and challenge.
- As a large Platform, the leadership needs to find ways to break the silo between faculties, institutes and research centres, enabling more internal collaboration and inter- and multi-disciplinary working. This may take the form of informal arrangements such as joint seminars to formal arrangement to share students and access (and finance) research facilities.
- As for most institutes in Latvia, a more proactive approach to implementing a strategy is necessary – aligning research funding applications and funding closely with the institute's strategy and seeking to influence national and international research agenda. While there will always be some need to react to opportunities, discretionary income (e.g. profits from contract research and clinical trials activities, revenue from successful technology transfer) can be reinvested to support identified strategic research agenda. This may require a close look at the terms for contract research ensuring both intellectual property agreements and

pricing strategies strike the right balance between attracting contract research/clinical trial clients and creating sufficient benefit for the institution.

Research funding

Increasing the quantity of research funding requires seeking funding from a more diverse range of sources. MP should increase efforts regarding:

- Aim to take the lead (as coordinator) in a small number of EU Horizon 2020 / Horizon Europe projects to both increase funding and enhance MP's and Latvia's reputation.
- Apply and reapply for ERC grants. The ERC's mission is to encourage the highest quality research in Europe through competitive funding and to support investigator-driven frontier research across all fields, on the basis of scientific excellence. Being 'investigator-driven', or 'bottom-up', in nature, the ERC approach allows researchers to identify new opportunities and directions in any field of research, rather than being led by priorities set by politicians. This ensures that funds are channelled into new and promising areas of research with a greater degree of flexibility. Getting an ERC grant will immediately identify the researcher and his/her institute as excellent in their field. These grants are highly competitive and hard to win but the institute should target a few key researches and support them to apply.
- Apply and take the lead of ITN Marie Curie MSCA-ITN-2015-EJD - Marie Skłodowska-Curie Innovative Training Networks (ITN-EJD). EJDs have the objective of promoting international, inter-sectoral and multi/inter-disciplinary collaboration in doctoral-level training in Europe through the creation of joint doctoral programmes, leading to the delivery of joint, double or multiple doctoral degrees. Such grants not only increase international collaboration but will attract international researchers as they offer the potential of providing a high salary for doctoral researchers.

M_7 Riga Stradins University Public Health Platform

2.12 Institute data and description

Riga Stradins University Public Health Platform (PHP)	
Primary field of science	Medical and health sciences
Corresponding fields of science	Health Sciences
Related fields of science	Medical engineering Nanotechnology Basic medicine Clinical medicine Health biotechnology Other medical sciences Other agricultural sciences Sociology Philosophy, ethics and religion
No. FTE academic personnel 2018	8.1
No. FTE academic research personnel 2018	8.9
Total number of FTE academic and research personnel 2018	17
Articles in peer reviewed scientific edited journals and conference proceedings included in WoS or SCOPUS in period 2013-2018	252
Articles in peer reviewed scientific edited journals and conference proceedings not included in WoS or SCOPUS in period 2013-2018	48
Monographs in period 2013-2018	21
Patents Latvian in period 2013-2018	1
Patents (Europe and international) in period 2013-2018	0
Total no. of self-reported outputs in period 2013-2018	322
No. of WoS or Scopus outputs in period 2013-2018 per researcher in 2018	14.82
No. of all outputs in period 2013-2018 per researcher in 2018	18.94
No of PhDs completed in period 2013-2018	33
No. of PhDs in period 2013-2018 per researcher in 2018	1.94
Total funding in period 2013 -2018 (Euros)	11,631,861
Total funding in period 2013-2018 per researcher in 2018 (Euros)	684,227

The Riga Stradins University Public Health Platform (PHP) is one of three research platforms at Riga Stradins University, a recently created organisational structure to coordinate and manage research within the University. The Platform is the coordination body for public and environmental health science and comprises: the Institute for Occupational Safety and Environmental Health; the Institute of Public Health; the Faculty of Public Health and Social Welfare; and the Faculty of Rehabilitation. The PHP is relatively small with a total of 32 research staff (but 8.9 researchers as full-time equivalents (FTE)) in two research institutes, two faculties and three shared laboratories (though the panel notes that the description of the PHP constituent parts varies in different documents). It conducts fundamental and applied research

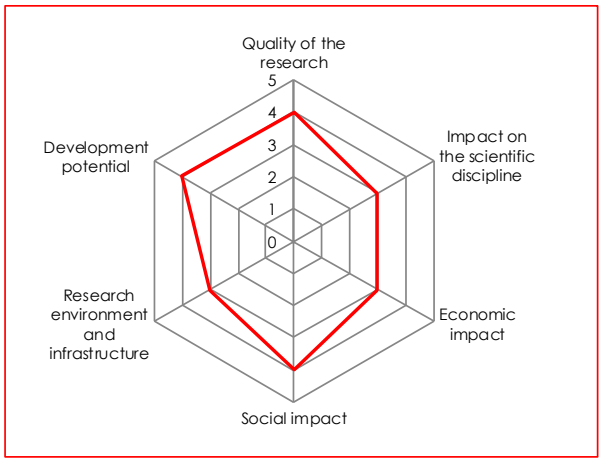
in three domains: disease prevention and health promotion; health systems and environmental and occupational health. While small, it has a reasonably high level of research income €11.6M in 2018 and a relatively high volume of research outputs.

2.13 Expert Panel evaluation

The figure below presents the scores assigned by the Expert Panel in Medicine and Health Sciences to Riga Stradins University Platform of Public Health (PHP).

Figure 7 Riga Stradins University Public Health Platform – Scores

Criteria	Scores
Quality of the research	4
Impact on the scientific discipline	3
Economic impact	3
Social impact	4
Research environment and infrastructure	3
Development potential	4
OVERALL SCORE	**3**



Overall score

Score: 3 - good level of research

The panel of experts have assigned the institute an overall score of 3 - PHP is a strong national player. The Platform is a coordination body for different organisational entities (two institutes and two faculties) and research directions all of which are inherently addressing practical societal concerns. The panel notes that score covers a range of sub-units and the overall score is a judgement of performance across the various units. The research quality is very good and the social impact is very good through a range of activities to engage with policy-makers and the general a public. However, the number of researchers is very small across the four sub-units reducing the ability to achieve critical mass in any one research domain. Nevertheless, the research undertaken at PHP and its contribution to the Latvian society is good, and PHP has the potential for further development to become a strong regional actor in public health research and education.

Quality of Research

Score: 4 – very good

The Public Health Platform (PHP) represents many different research directions, e.g. Disease Prevention and Health Promotion, Health Systems, Environmental and Occupational Health. The research covers many different issues relevant to public health. A research strategy for each of the areas has been developed, and the resulting research is of a very good standard. Work has been published in high quality international journals with outreach to the public health community. The number of papers published is increasing and has a very good impact considering the research area. In addition, the research has been presented at both national and international meetings. The research is multidisciplinary and focused on health issues

relevant to Latvia, but they do also participate and contribute to international public health research, e.g. EU biomonitoring project, EU Mother-Child project, WHO project on Health behaviour among school-age children. Other particular interesting projects are the follow-up study on the Chernobyl accident recovery workers, the association of depression and CVD morbidity, and the Toxicity of nanoparticles in the working environment, that are all projects of very good international standard.

Impact on the scientific discipline

Score: 3 – good

The results of the PHP's research are communicated to the scientific community though publication in international journals and the different groups within the PHP have established collaboration with many national universities and research institutions as well as universities abroad. They are partners in many different international research networks (EU, WHO, NATO) contributing data from national studies, which both increase the strength and the representativeness of these studies. As partner in the network studies, the Latvian partners contribute health information and participate in the analysis of the data and writing the papers. PHP has also established bi-lateral research collaboration with international universities and partners in the Baltic countries. These international collaborations are good, and the interaction with the international scientists is very important for technology transfer, training of young doctoral students, and the future development of the PHP. The findings of the research have also been disseminated to government agencies and other relevant stakeholders.

Economic impact

Score: 3 – good

Considering the type of research in the public health area, the direct economic impact must be classified as good. The PHP units have been involved in several R&D projects with private companies especially in the area of rehabilitation, i.e. higher value product development and have contracted research amounting to more than €300.000. In addition, they have provided individual consultations to various state organisations and private companies to develop new technologies and safer work processes, e.g. ergonomics and computer work.

Social impact

Score: 4 – very good

The social impact of the research is very good. The nature of the fields of research of the institute is directed at social impact. Importantly, the research results are communicated to relevant government agencies responsible for public health and to the public. The senior scientists are members of national and international working groups and scientific panels, that provide evidence-based recommendations for policymakers for the development of guidelines that can protect the health of the Latvian people. They have also developed diagnostic and treatment algorithms that will reduce patient mortality, prolong survival and improve quality of life, that indirectly have an economic impact via cost savings in healthcare provision. Information from the research have been used for public education activities and dissemination events, e.g. disease prevention, healthy lifestyle and safer working environment. As participant in the EU SHARE project on issues of the ageing population in Europe, the PHP researchers have access to and contribute to the knowledge on health problems in the ageing population.

Research environment and infrastructure

Score: 3 – good

The organisational structure of the PHP is very complex and consists of two different research pillars: 1) Institute for Occupational Safety and Environmental Health and Institute of Public Health, and 2) Faculty of Public Health and Social Welfare and Faculty of Rehabilitation, all of which are inherently addressing practical societal concerns. The latter two groups are linked to the Medical Education Technology Centre and offer BSc and Masters degrees. The separate units are responsible for the management of the day-to-day activities, whereas the long-term sustainable development, maintenance and renewal of equipment is managed by the RSU Department of Infrastructure and Research. RSU has developed a contemporary IT infrastructure, that is available to all RSU researchers and students. The facilities of PHP are located outside the main campus of the university in new building with excellent infrastructure and up-to-date equipment. Therefore, the PHP can participate in international and national research projects in the area of public health as well as participate in contract research for public and private stakeholders, and in international research networks, e.g., Horizon 2020. As for the other platforms at RSU, the PHP is supported the Research Department to oversee the research and has access wider support facilities of the university (the Doctoral Department and Doctoral School, Technology Transfer Office, Development and Project Department, etc). RSU (and therefore PHP) has a strategy for open access publications as well as its own open access repository for publications and data storing.

PHP is strongly involved in human resource development. The University it sits within (i.e. RSU) has established a structure for research career development, including both graduate and postgraduate training and PHP is the knowledge base for study programmes (at all levels) in the public health area. The Faculty of Public Health provides mentoring of all doctoral programme students at RSU in research methodologies and organisation, including ethical aspects. One major concern for PHP is in the area of human resources is the availability of qualified academic staff due to uncertain research career paths, competition with the private sector for qualified academic staff (better salaries and other incentives). One action taken by RSU to address this is supporting the best PhD students by offering them university positions in order to qualify them for an academic career in research.

Development potential

Score: 4 – very good

The developmental potential for PHP is very good. The platform consists of many different units with well-equipped shared laboratory facilities, and the research covers many different issues relevant for public health. They are connected to many different networks with local and international organisations as well as private enterprises. They have a good international reputation and credibility in Disease Screening, Health Behaviour Research, and Environmental and Occupational Health research. PHP has the ambition to become the lead organisation in research of public health systems in Latvia and the Baltic Sea region, and to become the first choice partner for Healthcare technology design, and environmental and occupational studies. A strength for future development is that they have the competence to work with complex issues and coordinating multidisciplinary teams for solving important public health issues, and that they are affiliated with MoH and contribute to public health policies. PHP staff is connected with international public health and research networks, with access to international research infrastructure. One of the critical issues is the lack and qualification of researchers, and PHP is already addressing this through their involvement in the development of a contemporary education program, especially at the PhD level. They should also consider developing programmes for Masters and Doctorates in Public Health (MPH and DPH).

Potential to offer doctoral studies

The PHP, as part of Pauls Stradins University, already supports and awards PhDs. Its quality of research is sufficient for doctoral studies and, although its size is rather small to support a large

intake, it has access to the wider RSU facilities for PhDs. RSU has strategically invested in the establishment of a structure for research career development, including both graduate and postgraduate training. The RSU Department of Doctoral Studies coordinate all activities related to the education/training. In order to improve and maintain a high standard of the PhD program, selection criteria and quality requirements have been introduced. Internal PhD grants and scholarships for advanced research (competitive) taking advantage of the ERASMUS program are available. PHP is the knowledge base for all level of study programs training in the public health area. The Faculty of Public Health provides mentoring of all doctoral programme students at RSU in research methodologies and organisation, including ethical aspects. The students have access to excellent laboratory facilities and the RSU IT infrastructure.

Each doctoral student receives personal support and advice throughout the doctoral studies. The PhD supervisors are experts recognised by the Latvian Council of Science. The students are stimulated to participate in relevant meetings nationally and internationally. As part of the PhD program the students receive training in how to write a grant application and a scientific paper.

Alignment with Smart Specialisation Strategies

- PHP aligns with the RIS3 strategy as it falls directly into the knowledge specialisation area of biomedicine, medical technologies, bio-pharmacy and biotechnologies and the knowledge-intensive bio-economy. It is advancing science and technical knowledge and human capital in these domains.
- PHP is actively involved in supporting commercial development of its knowledge through working with private companies and contract research.
- PHP is participating in the establishment of a National Significance Research Centre of Public Health and Clinical Medicine to ensure future sustainable quality of the research, human capital and transfer of the technology to the focus area of PHP, i.e. healthcare and rehabilitation. Public health is one of the priority directions in science in the national strategy for the period 2018-2021.

Conformity with state scientific and technology development

The PHP contributes to the objectives of Latvia's scientific and technological development as defined in key policy documents (e.g. Science, Technological Development and Innovation Guidelines 2014-2020, Education Guidelines 2014-2020 and other) in a number of ways:

- The scientific activities of PHP contribute to the goals of the National Science, Technology and Innovation policies as the knowledge hub for environmental and public health research – as public health is one of the nine priority directions identified for the period 2018-2021.
- Its activities are in line with the overarching development activities of RSU concentrating on four different policy goals: 1) Increase in investments in research and development activities. RSU invested in the research infrastructure that serves PHP research; 2) Increase competitiveness of the science by introducing reward activities to stimulate the competitiveness; 3) Increase the number of students, PHP has a stable flow of students in STEM, and RSU has developed favourable conditions for foreign students into the program; 4) Improvement of cooperation's between business and science - PHP is involved in 95 projects with private companies.

Recommendations

Enhancing research quality

- Develop programs to attract international scientists at different levels to work as visiting researchers in the research units ranging from short visits of 3 months up to a year.
- Develop a special grant program for early career scientists. Those grants should allow talented people, who have e.g. reached exceptional results during their PhD-time, to follow their own research goals, and e.g. create their Junior Research Group. The results should be regularly evaluated on the basis of the defined workplans and classical scientific KPIs.
- Establish an internal forum of scientists to better integrate / stimulate research between the units.
- Establish a Scientific Advisory Board (SAB) of key international persons, who review the main achievements and advice about new directions once a year or every two years. The evaluation results are shared and approved by the corresponding ministry. The SAB should have a positive and supporting role, and, for example, facilitate connection of the institute with international partners and suggest collaborations.
- Improve the organisation of the biobanks to facilitate public health studies, including environmental epidemiology.
- Competitive incentive mechanisms for high-performing groups and individuals should be put in place.
- Target regular presence at top conferences and in premium journals in the related fields. It will allow increasing the visibility of the institute and the potential impact of the achieved results. As a consequence, it will facilitate the creation of collaboration at international level.
- Target common publications with key partner institutes in Europe. Collaboration and networking with key European institutes will support the research work and identification of key topics.
- Establish a program to attract capable students at early stage through e.g. integrated research tracks, or internships. Their early integration in the institute is beneficial for both: students increase their knowledge and skills; the institute has the possibility to identify excellent students and select future PhD-candidates, and the researchers get additional support for their work.
- Organize all PhDs in PhD Schools, with defined programs and fostering exchanges and cooperation towards excellence.

M_8 University of Latvia Medicine and Health Science Cluster

2.14 Institute data and description

University of Latvia Medicine and Health Science Cluster (MHSC-UL)	
Primary field of science	Medical and health sciences
Corresponding fields of science	Basic medicine Clinical medicine Health sciences Health biotechnology Other medical sciences
Related fields of science	Computer and information sciences Physical sciences Chemical sciences Biological sciences Medical engineering Economics and business Law Philosophy, ethics and religion
No. FTE academic personnel 2018	37.05
No. FTE academic research personnel 2018	42.79
Total number of FTE academic and research personnel 2018	79.84
Articles in peer reviewed scientific edited journals and conference proceedings included in WoS or SCOPUS in period 2013-2018	511
Articles in peer reviewed scientific edited journals and conference proceedings not included in WoS or SCOPUS in period 2013-2018	90
Monographs in period 2013-2018	9
Patents Latvian in period 2013-2018	6
Patents (Europe and international) in period 2013-2018	1
Total no. of self-reported outputs in period 2013-2018	617
No. of WoS or Scopus outputs in period 2013-2018 per researcher in 2018	6.4
No. of all outputs in period 2013-2018 per researcher in 2018	7.7
No of PhDs completed in period 2013-2018	30
No. of PhDs in period 2013-2018 per researcher in 2018	0.38
Total funding in period 2013 -2018 (Euros)	12,766,918
Total funding in period 2013-2018 per researcher in 2018 (Euros)	159,906

University of Latvia Medicine and Health Science Cluster (MHSC-UL) is composed of three structural units which are the Faculty of Medicine (FoM), the Institute of Clinical and Preventive Medicine (ICPM) and the Institute of Cardiology and Regenerative Medicine (ICRM). It conducts basic, translational and clinical research mainly focused on personalised and precision medicine, regenerative medicine, microbiota, and biomarker research, pharmacy, pharmacology, medical ethics, epidemiology, prevention, health care organisation, cost-

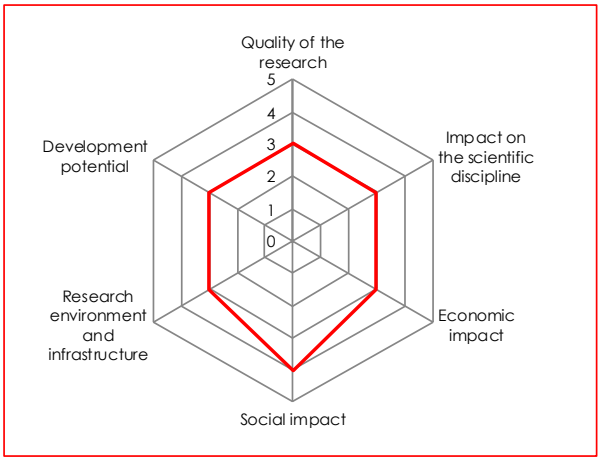
effectiveness studies. Within the medical and health sciences domain in Latvia is a medium-sized institution in terms of research staff, research outputs and number of PhDs awarded but with a rather low funding level per researchers. MHSC-UL vision is to maintain its position as a leading national research organization and a recognized international partner in the field of medicine, health and related sciences by: strengthening scientific capacity and competitiveness, integration of research and studies, promotion of international scientific cooperation and interdisciplinary collaboration, alignment of research to societal and economic needs, facilitation of knowledge transfer.

2.15 Expert Panel evaluation

The figure below presents the scores assigned by the Expert Panel in Medicine and Health Sciences to University of Latvia Medicine and Health Science Cluster (MHSC-UL).

Figure 8 University of Latvia Medicine and Health Science Cluster – Scores

Criteria	Scores
Quality of the research	3
Impact on the scientific discipline	3
Economic impact	3
Social impact	4
Research environment and infrastructure	3
Development potential	3
OVERALL SCORE	**3**



Overall score

Score: 3 - good level of research

The University of Latvia Medicine and Health Science Sector (MHSC-UL) is composed of three structural units which are the Faculty of Medicine (FoM), the Institute of Clinical and Preventive Medicine (ICPM) and the Institute of Cardiology and Regenerative Medicine (ICRM). The overall score awarded is 3 to indicate the good level of research overall at this cluster that was formed by grouping different structural units of the University of Latvia (FoM) and research units (Institutes) that were merged following the previous assessment (ICRM) or established in cooperation with University hospitals (ICPM). The University of Latvia took several actions to address the recommendations of the 2013 evaluation that highlighted the need to improve the research environment and critical mass of smaller institutions and the cooperation and links with other institutions nationally and internationally. These actions led to notable improvements in research facilities and infrastructure as well as in the overall scientific and academic environment. The panel recognised these improvements by awarding a score of 3 (Good) for most of the criteria and a score of 4 for Social Impact (Very Good) to reflect the importance of the work and research by the institution for the society and the extensive and influential contributions to the public sector.

Quality of Research

Score: 3 – good

The institution is a strong national player with a very good international recognition. Its main research directions are quite wide and include basic, translational and clinical research with emphasis on personalized and precision medicine, regenerative medicine, microbiota, and biomarker research, pharmacy, pharmacology, medical ethics, epidemiology, prevention, health care organization, cost-effectiveness studies. Research by the institution in general is at a very good standard of quality in terms of originality and importance. However, although the MHSC-UL comprises a substantial number of academic/research FTE scientists, it appears that the main research outputs in the evaluation period is rather limited to specific groups working on gastric cancer (particularly biobanking component and Helicobacter pylori research), evaluation of substances in exhaled breath as diagnostic biomarkers and interventional cardiology (Dr. Erglis' group). The majority of the top cited articles from these groups are published in collaboration with major international institutions, in which the Latvian scientists are listed as participants, but not often as first or communicating authors. Nevertheless, the quality of these publications is particularly strong with over half of the outputs (55%) published in Q1 journals and the citation impact metric of the publications is one of the highest amongst the other universities in Latvia.

The funding level is not as high as other universities, and this is probably a reflection of the medical education focus of the Faculty of Medicine. Overall the research performance is ranked 3 but certain aspects of the work such as the quality of the publications in some areas are at a higher standard.

Impact on the scientific discipline

Score: 3 – good

The institution is a strong national player and the main contributor of human capital in medicine and health sciences in Latvia with a very good international recognition and strong collaborations with key institutions abroad and a partner in some very important international projects. The institution occupies a respected position in the international scientific community and is considered a respected and recognized centre of competence, and hosts national research centres focused on cardiology, pharmacology, innovative medical technologies, regenerative medicine and biobank centres. Considering both the large number of publications (266 from SCIVAL and 314 from WOS) of which 55% are published in Q1 journals and the high number of citations/publication (13.37), the research impact of the MHSC-UL should be regarded as very good. Those two bibliometric data correspond to the 4th position out of the 8 institutions in the field of medical sciences in Latvia. However, from the list of publications submitted for analysis, it appears that the majority of top cited articles are published in collaboration with major international researchers/institutions, in which the Latvian scientists are listed as collaborators, not as first or communicating authors.

Economic impact

Score: 3 – good

The economic impact of the institution's research is good with a satisfactory level of interaction with non-academic units and industry for knowledge transfer and commercialisation of research results. Highlighted examples include: 1) The involvement of ICRM in collaboration with Faculty of Computing and international partners (e.g. Microsoft and Roche) in the development of further commercialization of liquid biopsy diagnostic system for lung cancer; 2) The involvement of ICPM in the development of a breath test analyser (based on the electronic nose VOC concept) for detection of tuberculosis and gastric cancer (with expected further development for other cancers); 3) Industrial collaborative research projects with

involvement of various research groups in the FoM on novel herbal products for wound healing and development and standardization of new tumour mutation diagnostic technologies. There is further high potential for implementation of knowledge transfer activities from the outputs from the other major activities of the MHSC-UL in their areas of high-quality research (biomarkers, biobanking, regenerative medicine), but these have not been exploited sufficiently in the reporting period. In general, however, the research of the institution is important for the economy the interactions with the private sector are at a level that is expected of recognised academic institutions.

The MHSC-UL employs substantial number of academic/research staff which are primarily funded from local funds, either provided as basic funding from the Ministry or Latvian EU Structural Funds, whereas funding from international competitive grants for research, knowledge transfer and economic impact activities is rather limited.

Social impact

Score: 4 – very good

The institution is conducting research, transferring knowledge and provides medical education that are all very important functions for the society and the health and well-being of the population in Latvia. Given the wider importance of medical research and education, the impact on society issues is substantial despite the limitations in economic impact highlighted above. The MHSC-UL actively participates in the higher education of Latvia and is an important contributor to the development of human capital in medicine and health science. Approximately 5 PhD theses are defended at the MHSC-UL annually, which is an important contribution to human scientific capital in medical research although the potential is much higher given the high number of full time academic/research staff.

The institution's interactions with the public sector/the public stand out in terms of their extensive and dynamic nature and include open seminars, conferences, scientific cafés, summer schools for researchers, professional societies, health care administrators, students, patient organisations, popular science articles, interviews with leading experts in mass and specialised media, and specific projects researching the public understanding of the significance of biomedical research.

The MHSC-UL researchers are also involved as experts in various task force groups at ministerial level, joint projects with State agencies and commissioned research that have important national societal impact.

Research environment and infrastructure

Score: 3 – good

The MHSC-UL has an appropriate research infrastructure and the institution is a strong national player and is able to provide a research environment that is comparable with globally recognised academic institutions in its discipline. Following the previous evaluation in 2013, the scientific environment of the FoM appears to have been substantially improved by the development of the UL Academic Centre and the relocation to new buildings supported by ERDF grants for the purchase of the new equipment especially important for research groups in medicine basic sciences, pharmacy and pharmacology. Modern equipment has enabled the research infrastructure to be upgraded to ensure the implementation of national and international research grants, as well as collaboration with pharmaceutical industry, and to attract young students to research careers. The co-location in the same building with other UL research institutes, for example, Institute of Atomic Spectroscopy, greatly facilitates interdisciplinary research and scientific environment and more rational (shared) use of equipment and laboratory facilities.

Development potential

Score: 3 – good

The MHSC-UL has a clear developmental plan in the contemporary basic and clinical biomedical sciences. The institution's future strategy is detailed and appropriate and based on a realistic assessment of its strengths and weaknesses, opportunities and threats. The institution has the potential to establish itself as a recognized and respected player in the international scientific community within the given scientific discipline. Given the well-defined management and organizational structure, the scientific infrastructure, interest for involvement of young researchers and attractive/propulsive thematic research priorities, the MHSC-UL has a great potential for future development. The major obstacle might be decreased funding from EU Structural Funds, which should be replaced by funds from national or international competitive grants and/or funds from collaborative applied research with industrial partners, which are not evident in the current period. Overall, the Panel's view is that over the next 5-10 years the institution will be able to strengthen its position in the international scientific community as a convincing actor and a trustworthy partner within international collaboration networks.

Potential to offer doctoral studies

The institution is currently providing doctoral training as a major academic centre in medicine and health sciences in Latvia. The number of awarded doctoral degrees over this assessment period is 30 with around 4-6 PhD degrees awarded per year, most of which were funded through European Social Fund scholarships that were available until 2015. Given the large number of academic staff in the institution, this number is quite low given the potential of a major medical education and research centre and as a consequence the number of PhDs per member of staff is one of the lowest amongst all the other 8 institutions in Latvia assessed by this panel. The main reasons for these low numbers of PhD students are linked to the lack of adequately funded scholarships and the preference of young graduates to seek employment in the clinical sector as a career rather than enrol in a PhD programme when the level of scholarship funding is not adequate requiring employment elsewhere and conducting the doctoral work in parallel with full or part time employment. The quality and quantity of the research is sufficient to support a doctoral programme in most areas and the institution has both the research and the educational and academic infrastructure to support doctoral programmes in addition to links and collaborations with other Universities. For these reasons there is very good potential for doctoral medical education and research as this is one of the main contributor of human capital in medicine and health sciences in Latvia but the availability of adequate funding and support for doctoral studies and the attractiveness of PhD study as a viable career choice must be addressed by the joint efforts of the University in collaboration with the higher education sector and the Government in Latvia.

Alignment with Smart Specialisation Strategies

- There is excellent alignment with RIS3 objectives as MHSC-UL is focused on the fields of medicine and health and in particular on growth of S&T human capital and scientific excellence targeting present and future societal and economic challenges.
- The research foci of the institution are focused on areas that are aligned directly with some of the major RIS3 defined growth priorities and specialisation areas in biomedicine and related technologies, pharmacy and applications of information and communication technologies and data science for the development and exploration of biobanks for human health.
- The work by MHSC-UL is in general contributing to the growth of highly competent human capital by developing researchers and clinicians that are addressing important problems of health and well-being and the challenges of the Latvian health care system by

conducting research and developing innovative personalised technologies and approaches that will benefit the society and the economy.

- MHSC-UL takes action to commercialise its research and this can contribute to the Strategy's priority of development of high added value products.

Conformity with state scientific and technology development

The scientific activities of the MHSC-UL align with the specific objectives of the national science, technology, innovation and education policies in a number of ways, for example:

- The scientific activities relate to important contributions in the fields of medicine and health by contributing to the development of human capital in healthcare and research.
- In collaboration with international partners and targeting innovations in diagnostics and preventative medicine and translating medical research results into clinical practice. These contributions not only conform to the objectives of the state scientific and technology development but also make a valuable contribution to the society and the economy.
- Being based within a university it enables and supports links between and greater integration of medical and health sciences research and medical and scientific education at all levels, from undergraduate to Masters and PhDs.

Recommendations

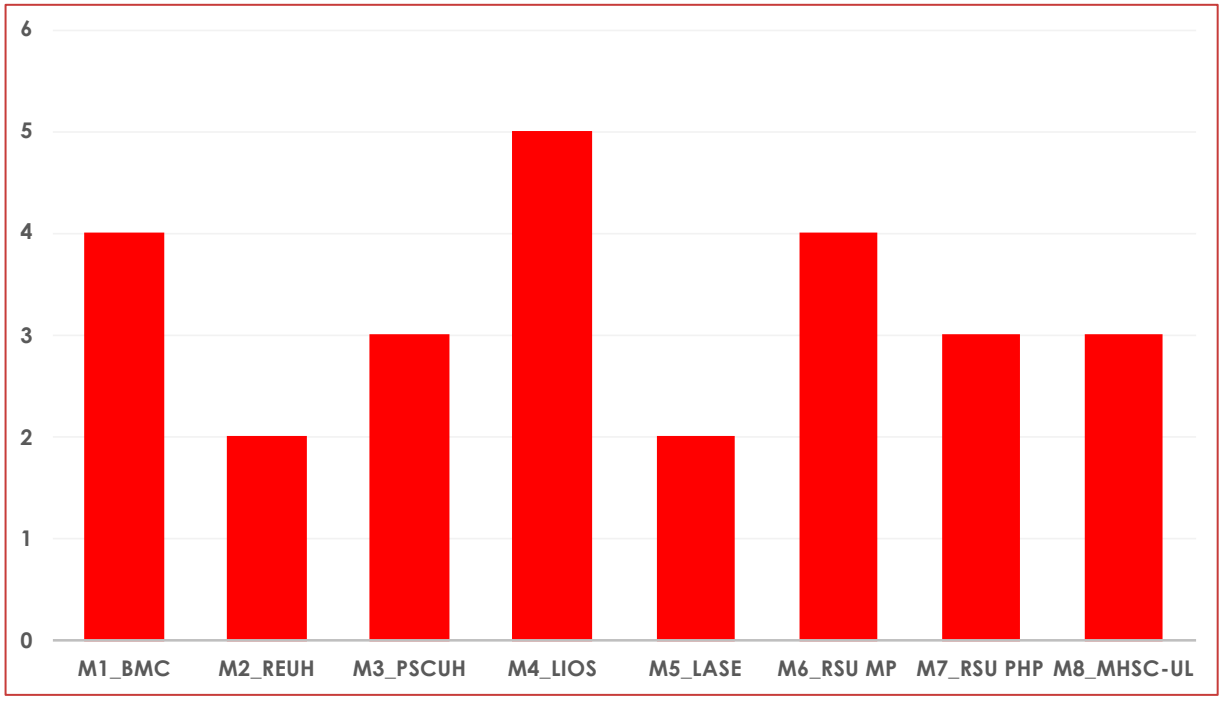
- Increase the number, quality and principal author collaborative publications with international groups in all the different research areas of the MHSC-UL. The high quality publications are exclusively concentrated in only a few areas of the new merged institution that traditionally had a strong research profile so there is a requirement to develop the potential of the researchers in the other research areas and increase the quality and quantity of the publications across the spectrum of the work in MHSC-UL.
- This development of the academic members of staff across all areas of work in MHSC-UL and the necessary collaborations will also require the establishment of a clear relationship with University Hospitals and the appointment of staff to academic and/or clinical research contracts that will allow dedicated time for clinical research alongside their other academic duties.
- Increase knowledge transfer activities from the other major activities of the MHSC-UL in their areas of high-quality research (biomarkers, biobanking, regenerative medicine), since these have not been exploited sufficiently in the reporting period.
- The funding level must be improved by supporting more members of the academic staff and researchers to develop high quality funding bids in collaboration with other strong groups in Latvia, Europe and internationally, as the current level of funding per researcher is one of the lowest amongst the eight units assessed in this panel. In particular, funding from international competitive grants for research, knowledge transfer and economic impact activities is rather limited and this requires a research support and development strategy that is based on cooperation and collaborative bids.
- The national level funding requires the contributions of the Ministries of Health and Education and Government to provide clarity in terms of the strategic health directions and re-establish Health Research Fund or similar funding streams to support research on the identified strategic priorities. The funding needs to support human capital and also help attract foreign researchers or Latvians scientists working abroad with adequate level of salaries and financial support.
- The total number of awarded doctoral degrees (N=30) over this assessment period by MHSC-UL most of which were funded through European Social Fund scholarships are an

important contribution to human scientific capital in medical research but the potential is much higher given the high number of full time academic/research staff. Some of the difficulties with the availability and level of funding from national and European sources were addressed by the institution in their report and these require national effort to ensure an adequate level of funding and increasing the attractiveness of research careers.

- The improvement of doctoral training also requires the improvement of the recruitment, support and examination process of PhD students and the recommended Doctoral Schools platform is going to be a very useful initiative. Recruitment of PhD students to funded projects must be through advertisement and interview process for the selection of the best candidate by a committee comprising the whole supervisory team. The examination and thesis defence process is also too complex and a more appropriate and streamlined system perhaps in line with the Scandinavian or Northern European model will be a useful development.

3 Summary of findings across the set of institutional evaluations

3.1 The general level of quality of research



The Medicine and Health Sciences Expert Panel assessed eight research institutes ranging from independent research institutes to large university platforms and clusters. The overall score for each institute range from 2 to 5 almost evenly distributed around the central score of 3 and reflecting the variability of quality of research performed. It is also, to some extent, due to the evaluation including university platforms or clusters where an average score must be applied to a wide range of research groups within university departments, faculties and internal research institutes.

In the previous evaluation in 2013 sixteen research institutes were evaluated and since that time some institutes have merged, are no longer registered as research institutes or elected to not participate in the current evaluation. This means comparisons with the previous evaluation are not possible in all cases. However, where this is possible, some institutions have improved in terms of the overall score for research performance, some remain the same and one has decreased slightly. Several of the current Panel members also participated in the evaluation in 2013 and were able to see improvements quite clearly evidenced particularly during the visits. The Panel also notes that, in the context of internationally competitive research, effort and development is required simply to retain a consistent level of research quality.

As might be expected, high-quality research largely remains to the same institutes as in the 2013 evaluation. Among the 8 institutions evaluated, one, the **Latvian Institute of Organic Synthesis** (LIOS) **scored 5**, meeting all the criteria of excellence and has the stature of an internationally competitive research institute that is, for example, able to attract outstanding researchers from abroad. Although it also achieved an overall score of 5 in 2013, it has also made significant improvement since 2013 and in this evaluation received a score of 5 for each criteria assessed. The Panel was pleased to see that LIOS had acted on many of the 2013 Panel's recommendations.

Two institutions were **scored 4,** indicating a very research performance and, in the view of the Panel, with a high potential to become competitive on the international field:

- The **Latvian Biomedical Research and Study Centre** (BMC) is a well managed institute with a very good doctoral programme. BMC took heed of the 2013 recommendations and established an International Scientific Advisory Board that meets every two years to assess and advise the institute. This Board is definitely an important step forward and will continue to help BMC improve the quality of its research. An effort in governance and management was also made by concentrating existing equipment in dedicated core facilities, providing specific training (e.g. in bioinformatics, which includes cooperation with the Institute of Mathematics and Informatics of the University of Latvia) and opening a Biomedical Technology Complex in 2016 that hosts animal facilities, cell culture and a Bioinformatics Core Facility.
- **Riga Stradins University Platform of Medicine** (MP) has made considerable efforts to improve since the 2013 evaluation and improved its overall score from a 3 to a 4. Since 2013 it has invested in and improved its research infrastructure and strengthened its research management and administrative support systems, including a technology transfer office (TTO), improving support to researchers for grant submission preparation, project implementation and research exploitation.

Three Institutions were **scored 3**:

- **Riga Stradins University Platform of Public Health** (RSU PHP) is a recently created organisational structure to coordinate and manage research within the university. While small, it has a reasonably high level of research income €11.6M in 2018 and a relatively high volume of research outputs. Its research performance is good and it is a strong national player and has the potential, within the strong and supportive management structures, to improve its performance in the coming years.
- **University of Latvia Medicine and Health Science Cluster** (MHSC-UL) Since 2013, University of Latvia took several actions to improve the research environment and critical mass which led to notable improvements in research facilities and infrastructure as well as in the overall scientific and academic environment. Although a large institute where the overall score is, by necessity, an average of performance, the Panel notes that the score is driven by a small number of specific groups who produce the majority of the research outputs.
- **Pauls Stradins Clinical University Hospital Research Institute** (PSCUH) have interest in several research directions on: personalised medicine; regenerative medicine; heart and cardiovascular diseases; disabling diseases, endocrine diseases; peripheral vascular diseases; oncology; and orphan diseases. This score is a reduction from a score of 4 in the previous evaluation. The Panel considers that limited change and development has occurred since the previous evaluation and (as for Riga East University Hospital) there are considerable deficiencies in the PhDs undertaken by medical staff.

Two Institutions were **scored 2:**

- **Riga East University Hospital** (REUH) plays an important role in the education of medical doctors and other medical professionals in Latvia and supports the delivery of good quality healthcare to Latvian citizens. This is its key role, but it also contributes to scientific research and international treatment studies and in doing so, contributes to the development of human resources in science and technology to some degree. However as stated above, this role could be greatly enhanced but it requires sufficient drive from within the hospital and research leadership teams to do this. As for Pauls Stradins Clinical University Hospital Research Institute there are considerable deficiencies in the PhDs undertaken by medical staff.

- **The Latvian Academy of Sport Education** (LASE) is a specialist academic and professional state higher education and science institution. It is the only institution of sport science, exercise and health in Latvia with a large number of academic staff that has been providing the physical education and coaching courses in Latvia and the sport science support for Olympic sports. It has improved its overall score from a 1 in 2013 but retains a national and rather inward-looking focus.

3.2 Key strengths and areas of particular interest

The Panel was pleased to see improvements from the previous evaluation across most of the institutes evaluated. Publication in international journals is increasing, research facilities have been upgraded across the medical and life science fields using European Structural Funds and in several cases the leadership and management of research (in terms of research strategy and operational support) has also improved.

Particular areas of strength within the institutes include:

- **LIOS** increased its international visibility in succeeding in becoming a full member of EU-OPENSCREEN, increasing the number of publications in quartile 1 (Q1). Excellence was also evidenced by the bidding for more than 60 EU projects and winning and participating in 11 - a high success rate that attracted international researchers into Latvia and appears now as a regular partner for the highly science driven pharmaceutical sector.
- **BMC** with the Latvian Genome Database (LGBD), occupies a very good position at the international level evidenced by participation to large genome consortium. On the innovation field emerged the promising research on the use of plant viruses and virus-like particles for the creation of novel vaccines developed by Prof. Andris Zeltins.
- **RSU-MP** is developing a particularly good niche which is the development of new antibacterial agents (Re-introduction of Phage Therapy in Military Medicine, NATO-STO activities HFM-ET-174, HFM-RTG-313), studying the efficacy of bacteriophage therapy in cases of resistant bacterial disease. In dentistry, excellent management, in particular due to Prof. Ilga Urtane, who wisely invests clinical revenues in research equipment and consequently attracted excellent PhD students enabling the Institute of Stomatology to occupy a leading position in research in dentistry and stomatology in Latvia internationally recognised.
- **PSCUH** is an attractive partner in international collaborative follow-up clinical studies. Many of these studies have resulted in publication in top-ranked clinical journals such as Lancet and NEJM although PSCUH does not lead this research and is not the first second authors on these publications.
- **RSU-PHP** has an increasing number of papers published with a very good impact considering the research area. Research topics are multidisciplinary, focused on health issues relevant to Latvia. RSU-PHP does also participate and contribute to international public health research.
- **MHSC-UL:** Modern equipment has enabled the research infrastructure to be upgraded to ensure the implementation of national and international research grants, as well as collaboration with pharmaceutical industry, and to attract young students to research careers. The co-location in the same building with other UL research institutes greatly facilitates interdisciplinary research and scientific environment and more rational (shared) use of equipment and laboratory facilities. The institution's interactions with the public sector/the public stand out in terms of their extensive and dynamic nature.

- **REUH:** Research that is published in international journals deals almost exclusively with multiple-centre treatment studies. These studies are often of very good quality, but REUH does not play a leading role in them.
- **LASE:** Progress in improving the research infrastructure and facilities through some diligent and focused investment of European Structural Funding and an organisational re-structuring of research units and laboratories and the launch of a new research centre.

3.3 Main weaknesses

While the publication in international journals is increasing, the Latvian institutes are rarely the first author which indicates they are not the lead researchers in collaborations. In clinical research for example, Latvian institutes play an important role as a trial location in multi-centre clinical trials (providing access to patients) but their contribution to the intellectual content of the research is rather limited. This restricts the ability of Latvian medical research to have impact on the international scientific and medical communities.

The improvement of research quality for the future is, to a large extent, dependent on the quality of the younger generation of researchers and therefore the Panel placed considerable emphasis on PhD training. Structured doctoral training programmes that not only provide teaching and research support but that also allow PhD students to interact, learn from each other and potentially collaborate are not, in general, in place. Though the Panel notes that this is type of system is under development at the current time. PhDs conducted by medical staff are particularly concerning. In the university hospitals it was difficult for the Panel to understand if PhD students actually spent at least three years full time on research. It was often not clear who their scientific supervisors or promoters were or who was following-up the progresses made by the PhD candidates. The main explanation received from those responsible for PhDs and research in the institutions was that the PhDs students were excellent MDs working as full-time residents with all the clinical requirements, implying that their PhD research is conducted 'on the side' alongside their clinical duties. The development of an infrastructure for academic activities in the university hospitals and the PhD training of medical students and young MDs in a clinical setting have been neglected. These important parameters lag decades behind the standards set for infrastructure and PhD training in most West European countries and does not appear to follow the Bologna Process. This is a serious drawback for all medical research programs in Latvia.

This lack of well-structured research programmes was also evident in the meetings with clinician-professors and we were not able to determine exactly how much of their time is spent on research. Such an ambiguous situation impairs the quantity and quality of research. In general, the model where the 'university hospitals' in Latvia are independent research units is not an effective or efficient approach to enhance clinical research quality. University hospitals in most countries are clinical facilities affiliated to a specific university that has oversight and responsibility for the academic standards and work of the hospital in medical student training and clinical research. Academic clinical staff appointed as professor in the university normally have a part-time clinical appointment so that the balance of their clinical and academic/research work is divided appropriately between the relevant university department (Medicine or Health) and the university hospital. The model of the independent 'university hospitals' in Latvia that have no association with a university alongside full-time clinicians are required to conduct research on top of their full-time clinical duties without any oversight, monitoring or support from a university's structures is leading to capacity and governance issues that affect the research quality, capability and sustainability of these units in the long term.

Latvia lacks an infrastructure for Phase 1 clinical trials - the first trials of a new drug in humans and the foundation of a successful clinical drug development process. Having access to such

an infrastructure provides better control of intellectual production and the valorisation of drugs and vaccines developed within the research system.

Within individual institutes particular areas of weaknesses are largely linked to the weaknesses described above:

- Where **LIOS** and **BMC** are concerned: there is a lack of multilateral agreements with Latvian universities for managing an effective joint doctoral programmes and neither have access to Phase I clinical trial infrastructure in Latvia.
- There is scope for greater sharing of key research infrastructure between institutes. In particular several institutes – **LIOS, BMC and RSU-MP** - could benefit greatly from access to a cryo-Electron Microscopy system, an expensive piece of research equipment that could be shared.
- The university hospitals **(PSCUH, REUH)** are insufficiently linked to the research institutes and there is much to be gained on both sides through better linking of research skills and knowledge to clinical practice both as a route to research application and trials but also as source of interesting research questions.
- There appears to be inertia within the university hospitals **(PSCUH, REUH)** and, to some extent, at **RSU-MP** to improve the PhD programmes for MDs. Without this the quality of the medical research will not improve. Linked to this, at **REUH** there are almost no dedicated research staff (reporting 0.39 of an FTE) indicating that research is not a priority at the hospital.
- **RSU-PHP**: the number of researchers is too small across the four sub-units to achieve critical mass in any one research domain.
- **MHSC-UL:** the examination and thesis defence process is too complex and a more appropriate and streamlined system perhaps in line with the Scandinavian or Northern European model will be a useful development.
- **LASE**: has limited links with medical schools, engineering and ICT departments and industrial partners that would be mutually beneficial, increasing the quality of research at LASE, bringing in new ideas and concepts, as well as providing an interesting application domain for external researchers.

3.4 Conclusions

Since the evaluation in 2013, many general improvements in terms of concentrating research infrastructure and strengthening research management has been achieved. For most of the institutes the quality of research has improved as indicated in by the key indicator of increased number of publications made in high impact journals.

Research facilities have been upgraded using European Structural Funds but the quantity and quality of researchers needs to continue to improve to maximise the benefit of these investments in research infrastructure. This requires not only an overhaul of the doctoral programmes but continuous improvements in the capabilities of researchers leaders and managers to develop and implement research strategies. A particular concern is the gap between clinical research and basic research with no clear PhD programme or rules established for MDs performing PhDs.

Economic impact is limited to a large extent by the small size of the Latvian economy but the high-quality research institutes do have connections with national and international companies such as those in pharmaceutical development. In social impact terms, the institutes are well-connected into the relevant national Ministries and medical providers.

3.5 Recommendations

- It is strongly recommended to introduce in each institute (including university platforms and clusters and the university hospitals) an International Scientific Advisory Board. This International Scientific Advisory Board should be an independent body composed of four internationally recognised scientists tasked with helping the institute develop scientific strategies and providing independent assessment. Such a board should receive a biannual Progress Report from the institute with detailed activities description of each group, core facilities and overall management and strategy for the next years. This Advisory Board should meet every two years, with renewed membership every four years, and hold face to face detailed meetings with group leaders, managers, researchers and PhD students.
- It is strongly recommended that all PHD programmes align with the Bologna Process and the Panel takes the view that it is indeed urgent that institutional, structural and cultural changes must occur to ensure alignment with Bologna. This is particularly important for PhDs undertaken by MDS as the structure at present is far from the spirit and rules of Bologna and the quality of PhDs is quite low. A number of key issues to address include (but the list is not exhaustive):
  - One important issue that must be addressed is the oversight of PhD work by a supervisory team composed of 2 or 3 academic supervisors as it was evident that in many cases there is only one supervisor for each PhD student. This is not recommended as it is not best practice and it reduces the opportunities for collaboration and for developing a culture of collaboration. Younger and less experienced academics that do not have supervisory experience must be given opportunities to develop their supervisory experience as members of supervisory teams before given responsibility as main supervisors of a PhD student.
  - We recommend to clearly re-establish rules within the university hospitals in order to support and enable quality research. The Panel's view is that the main issue to be targeted is the current situation whereby PhDs are undertaken in addition to being employed also full time by the hospital as clinician.
  - Research development and support programmes for PhD students and early career researchers are required to enable them to develop their generic research skills such as writing high quality papers and grants, effective communication and public engagement as well as to plan their research career. As present these types of facilities are variable amongst institutions or non-existent in others. Since most institutions in Riga are geographically close, there could be central support and research development programmes organised jointly by all the universities by pulling resources and collaborating for each contribute in their areas of strength and expertise. Such a central resource would benefit all PhD students and young or early carer researchers especially in institutions that are less experienced in research or they do not have well organised centralised administrative and researcher support departments. Most modern successful universities have dedicated Doctoral Academies or Graduate Schools that provide support and development of research skills for all the PhD Students in the university.
  - One possibility/proposal to improve both the selection and supervision and funding of doctoral researchers could be to emulate what is done by other countries. For instance, in Belgium at the Erasmus University Hospital, a Foundation has been launched in 2000. Its function is 1) fund raising from private sectors and 2) making calls for MDs candidate for PhD. A selection committee made of university professors nominated by the Foundation board selects the best research proposals (to be implemented within the research structure of the Erasmus hospital) submitted by the candidate. The grant covers a salary for 2 years. It is agreed with the hospital and the Faculty of Medicine

that these 2 years count for their residency period (4 years) needed to get their accreditation as specialist. There are also national level organisations that coordinate the standards and programmes for doctoral training and early career researchers (ECRSs) throughout the country e.g. the Vitae organisation in the UK (https://www.vitae.ac.uk/ and https://www.vitae.ac.uk/policy/concordat-to-support-the-career-development-of-researchers) in collaboration with funders such as research councils and employers of researchers in academia and industry.

  - The doctoral thesis defence model also appears to be too complex and perhaps a process followed in other countries in Scandinavia or the UK could offer possibilities to enhance the process and improve the experience for the PhD student and supervisory team.

- To improve the research infrastructure for several institutions it is recommended to acquire a Cryo-Electron Microscopy system, an expensive (about 6 millions Euros) research equipment to be shared between the 3 best Institutes (LIOS, BMC, RSU-MP). This equipment supports breakthroughs in producing detailed maps of molecules such as membrane-bound proteins which are implicated in disease and serve as target for drugs. We recommend this equipment, that requires a specialized lab that minimizes vibration (in particular) and that costs thousands of Euros each day to run (see Nature, Vol 578, 13 February 2020, page 201) should be installed in the LIOS campus subject to a thorough site review for suitability.
- A thorough review and re-design of the role and capabilities of the university hospitals in clinical research to ensure they can play a full role in the medical research system. The fully rounded and comprehensive medical research programme is not possible without access to patients and the involvement of clinical researchers - as this provides not only access to patients for medical trials but is also the source of interesting new research questions and hypotheses. The review and re-design should address the infrastructure and environment for academic research within the hospitals (including physical facilities, research strategies, support services, dedicated time for research); PhD training for MD; links between the university hospitals. Such a review would benefit from international expertise and advice both from countries with well-established medical research systems as well as those that have more recently been through a similar process to improve their national systems.
- In addition to the re-design of the role of university hospitals in medical research system, to elevate clinical research in Latvia to the next level, it is necessary to establish a Phase I clinical trials infrastructure (perhaps based at the Riga Stradins University Medicines Platform as the institute may be best placed to bridge the academic-university hospital 'divide'). This can only be successful if a high-level committee is established and dedicated to this challenge. It should be composed of appropriately qualified scientists and authorised officials from the Ministry of Research and Education, the Ministry of Health and the Ministry of Economy to work collaboratively.
- It is recommended to re-establish competitive research funding by the State through the "National Research Programme for Health" under the various Ministries as these schemes were considered very successful and can be targeted to the national science priorities and specialisation areas. This will help to provide the required clarity from the Government for the strategic directions in health and scientific research and can facilitate the attraction of established researchers and promising post-doctoral scientists from abroad to return and work on those priorities in Latvia.

Appendix A Feedback on Panel Assessment

A.1. Feedback received from Pauls Stradins Clinical University Hospital Research Institute

PAULA STRADIŅA
KLĪNISKĀ UNIVERSITĀTES
SLIMNĪCA

Riga

February 1 2021

Objections and supplements for the draft of individual international assessment report for the activities of a scientific institution

DISCLAIMER:

Until February 1 2021 the Research Institute of VSIA 'Paula Stradiņa klīniskā universitātes slimnīca' (Pauls Stradins Clinical University Hospital) has not received written answer (except short e-mail from Ms. Anete Vingre on December 25 2020) to our letter No. 15-5.2/1957 of December 29 2020 and any documents justifying opinion of the expert group.

Furthermore we have not been familiarized with final version of the report.

Thereby objections below refer to the draft of the report downloaded on National Research Information System on December 16 2020.

The Research Institute of VSIA 'Paula Stradiņa klīniskā universitātes slimnīca' (Pauls Stradins Clinical University Hospital ('Institute') has reviewed the file 'Stradina slimnica.docx' located in Section 'Scientific institution international assessment', Subsection 'Individual reports' of the National Scientific Activity Information System ('NZDIS').

We would like to direct your attention to the fact the file does not meet the requirements of Chapter 2 of Cabinet Regulation 558 'Procedures for Drawing up and Preparing Documents' of 4 September 2018, as the document lacks a title, does not specify its author or date, and does not have a signature. We have been informed that an assessment by public health and medical experts has been uploaded to NZDIS, and, thus, we assume that the contractor selected as part of a public procurement procedure of the Ministry of Education and Science to provide the service of arranging the international assessment of scientific institutions, Technopolis Group Eesti OÜ (registered in Estonia, with a share capital of EUR 2500), considers the document uploaded without a title to NZDIS to be the assessment report on the results of the activities of a scientific institution ('report'), as defined in Section 9.5 of Cabinet Regulation 619 'Procedures for Organising the International Evaluation of Scientific Institution Activity' ('Regulation 619') of 2 October 2018.

We would like to point out that Section 4 of Regulation 619 determines the procedure for developing and approving the assessment methodology. However, it does not regulate the scope and the procedure for submitting and assessing report objections and additions specified in Section 10 of Regulation 619, which is why Section 5.2 of the Methodology for the International

Assessment of Scientific Institutions ('Methodology') approved by Order No 1-2e/19/344 of 4 December 2019 and Order No 1-2e/20/311 of 12 October 2020 of the Ministry of Education and Science, stating 'Expert Panels will consider feedback on factual information', unreasonably restricts the scope and procedure for submitting and assessing objections and additions regarding the submission and assessment of reports, thus deviating from the legal scope and purpose of Section 10 of Regulation 619.

In accordance with Section 10.1 of Regulation 619, the Institute submits its objections and additions regarding the report.

1. Overall Score

Annex E to the Methodology states that it includes compliance with the national goals for scientific and technological development, and a qualitative assessment of development in education and innovation.

The conclusions provided in the overall score do not have these evaluations, and the statements there do not match the positive assessment made in the sections 'Compliance with the national smart specialisation strategy' and 'Compliance with the national scientific and technology development'.

The Hospital received a score of 4 in the 2013 assessment. Since 2013, the Hospital has seen significant achievements and improvements in all the assessed criteria.

Neither the overall score, nor the other sections of the report mention the creation and operation of the Hospital's Scientific Institute as a separate division with its own research staff and infrastructure, as described in the self-assessment, and explained in detail during the on-site visit by the experts. Furthermore, the following aspects saw qualitative and quantitative improvement during the reporting period:

1) number of publications and other results of scientific activity;
2) significant improvements in research infrastructure, demonstrated to the panel experts during their on-site visit;
3) more and better local and international cooperation with other scientific institutions and businesses;
4) more extensive and profound impact of the Hospital in social and economic fields.

Each criterion of the assessment and the corresponding evaluations are commented and objected against below.

Because the overall score is lower than that of the 2013 assessment, and in view of what is set forth above and below in this paper, we would like to receive a clear, detailed and accurate explanation for the score, with a list of assessment criteria that scored lower in our work, i.e. where our performance has become worse. This request includes all assessment criteria.

2. Quality of research

This section does not explain or justify the following note in the third sentence: '*in view of the poor research infrastructure, weak doctoral study programme, and little support from the University*'.

The research infrastructure has significantly improved since 2013, with the only modern out-patient unit for clinical research in the Baltics, the new Cell Transplantation Laboratory, as well as modern diagnostic and other medical technology set up in the clinical units and used in research. This is stated in Section 1.13 of the self-assessment, and was presented to the experts during their

on-site visit. For this reason, the infrastructure being described as becoming 'poor' since the last period's assessment (with a score of 4) not only lacks objectivity, but also makes one suspect that the experts were either incompetent, or deliberately ignored the information provided in the self-assessment and during the on-site visit.

Annex D to the Methodology lists the relevant policy documents and regulations, including a number of external regulations governing the activities of the education system in Latvia. In accordance with Section 45 of the Education Law and Section 3, Part 3 of the Law on Higher Education Institutions, universities are in charge of running doctoral study programmes. The Hospital is not a university, and is not a division or otherwise legally related subject of one. Multiple remarks about the 'weakness' and deficiencies of the doctoral study programme made in the report suggest that the experts must have improved their understanding of the way doctoral study programmes are conducted in Latvia and what entities run such programmes, and this process before taking charge of the assessment.

Regarding the 'little support from the University' comment: no explanation is provided, though the statement itself suggests that the experts do not understand the legal status of university hospital, and the legal nature of their relation to universities, based on the principles of cooperation in various obligations and business activities.

A clause in the last sentence of this report suggests the experts' possible biased view in assessing the publications. It is well-known in the academia that the leading authors of publications in journals with high citation rates largely come from countries and research centres that can provide incomparably more scientific resources that what is available in Latvia. With this approach, any work or contribution done by an author from a smaller country or a smaller medical research centre can be by default, and mistakenly, assessed with such a comment.

Taking into account the quantitatively limited capacity for producing research results specified in the self-assessment form (10 to 15 publications), in Section 3.3 of the self-assessment we listed 22 publications, of which 14 have the Hospital's researchers whose names were included in the list of authors before the list of global researchers. Thus, the allegation that the Hospital's staff do not lead such research, and are not the first or the last authors in their publications, is false.

Regarding the involvement of the Hospital's researchers in international academic organisations, their participation in such forums, international projects, as included in Sections 3.1, 3.2, 4, 5 and other Sections of the self-assessment, the score of 3 is inexplicable.

Table 8 of the Methodology provides a description of assessment criteria. For a score of 4 it states:

The Institute is a strong and internationally important entity. The research conducted by the institution maintains a very high standard of quality in terms of originality and significance. Such work can attract much interest in international academic cooperation, and may be published by international publishers or journals with the strictest standards of publication (regardless of the language or location of the publication).

This section is another part of the report, for which we would like to get a clear, detailed and accurate explanation of the score given (3), with a list of criteria that scored lower in our work, i.e. where our performance has become worse, compared to the previous score of 4.

3. Impact on the scientific discipline

The only argument mentioned with the score in this section (2) is that the overall impact on the scientific discipline is limited, because a major proportion of the research is not managed by Hospital employees.

The self-assessment, and this paper (above) provide factual information about the participation of Hospital employees in global research and managing such research. International research and the impact of the assessed subject on the scientific discipline should not be assessed only based on whether the research institution has led a study or not; instead, the assessment should take into account the actual intellectual and research contribution to the project in question. In addition to the above, Section 6 of the self-assessment should have given the experts a general overview of the research work done by the Hospitals staff, which is extensive in scope and variety.

We were happy to see the praise of our research into cardiovascular diseases and their treatment; however, it is worth noting that during the reporting period, there have been international and important studies and high-quality publications in many other disciplines of medical science (e.g. infectiology, ophthalmology, endocrinology), and there is absolutely no justification for leaving the outside the scope of the report.

In Table 9 of the Methodology, the score of 4 includes the following comment:

The Institute is a strong and internationally important entity. The institution is internationally recognised in its discipline, and praised as a partner in international research projects and networks.

The information about the participation of the Hospital in international studies, publications, large number of presentations at scientific forums, as well as the work of its employees in international industry organisations provided in the self-assessment clearly demonstrate the position of the Hospital among the leaders of opinion in its industry, of its international recognition in its discipline, and of its being a highly appreciated partner in international research projects and networks.

The score of 2, which is two less than in the previous assessment, is described in Table 9 of the Methodology as follows: *The Institute is an acceptable entity of national significance. The institution maintains a stable position among national research entities. The position of the institution among international researchers is still changing; the institution must work to achieve the status of a recognised entity in its discipline; its influence on the international researcher community is undetermined.* This not only clashes with the information presented in the self-assessment, but is also unacceptable without clear, well-reasoned argumentation based on the information provided to the experts, and is a sign of low quality of the work done by the experts.

4. Economic impact

In this criterion, the Hospital received a score of 3, which according to the report is based on the fact that it was not clear to the experts, how much of the income gained from research was reinvested into more research. If the experts failed to understand this based on the information provided in the self-assessment and as part of the on-site visit, the Hospital does not have the means to explain the matter even further anymore. However, let us use the opportunity to repeat ourselves: all the income gained from research is reinvested into developing the research.

Like in the other criteria, the score received here is lower than that for the previous reporting period, and like elsewhere, we would like to receive a clear and accurate

explanation as to what has reduced the economic impact of the research performed by the Hospital, despite the fact that all the measurable financial and business indicators have increased.

5. Social impact

Section 1.3 of the self-assessment provides a detailed description of the Hospital's impact on the Latvian public, including residency studies for young physicians, measures for educating patients and professionals, and active participation in improving public health. The Hospital is the key player in clinical medical science in Latvia. Its employees are the industry's leaders of opinion. So, it is not clear here what a scientific institution must be like if it is to receive a higher score in this criteria than what has been given by the experts. It is also worth pointing out that the comment to this score does not provide any rationale for it, with an incomplete and narrow description of the scope of activities of the Hospital, which is not sufficient to represent the entirety of the Hospital's effect on the general public.

The social impact of the Hospital has not gone down since the last report; it has actually risen, and this fact becomes clear if one reads the self-assessment. Nevertheless, the score is lower. This is another criterion, in which we request an explanation for the reasoning behind reducing the score.

6. Research environment and infrastructure

Table 11 of the Methodology offers a clear description of this criterion; however, the report does not review or assess everything that the Methodology requires, as a result of which the conclusions made and the corresponding score are incomplete and unprofessionally prepared.

The score description does not even mention the way the management of research projects is organised at the Hospital. This is particularly noteworthy, because it was during the reporting period that the Research Institute of the Hospital was created, with its separate infrastructure, funding and research staff. This approach to organising research was not there during the previous reporting period, which produced a score of 4. And now, we see a reduction in the score.

Please clarify and provide more details about the report's statement that overall, the research infrastructure is impeded by many structural/organisational circumstances. Please name these circumstances, and the sources for the information that led to such a statement. We also do not understand the last part of the first sentence in this section's second paragraph ('*..with academic research activities clearly "protected"*').

There is also no detailed explanation as to the criticism that the research environment and infrastructure was far behind what would be expected from a European academic hospital. While we do agree that any environment or infrastructure can be, and should be, improved, and that this process of improvement never really ends, we cannot accept the reference to being 'far behind', especially in view of the major investments and improvements that have taken place in recent years, and which are described in the self-assessment and were shown to the experts during their on-site visit.

It is not clear what sources led to the false statement made in the report that the Hospital's employees with official academic positions in universities (note: the Hospital does not have the positions of a professor and academic professor, because these positions are limited to the academic staff of universities, as per Section 27, Part 1 of the Law on Higher Education Institutions) do not have research activities in their job descriptions. Research is included in job descriptions. Thus, this section's second paragraph only is only partially true.

Section 1.1 of the self-assessment states that: 'The number of PSKUS employees with a doctoral degree in science is approximately 100'; Section 4.2 lists 36 doctoral degree papers defended by Hospital employees during the reporting period. Please explain the reasoning for the comment '*...the lack of researchers with a doctoral degree has a direct impact on the capacity to undertake high-quality research in the future...*' in the report. **Conclusions based on assumptions and falsehoods must not be used as the basis of an expert report.**

As pointed out above, in accordance with the Latvian laws that govern education and science, the Hospital does not run any doctoral study programmes on its own, and only participates in them, because preparing and defending a doctoral paper, and then receiving a doctoral degree in medical science is impossible without conducting research in clinical medicine. This is why the criticisms of the lack of funding for a doctoral study programme found in the report are so mystifying.

The comparisons with European hospitals drawn in the report would make sense if they were specific, naming the exact hospitals the comparisons are based on.

According to Table 11 of the Methodology, the descriptive part of the report must also include the following assessment factors: access to and quality of support services, research infrastructure, databases, utility staff. These factors were not even mentioned, let alone assessed, which leads to the conclusion that in preparing the report, the experts either failed to acquaint themselves with the self-assessment (Sections 1.11– 1.14), or ignored it deliberately.

7. Development potential

The beginning of this section of the report only provides a positive description; nevertheless, the score was reduced compared to the previous one, despite clear improvements in planning, cooperation on different levels, infrastructure, all of which constituted good potential for development. Because this section does not include any criticism, and only presents a reduced score, it is difficult to make any comments about it, except for certain conclusions about the manner, in which the report was drafted. It is unclear what the report's authors thought by saying: 'This is a good starting point for development, and it may require making complex decisions that could be problematic for some employees.'

The Hospital does not run any doctoral study programmes, or develop them, and only participates in implementing them. This is why we cannot comment on the criticism regarding the quality of doctoral studies, because it does not pertain to the Hospital. We cannot agree with the assertion that the doctoral study programmes are on the level of master's studies. This statement made in the report is unjustified and inappropriate.

8. Recommendations

The authors of the report point out that the same recommendations were prepared for both the university hospitals. Therefore, we have concluded that Technopolis Group Eesti OÜ has not met the requirements specified in Sections 3.2.13 and 6.2.8 of Annex 2 'Technical Specification' to the regulations for the open tender 'Organisation of an international assessment of scientific institutions' (procurement identification number IZM 2019/22/AK), namely, breaching its obligations to the client (the Ministry of Education and Science) established in the procurement contract.

The recommendations included are intended for policymakers in education and science, and have little to do with the entity assessed. Overall, we can agree with individual recommendations; however, they cannot be implemented without the assent and initiative of the Ministry of Education and Science.

The biggest part of the recommendations is devoted to the problems and development of doctoral study programmes. We have already explained our position regarding doctoral study programmes in Items 2, 6 and 7, and there is no need to repeat ourselves. The Hospital actively participates in medical doctoral study programmes and will continue to do so; however, it does not run these programmes itself, which is required by law. If a discussion arises about the possible reform of doctoral studies in our country, the Hospital will take part in these processes.

In the recommendations for the Hospital, there was no need to include a very critical comment that is unacceptable for international academia, namely *'The development of infrastructure for academic activities in university hospitals and clinical training of students as part doctoral study programmes in medicine has been completely neglected everywhere in Latvia'*, which, in what pertains to the Hospital, is clearly not based on the information provided to the experts in the self-assessment (Sections 1.2, 1.10–1.15) and as part of the on-site visit.

In their recommendations, the experts included the inflammatory statement *'These important parameters show a gap of almost 50 years compared to the infrastructure and doctoral study standards adopted in most West European countries.'*, which is not explained in detailed, and does not refer to any particular facts. In view of the fact that this and other similar points included in the recommendations are intended for the leading government body in education and science, i.e. the Ministry of Education, we request that the statements of the ministry experts be taken into account, assessed, and, if found to be justified, used in making future science policy.

The next statement provided in the recommendations suggests a lack of research locations, and interesting and important research fields arising from clinical practice, which is another sign of the experts not having read or understood the information provided in Sections 1.2, 1.10–1.15, 4.2, 6.1 and 6.2 of the self-assessment. The Hospital works both on internal and international studies, which (as pointed out in Item 2 of this paper) cannot be described solely as *late-phase multi-centre studies led by other entities.*

Medical science, just like any other science, is based on international cooperation, working on common projects, and sharing research results. The Hospital does not seek to reject the path it has taken in developing its research. At the same time, Sections 1.2, 4.2, 6.1 and 6.2 of the self-assessment list a large number of research projects initiated and conducted by the Hospital's scientists, and we would like for the experts to provide a detailed explanation as to why the statement that 'for as long as researchers in Latvia have to import ideas, problems and fields, in which to conduct research, from abroad, it will be difficult to achieve top international standards' was included in the recommendations part of the report.

We can partially agree with some of the short-term recommendations. The Hospital implemented some of these (specified in Item 1, partially 3, not numbered in the text (●)) during the reporting period, through its strategic documents and in its day-to-day operations. Thus, failing to include these in the experts' recommendations excludes a significant amount of added value produced, and obviates the purpose of these recommendations, i.e. improving something, because the recommendations were implemented before they had even been drafted.

Item 2 (not numbered in the text) of the short-term recommendations proposes considering the establishment of a multidisciplinary and international advisory board. According to the experts, *with extensive experience organising, managing and conducting excellent clinical research that involves universities, research institutes and hospitals (i.e. the entire medical research ecosystem), a board like this could be useful in supporting the process of change.*

There is no explanation as to whether this advisory board should be established within the Hospital or outside it, in order for it to be able to operate within the change processes taking place in national medical research. Because no clear and specific changes are recommended for the Hospital, we assume that such a board is to function outside scientific institutions. The Hospital is ready to engage in a discussion regarding this matter. The establishment and activities of such a board must organised in accordance with the law, with absolutely clear goals, functions and responsibilities, and a work result that can be clearly defined. Otherwise, creating and maintaining this body would not produce any results.

9. Conclusion

In conclusion, we would like to summarise the opinion expressed in this paper.

The self-assessment form has Section 1.17, which covers the measures implemented as a result of the 2013 assessment. The report does not devote any attention to it. The international assessment of the activities of a scientific institution must be done in view of the previous assessment, because this is how the long-term development of the institution can be evaluated.

The report does not mention the previous international assessment, or the conclusions made in it, at all. What is particularly surprising here is the fact that three experts of the expert panel were members of the expert panel in the previous assessment. In our opinion, the composition of the panel made it particularly capable of assessing the progress the Hospital has achieved in research; nevertheless, the score has fallen in all criteria.

It is for a good reason that the legislator included the information that an international expert report must contain in Section 41, Part 1 of the Law on Scientific Activity, meaning that the legislator intended to define it on its own, and not to delegate this to the Cabinet. Thus, the legislator maintains that long-term, the international assessment must not change in its basic form and function, even if the methodology for conducting it may be amended.

We believe that the approach taken by the experts, which is based not on the Hospital's achievements and deficiencies, but on the circumstances that the Hospital cannot control (e.g. legislation, our country's population, national budget, national education and science policy), to be unproductive and superficial. We cannot accept the position that the experts of the panel can make an assessment without serious argumentation, while the Hospital must prove that the assessment is unjustified. This approach is unethical and even offensive to the research staff of the Hospital. We believe that the assessment approach should focus on the actual recipient of the service (the subject assessed), and on producing dialogue.

Reading some of the sections of the report gives an impression that **the experts refused evident facts that the self-assessment offers a detailed explanation of, in order to come to conclusions that allow one to reduce the score.** In multiple sections of the report, the quality of the experts' work is absolutely inadequate, something that one does not expect for internationally recognised experts. **Certain conclusions and assessments are prepared in a way that devaluates the goal and purpose of conducting international assessments of scientific institutions.**

We believe that Technopolis Group Eesti OÜ and the experts must perform a detailed review of our self-assessment, the documented materials of the on-site visit, and the facts and arguments provided in this paper, and correct their report and their assessments.

Director of the Research Institute Prof. D. Krieviņš