



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL
TRAINING AT THE UNIVERSITY OF HELSINKI 2005–2010

RC-Specific Evaluation of P-Molmed – Personalized Molecular Medicine

Seppo Saari & Antti Moilanen (Eds.)



Evaluation Panel: Medicine, Biomedicine and Health Sciences

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Title: International Evaluation of Research and Doctoral Training at the University of Helsinki 2005–2010 : RC-Specific Evaluation of P-Molmed – Personalized Molecular Medicine	Type of publication: Evaluations
Summary: Researcher Community (RC) was a new concept of the participating unit in the evaluation. Participation in the evaluation was voluntary and the RCs had to choose one of the five characteristic categories to participate. Evaluation of the Researcher Community was based on the answers to the evaluation questions. In addition a list of publications and other activities were provided by the TUHAT system. The CWTS/Leiden University conducted analyses for 80 RCs and the Helsinki University Library for 66 RCs. Panellists, 49 and two special experts in five panels evaluated all the evaluation material as a whole and discussed the feedback for RC-specific reports in the panel meetings in Helsinki. The main part of this report is consisted of the feedback which is published as such in the report. Chapters in the report: 1. Background for the evaluation 2. Evaluation feedback for the Researcher Community 3. List of publications 4. List of activities 5. Bibliometric analyses The level of the RCs' success can be concluded from the written feedback together with the numeric evaluation of four evaluation questions and the category fitness. More conclusions of the success can be drawn based on the University-level report.	
RC-specific information:	
Main scientific field of research: Medicine, Biomedicine and Health Sciences	RC-specific keywords: Personalized medicine, molecular medicine, translational research, human genome, molecular profiling, medical bioinformatics, predictive genomics, diagnostics, drug sensitivity testing, health care efficacy, biobanking
Participation category: 5. Research of the participating community has a highly significant societal impact	
RC's responsible person: Kallioniemi, Olli	
Keywords: Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community	

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Contents

Panel members	1
1 Introduction to the Evaluation	5
1.1 RC-specific evaluation reports	5
1.2 Aims and objectives in the evaluation	5
1.3 Evaluation method	5
1.4 Implementation of the external evaluation	6
1.5 Evaluation material	7
1.6 Evaluation questions and material	8
1.7 Evaluation criteria	10
1.8 Timetable of the evaluation	13
1.9 Evaluation feedback – consensus of the entire panel	13
2 Evaluation feedback	15
2.1 Focus and quality of the RC's research	15
2.2 Practises and quality of doctoral training	15
2.3 The societal impact of research and doctoral training	16
2.4 International and national (incl. intersectoral) research collaboration and researcher mobility	16
2.5 Operational conditions	17
2.6 Leadership and management in the researcher community	17
2.7 External competitive funding of the RC	17
2.8 The RC's strategic action plan for 2011–2013	18
2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)	18
2.10 Short description of how the RC members contributed the compilation of the stage 2 material ...	18
2.11 How the UH's focus areas are presented in the RC's research	18
2.12 RC-specific main recommendations	19
2.13 RC-specific conclusions	19
3 Appendices	21

Foreword

The evaluation of research and doctoral training is being carried out in the years 2010–2012 and will end in 2012. The steering group appointed by the Rector in January 2010 set the conditions for participating in the evaluation and prepared the Terms of Reference to present the evaluation procedure and criteria. The publications and other scientific activities included in the evaluation covered the years 2005–2010.

The participating unit in the evaluation was defined as a Researcher Community (RC). To obtain a critical mass with university-level impact, the number of members was set to range from 20 to 120. The RCs were required to contain researchers in all stages of their research career, from doctoral students to principal investigators (PIs). All in all, 136 Researcher Communities participated in this voluntary evaluation, 5857 persons in total, of whom 1131 were principal investigators. PIs were allowed to participate in two communities in certain cases, and 72 of them used this opportunity and participated in two RCs.

This evaluation enabled researchers to define RCs from the “bottom up” and across disciplines. The aim of the evaluation was not to assess individual performance but a community with shared aims and researcher-training activities. The RCs were able to choose among five different categories that characterised the status and main aims of their research. The steering group considered the process of applying to participate in the evaluation to be important, which led to the establishment of these categories. In addition, providing a service for the RCs to enable them to benchmark their research at the global level was a main goal of the evaluation.

The data for the evaluation consisted of the RCs’ answers to evaluation questions on supplied e-forms and a compilation extracted from the TUHAT – Research Information System (RIS) on 12 April 2011. The compilation covered scientific and other publications as well as certain areas of scientific activities. During the process, the RCs were asked to check the list of publications and other scientific activities and make corrections if needed. These TUHAT compilations are public and available on the evaluation project sites of each RC in the TUHAT-RIS.

In addition to the e-form and TUHAT compilation, University of Leiden (CWTS) carried out bibliometric analyses from the articles included in the Web of Science (WoS). This was done on University and RC levels. In cases where the publication forums of the RC were clearly not represented by the WoS data, the Library of the University of Helsinki conducted a separate analysis of the publications. This was done for 66 RCs representing the humanities and social sciences.

The evaluation office also carried out an enquiry targeted to the supervisors and PhD candidates about the organisation of doctoral studies at the University of Helsinki. This and other documents describing the University and the Finnish higher education system were provided to the panellists.

The panel feedback for each RC is unique and presented as an entity. The first collective evaluation reports available for the whole panel were prepared in July–August 2011. The reports were accessible to all panel members via the electronic evaluation platform in August. Scoring from 1 to 5 was used to complement written feedback in association with evaluation questions 1–4 (scientific focus and quality, doctoral training, societal impact, cooperation) and in addition to the category evaluating the fitness for participation in the evaluation. Panellists used the international level as a point of comparison in the evaluation. Scoring was not expected to go along with a preset deviation.

Each of the draft reports were discussed and dealt with by the panel in meetings in Helsinki (from 11 September to 13 September or from 18 September to 20 September 2011). In these meetings the panels also examined the deviations among the scores and finalised the draft reports together.

The current RC-specific report deals shortly with the background of the evaluation and the terms of participation. The main evaluation feedback is provided in the evaluation report, organised according to the evaluation questions. The original material provided by the RCs for the panellists has been attached to these documents.

On behalf of the evaluation steering group and office, I sincerely wish to thank you warmly for your participation in this evaluation. The effort you made in submitting the data to TUHAT-RIS is gratefully acknowledged by the University. We wish that you find this panel feedback useful in many ways. The bibliometric profiles may open a new view on your publication forums and provide a perspective for discussion on your choice of forums. We especially hope that this evaluation report will help you in setting the future goals of your research.

Johanna Björkroth
Vice-Rector
Chair of the Steering Group of the Evaluation

Steering Group of the evaluation

Steering group, nominated by the Rector of the University, was responsible for the planning of the evaluation and its implementation having altogether 22 meetings between February 2010 and March 2012.

Chair

Vice-Rector, professor **Johanna Björkroth**

Vice-Chair

Professor **Marja Airaksinen**

Chief Information Specialist, Dr **Maria Forsman**

Professor **Arto Mustajoki**

University Lecturer, Dr **Kirsi Pyhälä**

Director of Strategic Planning and Development, Dr **Ossi Tuomi**

Doctoral candidate, MSocSc **Jussi Vauhkonen**

Panel members

CHAIR

Professor Lorenz Poellinger

Cancer biology, cell and molecular biology
Karolinska Institute, Sweden

VICE-CHAIR

Professor Cornelia van Duijn

Genetic epidemiology, Alzheimer's disease and related disorders
Erasmus Medical Centre, the Netherlands

Professor Johanna Ivaska

Molecular cell biology, cell adhesion, cancer biology
University of Turku, VTT Technical Research Centre, Finland

Professor Olli Lassila

Immunology, medical microbiology
University of Turku, Finland

Professor Hans-Christian Pape

Neuroscience, neurophysiology
University of Münster, Germany

Professor Thomas Ruzicka

Dermatology, allergology
Ludwig-Maximilians-Universität (LMU) München, Germany

Professor Lars Terenius

Experimental alcohol and drug dependence research, mental disorders,
preventive medicine
Karolinska Institute, Sweden

Professor Peter York

Physical pharmaceuticals, pharmaceutical chemistry, pharmaceutical
technology
University of Bradford, Great Britain

The panel, independently, evaluated all the submitted material and was responsible for the feedback of the RC-specific reports. The panel members were asked to confirm whether they had any conflict of interests with the RCs. If this was the case, the panel members disqualified themselves in discussion and report writing.

Added expertise to the evaluation was contributed by two evaluators outside the panels and by three members from the other panels.

External Experts

Professor Olli Carpén

Pathology, cancer cell metastasis
University of Turku
Finland

Professor Anders Linde

Oral biochemi
Faculty of Odontology
Göteborg University
Sweden

Experts from the Other Panels

Professor Jan-Otto Carlsson, from the Panel of Natural Sciences

Professor Danny Huylebroek, from the Panel of Biological, Agricultural and Veterinary Sciences

Professor Holger Stark, from the Panel of Natural Sciences

EVALUATION OFFICE

Dr Seppo Saari, Doc., Senior Adviser in Evaluation, was responsible for the entire evaluation, its planning and implementation and acted as an Editor-in-chief of the reports.

Dr Eeva Sievi, Doc., Adviser, was responsible for the registration and evaluation material compilations for the panellists. She worked in the evaluation office from August 2010 to July 2011.

MSocSc Paula Ranne, Planning Officer, was responsible for organising the panel meetings and all the other practical issues like agreements and fees and editing a part the RC-specific reports. She worked in the evaluation office from March 2011 to January 2012.

Mr Antti Moilanen, Project Secretary, was responsible for editing the reports. He worked in the evaluation office from January 2012 to April 2012.

TUHAT OFFICE

Provision of the publication and other scientific activity data

Mrs Aija Kaitera, Project Manager of TUHAT-RIS served the project ex officio providing the evaluation project with the updated information from TUHAT-RIS. The TUHAT office assisted in mapping the publications with CWTS/University of Leiden.

MA Liisa Ekebom, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation. She also assisted the UH/Library analyses.

BA Liisa Jäppinen, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation.

HELSINKI UNIVERSITY LIBRARY

Provision of the publication analyses

Dr Maria Forsman, Chief Information Specialist in the Helsinki University Library, managed with her 10 colleagues the bibliometric analyses in humanities, social sciences and in other fields of sciences where CWTS analyses were not applicable.

Acronyms and abbreviations applied in the report

External competitive funding

AF - Academy of Finland
TEKES - Finnish Funding Agency for Technology and Innovation
EU - European Union
ERC - European Research Council
International and national foundations
FP7/6 etc. /Framework Programmes/Funding of European Commission

Evaluation marks

Outstanding (5)
Excellent (4)
Very Good (3)
Good (2)
Sufficient (1)

Abbreviations of Bibliometric Indicators

P - Number of publications
TCS - Total number of citations
MCS - Number of citations per publication, excluding self-citations
PNC - Percentage of uncited publications
MNCS - Field-normalized number of citations per publication
MNJS - Field-normalized average journal impact
THCP10 - Field-normalized proportion highly cited publications (top 10%)
INT_COV - Internal coverage, the average amount of references covered by the WoS
WoS - Thomson Reuters Web of Science Databases

Participation category

Category 1. The research of the participating community represents the international cutting edge in its field.

Category 2. The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.

Category 3. The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.

Category 4. The research of the participating community represents an innovative opening.

Category 5. The research of the participating community has a highly significant societal impact.

Research focus areas of the University of Helsinki

Focus area 1: The basic structure, materials and natural resources of the physical world

Focus area 2: The basic structure of life

Focus area 3: The changing environment - clean water

Focus area 4: The thinking and learning human being

Focus area 5: Welfare and safety

Focus area 6: Clinical research

Focus area 7: Precise reasoning

Focus area 8: Language and culture

Focus area 9: Social justice

Focus area 10: Globalisation and social change

1 Introduction to the Evaluation

1.1 RC-specific evaluation reports

The participants in the evaluation of research and doctoral training were Researcher Communities (hereafter referred to as the RC). The RC refers to the group of researchers who registered together in the evaluation of their research and doctoral training. Preconditions in forming RCs were stated in the Guidelines for the Participating Researcher Communities. The RCs defined themselves whether their compositions should be considered well-established or new.

It is essential to emphasise that the evaluation combines both meta-evaluation¹ and traditional research assessment exercise and its focus is both on the research outcomes and procedures associated with research and doctoral training. The approach to the evaluation is enhancement-led where self-evaluation constituted the main information. The answers to the evaluation questions formed together with the information of publications and other scientific activities an entity that was to be reviewed as a whole.

The present evaluation recognizes and justifies the diversity of research practices and publication traditions. Traditional Research Assessment Exercises do not necessarily value high quality research with low volumes or research distinct from mainstream research. It is challenging to expose the diversity of research to fair comparison. To understand the essence of different research practices and to do justice to their diversity was one of the main challenges of the present evaluation method. Understanding the divergent starting points of the RCs demanded sensitivity from the evaluators.

1.2 Aims and objectives in the evaluation

The aims of the evaluation are as follows:

- to improve the level of research and doctoral training at the University of Helsinki and to raise their international profile in accordance with the University's strategic policies. The improvement of doctoral training should be compared to the University's policy.²
- to enhance the research conducted at the University by taking into account the diversity, originality, multidisciplinary nature, success and field-specificity,
- to recognize the conditions and prerequisites under which excellent, original and high-impact research is carried out,
- to offer the academic community the opportunity to receive topical and versatile international peer feedback,
- to better recognize the University's research potential.
- to exploit the University's TUHAT research information system to enable transparency of publishing activities and in the production of reliable, comparable data.

1.3 Evaluation method

The evaluation can be considered as an enhancement-led evaluation. Instead of ranking, the main aim is to provide useful information for the enhancement of research and doctoral training of the participating RCs. The comparison should take into account each field of science and acknowledge their special character.

¹ The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics or comparable analyses.

² [Policies on doctoral degrees and other postgraduate degrees at the University of Helsinki.](#)

The comparison produced information about the present status and factors that have lead to success. Also challenges in the operations and outcomes were recognized.

The evaluation approach has been designed to recognize better the significance and specific nature of researcher communities and research areas in the multidisciplinary top-level university. Furthermore, one of the aims of the evaluation is to bring to light those evaluation aspects that differ from the prevalent ones. Thus the views of various fields of research can be described and research arising from various starting points understood better. The doctoral training is integrated into the evaluation as a natural component related to research. Operational processes of doctoral training are being examined in the evaluation.

Five stages of the evaluation method were:

1. Registration – Stage 1
2. Self-evaluation – Stage 2
3. TUHAT³ compilations on publications and other scientific activities⁴
4. External evaluation
5. Public reporting

1.4 Implementation of the external evaluation

Five Evaluation Panels

Five evaluation panels consisted of independent, renowned and highly respected experts. The main domains of the panels are:

1. biological, agricultural and veterinary sciences
2. medicine, biomedicine and health sciences
3. natural sciences
4. humanities
5. social sciences

The University invited 10 renowned scientists to act as chairs or vice-chairs of the five panels based on the suggestions of faculties and independent institutes. Besides leading the work of the panel, an additional role of the chairs was to discuss with other panel chairs in order to adopt a broadly similar approach. The panel chairs and vice-chairs had a pre-meeting on 27 May 2011 in Amsterdam.

The panel compositions were nominated by the Rector of the University 27 April 2011. The participating RCs suggested the panel members. The total number of panel members was 50. The reason for a smaller number of panellists as compared to the previous evaluations was the character of the evaluation as a meta-evaluation. The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics and comparable analyses.

The panel meetings were held in Helsinki:

- On 11–13 September 2011: (1) biological, agricultural and veterinary sciences, (2) medicine, biomedicine and health sciences and (3) natural sciences.
- On 18–20 September 2011: (4) humanities and (5) social sciences.

³ TUHAT (acronym) of Research Information System (RIS) of the University of Helsinki

⁴ Supervision of thesis, prizes and awards, editorial work and peer reviews, participation in committees, boards and networks and public appearances.

1.5 Evaluation material

The main material in the evaluation was the RCs' self-evaluations that were qualitative in character and allowed the RCs to choose what was important to mention or emphasise and what was left unmentioned.

The present evaluation is exceptional at least in the Finnish context because it is based on both the evaluation documentation (self-evaluation questions, publications and other scientific activities) and the bibliometric reports. All documents were delivered to the panellists for examination.

Traditional bibliometrics can be reasonably done mainly in medicine, biosciences and natural sciences when using the Web of Science database, for example. Bibliometrics, provided by CWTS/The Centre for Science and Technology Studies, University of Leiden, cover only the publications that include WoS identification in the TUHAT-RIS.

Traditional bibliometrics are seldom relevant in humanities and social sciences because the international comparable databases do not store every type of high quality research publications, such as books and monographs and scientific journals in other languages than English. The Helsinki University Library has done analysis to the RCs, if their publications were not well represented in the Web of Science databases (RCs should have at least 50 publications and internal coverage of publications more than 40%) – it meant 58 RCs. The bibliometric material for the evaluation panels was available in June 2011. The RC-specific bibliometric reports are attached at the end of each report.

The panels were provided with the evaluation material and all other necessary background information, such as the basic information about the University of Helsinki and the Finnish higher education system.

Evaluation material

1. Registration documents of the RCs for the background information
2. Self evaluation material – answers to the evaluation questions
3. Publications and other scientific activities based on the TUHAT RIS:
 - 3.1. statistics of publications
 - 3.2. list of publications
 - 3.3. statistics of other scientific activities
 - 3.4. list of other scientific activities
4. Bibliometrics and comparable analyses:
 - 4.1. Analyses of publications based on the verification of TUHAT-RIS publications with the Web of Science publications (CWTS/University of Leiden)
 - 4.2. Publication statistics analysed by the Helsinki University Library - mainly for humanities and social sciences
5. University level survey on doctoral training (August 2011)
6. University level analysis on publications 2005–2010 (August 2011) provided by CWTS/University of Leiden

Background material

University of Helsinki

- [Basic information about the University of the Helsinki](#)
- [The structure of doctoral training at the University of Helsinki](#)
- Previous evaluations of research at the University of Helsinki – links to the reports: [1998](#) and [2005](#)

The Finnish Universities/Research Institutes

- [Finnish University system](#)
- [Evaluation of the Finnish National Innovation System](#)
- [The State and Quality of Scientific Research in Finland. Publication of the Academy of Finland 9/09.](#)

The evaluation panels were provided also with other relevant material on request before the meetings in Helsinki.

1.6 Evaluation questions and material

The participating RCs answered the following evaluation questions which are presented according to the evaluation form. In addition, TUHAT RIS was used to provide the **additional material** as explained. For giving the feedback to the RCs, the panellists received the evaluation feedback form constructed in line with the evaluation questions:

1. Focus and quality of the RC's research

- Description of
 - the RC's research focus.
 - the quality of the RC's research (incl. key research questions and results)
 - the scientific significance of the RC's research in the research field(s)
- Identification of the ways to strengthen the focus and improve the quality of the RC's research

The additional material: TUHAT compilation of the RC's publications, analysis of the RC's publications data (provided by University of Leiden and the Helsinki University Library)

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

2. Practises and quality of doctoral training

- Organising of the doctoral training in the RC. Description of the RC's principles for:
 - recruitment and selection of doctoral candidates
 - supervision of doctoral candidates
 - collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes
 - good practises and quality assurance in doctoral training
 - assuring of good career perspectives for the doctoral candidates/fresh doctorates
- Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations

A written feedback from the aspects of: processes and good practices related to leadership and management

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

3. The societal impact of research and doctoral training

- Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).
- Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.

The additional material: TUHAT compilation of the RC's other scientific activities.

A written feedback from the aspects of: societal impact, national and international collaboration, innovativeness

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

4. International and national (incl. intersectoral) research collaboration and researcher mobility

- Description of
 - the RC's research collaborations and joint doctoral training activities
 - how the RC has promoted researcher mobility
- Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

A written feedback from the aspects of: scientific quality, national and international collaboration

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

5. Operational conditions

- Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).
- Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.

A written feedback from the aspects of: processes and good practices related to leadership and management

- Strengths
- Areas of development
- Other remarks
- Recommendations

6. Leadership and management in the researcher community

- Description of
 - the execution and processes of leadership in the RC
 - how the management-related responsibilities and roles are distributed in the RC
 - how the leadership- and management-related processes support
 - high quality research
 - collaboration between principal investigators and other researchers in the RC
 - the RC's research focus
 - strengthening of the RC's know-how
- Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes

7. External competitive funding of the RC

- The RCs were asked to provide information of such external competitive funding, where:
 - the funding decisions have been made during 1.1.2005-31.12.2010, and
 - the administrator of the funding is/has been the University of Helsinki
- On the e-form the RCs were asked to provide:
 - 1) The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation , EU, ERC, foundations, other national funding organisations, other international funding organisations), and
 - 2) The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.

Competitive funding reported in the text is also to be considered when evaluating this point.

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness, future significance

- Strengths
- Areas of development
- Other remarks
- Recommendations

8. The RC's strategic action plan for 2011–2013

- RC's description of their future perspectives in relation to research and doctoral training.

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

- Strengths
- Areas of development

- Other remarks
- Recommendations

9. Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category

A written feedback evaluating the RC's fitness to the chosen participation category

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

10. Short description of how the RC members contributed the compilation of the stage 2 material

Comments on the compilation of evaluation material

11. How the UH's focus areas are presented in the RC's research?

Comments if applicable

12. RC-specific main recommendations based on the previous questions 1-11

13. RC-specific conclusions

1.7 Evaluation criteria

The panellists were expected to give evaluative and analytical feedback to each evaluation question according to their aspects in order to describe and justify the quality of the submitted material. In addition, the evaluation feedback was asked to be pointed out the level of the performance according to the following classifications:

- outstanding (5)
- excellent (4)
- very good (3)
- good (2)
- sufficient (1)

Evaluation according to the criteria was to be made with thorough consideration of the entire evaluation material of the RC in question. Finally, in questions 1-4 and 9, the panellists were expected to classify their written feedback into one of the provided levels (the levels included respective descriptions, 'criteria'). Some panels used decimals in marks. The descriptive level was interpreted according to the integers and not rounding up the decimals by the editors.

Description of criteria levels

Question 1 – FOCUS AND QUALITY OF THE RC'S RESEARCH

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

Outstandingly strong research, also from international perspective. Attracts great international interest with a wide impact, including publications in leading journals and/or monographs published by leading international publishing houses. The research has world leading qualities. The research focus, key research questions scientific significance, societal impact and innovativeness are of outstanding quality.

In cases where the research is of a national character and, in the judgement of the evaluators, should remain so, the concepts of "international attention" or "international impact" etc. in the grading criteria above may be replaced by "international comparability".

Operations and procedures are of outstanding quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality.

Excellent quality of procedures and results (4)

Research of excellent quality. Typically published with great impact, also internationally. Without doubt, the research has a leading position in its field in Finland.

Operations and procedures are of excellent quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality.

Very good quality of procedures and results (3)

The research is of such very good quality that it attracts wide national and international attention.

Operations and procedures are of very good quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

Good quality of procedures and results (2)

Good research attracting mainly national attention but possessing international potential, extraordinarily high relevance may motivate good research.

Operations and procedures are of good quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

Sufficient quality of procedures and results (1)

In some cases the research is insufficient and reports do not gain wide circulation or do not have national or international attention. Research activities should be revised.

Operations and procedures are of sufficient quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

Question 2 – DOCTORAL TRAINING

Question 3 – SOCIETAL IMPACT

Question 4 – COLLABORATION

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

Procedures are of outstanding quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality. The procedures and results are regularly evaluated and the feedback has an effect on the planning.

Excellent quality of procedures and results (4)

Procedures are of excellent quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality. The procedures and outcomes are evaluated and the feedback has an effect on the planning.

Very good quality of procedures and results (3)

Procedures are of very good quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and

management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

Good quality of procedures and results (2)

Procedures are of good quality, shared occasionally in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

Sufficient quality of procedures and results (1)

Procedures are of sufficient quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

Question 9 – CATEGORY

Participation category – fitness for the category chosen

The choice and justification for the chosen category below should be reflected in the RC's responses to the evaluation questions 1–8.

1. *The research of the participating community represents the international cutting edge in its field.*
2. *The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.*
3. *The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.* The research is of high quality and has great significance and impact in its field. However, the generally used research evaluation methods do not necessarily shed sufficient light on the merits of the research.
4. *The research of the participating community represents an innovative opening.* A new opening can be an innovative combination of research fields, or it can be proven to have a special social, national or international demand or other significance. Even if the researcher community in its present composition has yet to obtain proof of international success, its members can produce convincing evidence of the high level of their previous research.
5. *The research of the participating community has a highly significant societal impact.* The participating researcher community is able to justify the high social significance of its research. The research may relate to national legislation, media visibility or participation in social debate, or other activities promoting social development and human welfare. In addition to having societal impact, the research must be of a high standard.

An example of outstanding fitness for category choice (5)⁵

The RC's representation and argumentation for the chosen category were convincing. The RC recognized its real capacity and apparent outcomes in a wider context to the research communities. The specific character of the RC was well-recognized and well stated in the responses. The RC fitted optimally for the category.

- Outstanding (5)
- Excellent (4)
- Very good (3)
- Good (2)
- Sufficient (1)

The above-mentioned definition of outstanding was only an example in order to assist the panellists in the positioning of the classification. There was no exact definition for the category fitness.

⁵ The panels discussed the category fitness and made the final conclusions of the interpretation of it.

1.8 Timetable of the evaluation

The main timetable of the evaluation:

- | | |
|--|-----------------------|
| 1. Registration | November 2010 |
| 2. Submission of self-evaluation materials | January–February 2011 |
| 3. External peer review | May–September 2011 |
| 4. Published reports | March–April 2012 |
| - University level public report | |
| - RC specific reports | |

The entire evaluation was implemented during the university's strategy period 2010–2012. The preliminary results were available for the planning of the following strategy period in late autumn 2011. The evaluation reports will be published in March/April 2012. More detailed time schedule is published in the University report.

1.9 Evaluation feedback – consensus of the entire panel

The panellists evaluated all the RC-specific material before the meetings in Helsinki and mailed the draft reports to the evaluation office. The latest interim versions were on-line available to all the panellists on the Wiki-sites. In September 2011, in Helsinki the panels discussed the material, revised the first draft reports and decided the final numeric evaluation. After the meetings in Helsinki, the panels continued working and finalised the reports before the end of November 2011. The final RC-specific reports are the consensus of the entire panel.

The evaluation reports were written by the panels independently. During the editing process, the evaluation office requested some clarifications from the panels when necessary. The tone and style in the reports were not harmonized in the editing process. All the reports follow the original texts written by the panels as far as it was possible.

The original evaluation material of the RCs, provided for the panellists is attached at the end of the report. It is essential to notice that the exported lists of publications and other scientific activities depend how the data was stored in the TUHAT-RIS by the RCs.

2 Evaluation feedback

2.1 Focus and quality of the RC's research

- *Description of*
 - *the RC's research focus*
 - *the quality of the RC's research (incl. key research questions and results)*
 - *the scientific significance of the RC's research in the research field(s)*
- *Identification of the ways to strengthen the focus and improve the quality of the RC's research*

ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness

The RC P-Molmed is formed around PIs working either at the Institute of Molecular Medicine Finland (FIMM) or the Faculty of Medicine, University of Helsinki/Helsinki University Hospital. The RC altogether has seven research groups, but some of the groups consist of only 1-3 persons. The key focus of the RC is personalized molecular medicine. The RC specifically aims to 1) carry out research on personalized molecular medicine, 2) create technical expertise and internationally competitive infrastructures for facilitating personalized medicine, 3) carry out research training, 4) increase society impact arising out of the above, and 5) facilitate implementation of personalized medicine in the health care sector. The selected research topics include: 1) predicting the risk of cardiovascular disease by using genomics and molecular profiling data from large-scale Finnish population cohorts, 2) developing personalized medicine strategies to assess the most optimal therapies to individual leukemia patients, acute myeloid leukemias in particular and 3) integrating systems for automated molecular, imaging and clinical decision algorithms in cancer.

The **strengths** of the RC rely on a very focused research topic with a strong impact on the society, on technology platforms it has developed and/or adapted, a combination of basic researchers and clinicians, and the extensive research networks it formed.

The **scientific quality** of most individual PIs of P-Molmed is excellent, although at this point it is too early to evaluate the collaborative efforts of this newly established RC. First or last author papers of the PIs have been published in journals including Blood, Genome Biology, Clinical Cancer Research, Oncogene, Cancer Research, PloS One and Lancet. It appears that both the quantity and quality of the articles has increased during years 2005-2010.

Numeric evaluation: 4 (Excellent)

2.2 Practises and quality of doctoral training

- *Organising of the doctoral training in the RC. Description of the RC's principles for:*
 - *recruitment and selection of doctoral candidates*
 - *supervision of doctoral candidates*
 - *collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes*
 - *good practises and quality assurance in doctoral training*
 - *assuring of good career perspectives for the doctoral candidates/fresh doctorates*
- *Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.*
- *Additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations*

ASPECTS: Processes and good practices related to leadership and management

FIMM, and thereby the P-Molmed RC has an excellent structure for recruiting and training PhD students, using schemes adapted from the European Molecular Biology Laboratory (EMBL). The entire training period is clearly well thought and professionally pursued. The two-step selection process includes videoconferencing and on-site interviews of selected candidates and a specific evaluation requested from their referees. Students selected first engage in rotational training for 6-9 months, during which they are supervised by the research training coordinator and 2-3 group leaders. After this stage, students are supervised primarily by one group leader. Supervision involves complete mentoring toward the PhD degree, including development of a specific research plan, discussion of results and planning, development of communication and presentation skills, and analysis of published literature. A wide array of specific educational courses is offered together with local graduate schools, the Nordic EMBL Molecular Medicine Network and the TRANSMED translational medicine PhD program operated by the Faculty of Medicine.

The RC activities only started really in 2010, therefore, it does not have a track-record in PhD training. It is unclear from the documents, how many doctoral theses the PIs have supervised during 2005-2010. If one takes into account the fact that most of the PIs have carried out research at this environment for several years, the current number of PhD students (13) sounds low. However, the training program is well-thought, indeed, and should yield highly educated PhDs in the following years.

Numeric evaluation: 5 (Outstanding)

2.3 The societal impact of research and doctoral training

- *Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).*
- *Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.*
- *Additional material: TUHAT compilation of the RC's other scientific activities.*

ASPECTS: Societal impact, national and international collaboration, innovativeness

The **high societal impact** of P-Molmed is one of the strengths of the RC. It appears that apart from science, the implications of the findings to the society are of special interest to the RC. This is evidenced by networking with Ministers and the European Commission, major companies, hospital directors, other health care providers and funders, the Academy of Finland, Tekes, Sitra, patient organizations, ethical experts, researchers and physicians active in the area.

The RC has several ways for collaboration with the industry to promote the application of its research. For instance, it works with two national umbrella organizations, Salve Inc. in the health care sector and Tivit in the IT sector as well as with many other private companies to launch collaborative proposals and joint work. Furthermore, its newly-funded Innovative Medicines Initiative (IMI) project with the big pharma and the European commission (PREDECT), will certainly have societal impact.

Numeric evaluation: 5 (Outstanding)

2.4 International and national (incl. intersectoral) research collaboration and researcher mobility

- *Description of*
 - *the RC's research collaborations and joint doctoral training activities*
 - *how the RC has promoted researcher mobility*
- *Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.*

ASPECTS: Scientific quality, national and international collaboration

As a member of the Nordic EMBL Partnership of Molecular Medicine, FIMM and its associated RC PIs have direct connections to international networks. In addition, the RC is integrated with several technological platform programs of the Biocenter Finland and the national and international infrastructures (e.g. EATRIS translational research, BBMRI biobanks, ELIXIR bioinformatics and EU-OPENSOURCE chemical biology). National research collaboration is promoted by different mechanisms, e.g. by the Academy of Finland Centre of Excellence.

Numeric evaluation: 5 (Outstanding)

2.5 Operational conditions

- *Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).*
- *Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.*

ASPECTS: Processes and good practices related to leadership and management

The operational infrastructure of FIMM and the Meilahti biomedical campus provides excellent surroundings to carry out research on personalized molecular medicine. Importantly, the RC is actively developing its own infrastructure such as clinical decision algorithms and web-based data handling and analysis. The RC clearly benefits from strong, international-level infrastructures that support its activities in biobanking, translational research, bioinformatics, sequencing, high-throughput drug testing etc., in which it is actively engaged.

2.6 Leadership and management in the researcher community

- *Description of*
 - *the execution and processes of leadership in the RC*
 - *how the management-related responsibilities and roles are distributed in the RC*
 - *how the leadership- and management-related processes support*
 - *high quality research*
 - *collaboration between principal investigators and other researchers in the RC*
 - *the RC's research focus*
 - *strengthening of the RC's know-how*
- *Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes*

ASPECTS: Processes and good practices related to leadership and management

It appears that the RC leadership is closely tight to the activities of FIMM. As the majority of the PIs are employed by FIMM, this appears to be a natural way to organize the management.

2.7 External competitive funding of the RC

- *The RCs were asked to provide information of such external competitive funding, where:*
 - *the funding decisions have been made during 1.1.2005-31.12.2010, and*
 - *the administrator of the funding is/has been the University of Helsinki*
- *On the e-form the RCs were asked to provide:*
 - 1) *The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation, EU, ERC, foundations, other national funding organisations, other international funding organizations), and*

2) *The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.*

Competitive funding reported in the text is also to be considered when evaluating this point.

ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness and future significance

The extra-mural funding of P-Molmed for years 2005-2010 is appr. 8 Mill €, of which 2.7 Mill € is from TEKES and 2.1 Mill € from international sources. Considering the size of the RC the amounts are substantial, and indicate the impact of the RC.

2.8 The RC's strategic action plan for 2011–2013

• *RC's description of their future perspectives in relation to research and doctoral training.*

ASPECTS: Scientific quality, scientific significance, societal Impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

As a recently established RC, the strategic action plan includes executing the activities described in point 1. (Focus of RCs research). This will include building the research infrastructure, collecting biobank material for the goals and carrying out research on risk prediction for cardiovascular disease, developing personalized therapy for AML and building automated molecular, imaging and clinical decision algorithms in cancer.

Similarly, the action plan for doctoral training follows the plans described in point 2 (Practises and quality of doctoral training).

2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category.

Category 5. The research of the participating community has a highly significant societal impact.

The P-Molmed RC clearly fits within the chosen participation category.

Numeric evaluation: 5 (Outstanding)

2.10 Short description of how the RC members contributed the compilation of the stage 2 material

All PIs contributed to the evaluation material by providing information of their own research groups. Different chapters of the actual text were written by individual PIs and group members based on joint agreement.

2.11 How the UH's focus areas are presented in the RC's research

Focus area 6: Clinical research

The research of P-Molmed falls into the focus area: "health and welfare", and within several of the key focus areas: **The basic structure of life** (systemic biology and biotechnology) and **Clinical research** (clinical translational medicine, personalized medicine).

2.12 RC-specific main recommendations

–

2.13 RC-specific conclusions

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3 Appendices

- A. Original evaluation material
 - a. Registration material – Stage 1
 - b. Answers to evaluation questions – Stage 2
 - c. List of publications
 - d. List of other scientific activities
- B. Bibliometric analyses
 - a. Analysis provided by CWTS/University of Leiden
 - b. Analysis provided by Helsinki University Library (66 RCs)



International evaluation of research and doctoral training
at the University of Helsinki 2005-2010

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW

NAME OF THE RESEARCHER COMMUNITY:
Personalized Molecular Medicine (P-Molmed)

LEADER OF THE RESEARCHER COMMUNITY:
Professor Olli Kallioniemi, Institute of Molecular Medicine Finland (FIMM)

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW:

- Material submitted by the RC at stages 1 and 2 of the evaluation
 - STAGE 1 material: RC's registration form (incl. list of RC participants in an excel table)
 - STAGE 2 material: RC's answers to evaluation questions
- TUHAT compilations of the RC members' publications 1.1.2005-31.12.2010
- TUHAT compilations of the RC members' other scientific activities 1.1.2005-31.12.2010
- Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010 (analysis carried out by CWTS, Leiden University)

NB! Since Web of Science(WoS)-based bibliometrics does not provide representative results for most RCs representing humanities, social sciences and computer sciences, the publications of these RCs will be analyzed by the UH Library (results available by the end of June, 2011)



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

1 RESPONSIBLE PERSON

Name: Kallioniemi, Olli

E-mail:

Phone: +358-50-4150363

Affiliation: Institute for Molecular Medicine Finland (FIMM)

Street address: Tukholmankatu 8, 00290 Helsinki

2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): Personalized Molecular Medicine

Acronym for the participating RC (max. 10 characters): P-Molmed

Description of the operational basis in 2005-2010 (eg. research collaboration, joint doctoral training activities) on which the RC was formed (MAX. 2200 characters with spaces): This RC on personalized molecular medicine is developing next-generation personalized medicine technologies, approaches and clinical implementation. The basis for this RC is the significant need at the society level for a profound change in the way by which medicine is practised to improve efficacy, reduce ineffective and harmful therapies and curtail health care costs.

This RC is based on the research focus of the Institute for Molecular Medicine Finland (FIMM) and at the Faculty of Medicine and collaborators elsewhere (such as Helsinki University Hospital, the National Institute for Health and Welfare and the VTT Technical Research Centre thereby bridging institutions under three different ministries). FIMM is also an international partner research institution of the European Molecular Biology Laboratory that is operated by the University of Helsinki. Both FIMM and the Faculty of Medicine of the University of Helsinki have set up personalized medicine as one of their key strategic research areas.

Two specific areas within personalized medicine will be specifically investigated: 1) genomic risk factor predictors for common diseases and 2) molecular oncology therapy predictions.

While the society impact from these studies may be felt in these areas first, the impact of personalized medicine will be critically important across all disease types. Therefore, the researchers will make specific efforts to bridge out to the society and facilitate the implementation of personalized medicine. This will require a multi-disciplinary, cross-society consensus among biomedical and clinical scientists, other health care professionals and institutions, patients and patient organizations, the funding bodies (government/communities), regulatory entities and companies.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

The plan is to make Finland an early adaptor of personalized medicine and forerunner in making use of the new possibilities to improve human health.

3 SCIENTIFIC FIELDS OF THE RC

Main scientific field of the RC's research: medicine, biomedicine and health sciences

RC's scientific subfield 1: Oncology

RC's scientific subfield 2: Cardiac and Cardiovascular System

RC's scientific subfield 3: --Select--

RC's scientific subfield 4: --Select--

Other, if not in the list: Genomics, systems biology, translational research

4 RC'S PARTICIPATION CATEGORY

Participation category: 5. Research of the participating community has a highly significant societal impact

Justification for the selected participation category (MAX. 2200 characters with spaces): Health care accounts for about 7,5 % of the GDP in Finland, a number which is expected to grow significantly in the future due to the aging population on one hand and (bio)medical advances on the other. Indirect consequences of health care are much larger than this direct percentage would imply. The way by which countries deliver health care and contribute to the well-being of the population is therefore critically important. One of the key trends emerging as a possible solution to the health care dilemmas of Western society is personalized medicine. Personalized medicine gains strength from the recent advances in molecular medicine that has led and will continue to lead to the re-definition of disease.

FIMM and the Faculty of Medicine have assembled an outstanding group of scientists interested in translating the personalized medicine research to clinical practice. The two topics to be investigated include 1) the use of the Finnish population cohorts as a resource to investigate the health impact of single nucleotide polymorphisms (SNP) panels and 2) the application of cancer genomics, proteomics and drug sensitivity screening as a means to develop individualized therapeutic approaches.

For example, a recent study by Ripatti et al. (Lancet, 2010) identified novel genetic determinants of cardiovascular disease that were as good as current risk factors. Exploring the use of conventional and novel risk determinants would make it possible to tailor preventive measures specifically to the people at risk, and even develop genotype-specific preventive approaches.

As a second example, we have developed novel approaches to combine molecular profiling of clinical tumor samples (e.g. sarcomas and AML as ongoing pilot studies) with drug sensitivity screening of the patient-derived cells and cell lines. We believe that these approaches will in the future help to match new treatments and drug combinations with patients most likely to benefit and improve quality of life of cancer patients by sparing patients from toxic, unnecessary treatments. This would also improve the effectiveness of health care.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

5 DESCRIPTION OF THE RC'S RESEARCH AND DOCTORAL TRAINING

Public description of the RC's research and doctoral training (MAX. 2200 characters with spaces):
Personalized medicine is a future trend for medicine, arising from the recent results indicating that the definitions of disease need to be thoroughly redefined based on the new molecular understanding. With each disease divided into multiple molecular subgroups, we will need significant additional studies to assess how the etiology and risk factors need to be considered and how diagnostic procedures and therapeutic approaches should be changed to reflect the new understanding of disease heterogeneity and individual variability. The next challenge is also to translate the new understanding to the health care practise in pilot studies. The hope is that personalized medicine will in the future significantly increase the effectiveness of health care and medical practice and result in better health and well-being of the population.

Personalized medicine research and expertise is therefore crucial to the future progress of medicine and it is of paramount importance to carry out research in this field, and train the future experts in this field to serve in the health care organizations, but also in the government-regulatory functions as well as in the private sector.

Significance of the RC's research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): Personalized medicine is a future trend for medicine, arising from the recent results indicating that the definitions of disease need to be thoroughly redefined based on the new molecular understanding. With each disease divided into multiple molecular subgroups, we will need significant additional studies to assess how the etiology and risk factors need to be considered and how diagnostic procedures and therapeutic approaches should be changed to reflect the new understanding of disease heterogeneity and individual variability. The next challenge is also to translate the new understanding to the health care practise in pilot studies. The hope is that personalized medicine will in the future significantly increase the effectiveness of health care and medical practice and result in better health and well-being of the population.

Personalized medicine research and expertise is therefore crucial to the future progress of medicine and it is of paramount importance to carry out research in this field, and train the future experts in this field to serve in the health care organizations, but also in the government-regulatory functions as well as in the private sector.

Keywords: Personalized medicine, molecular medicine, translational research, human genome, molecular profiling, medical bioinformatics, predictive genomics, diagnostics, drug sensitivity testing, health care efficacy, biobanking

6 QUALITY OF RC'S RESEARCH AND DOCTORAL TRAINING

Justified estimate of the quality of the RC's research and doctoral training at national and international level during 2005-2010 (MAX. 2200 characters with spaces): An internationally significant group of scientists and physician scientists has been assembled to lead and participate in this effort with Olli



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

Kallioniemi as Director of FIMM coordinating the effort. We are particularly excited about the recent nomination of Jonathan K.C. Knowles as a FiDiPro Professor at FIMM. Jonathan Knowles was previously Director of Research at Hoffman La Roche in Basel, and is globally known as a pioneer in personalized medicine. His impact in this effort will be critical towards influencing the society and making a big change in the field locally, nationally and internationally.

Other key members of this consortium are Professors at the Faculty of Medicine in cancer research and molecular oncology, such as Professors Kari Alitalo, Heikki Joensuu and Kimmo Porkka, as well as in the field of human genomics professors Jaakko Kaprio and Kimmo Kontula.

At FIMM, many other people will join this effort, including Professor Aarno Palotie and young EMBL-style group leaders and senior researchers Samuli Ripatti, Krister Wennerberg, Johan Lundin, Caroline Heckman, Gretchen Repasky, Maija Wolf, Kimmo Pitkänen and Imre Västrik.

Comments on how the RC's scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces): This new effort is primarily focused at improving society benefits through cutting-edge research. Therefore, besides the number of dissertations and the quality and number of publications, the impact can be felt in terms of educational events, other public events, and contacts with the society, newspaper and professional articles, by expansion of biobanking practices, and by the adaptation of the personalized medicine by the institutions.

LIST OF RC MEMBERS

NAME OF THE RESEARCHER COMMUNITY:			Personalized Molecular Medicine (P-Molmed)		
RC-LEADER			O. Kallioniemi		
CATEGORY			5		
	Last name	First name	PI-status (TUHAT- check, lista 29.11.)	Title of research and teaching personnel	Affiliation
1	Kallioniemi	Olli	X	Professor	FIMM
2	Mpindi	John Patrick		Doctoral Student	FIMM
3	Knowles	Jonathan	X	Professor	FIMM
4	Heckman	Caroline		Senior Researcher	FIMM
5	Lundin	Johan	X	Senior Researcher	FIMM
6	Linder	Nina		Postdoctoral Researcher	FIMM
7	Konsti	Juho		Doctoral Student	FIMM
8	Lehtimäki	Tiina		Doctoral Student	FIMM
9	Lundin	Mikael		Doctoral Student	FIMM
10	Porkka	Kimmo	X	Professor	Faculty of Medicine
11	Mustjoki	Satu	X	Senior Researcher (PI)	Faculty of Medicine
12	Vakkila	Jukka		Senior Researcher	Faculty of Medicine
13	Jalkanen	Sari		Doctoral Student	Faculty of Medicine
14	Kontro	Mika		Doctoral Student	Faculty of Medicine
15	Koskela	Hanna		Doctoral Student	Faculty of Medicine
16	Koskenvesa	Perttu		Doctoral Student	Faculty of Medicine
17	Kreutzman	Anna		Doctoral Student	Faculty of Medicine
18	Ripatti	Samuli	X	Senior Researcher	FIMM
19	Sarin	Antti-Pekka		Doctoral Student	FIMM
20	Tikkanen	Emmi		Doctoral Student	FIMM
21	Wennerberg	Krister	X	Senior Researcher	FIMM
22	Repasky	Gretchen		Senior Researcher	FIMM
23	Karhinen	Leena		Postdoctoral Researcher	FIMM
24	Ebai	Tonge		Doctoral Student	FIMM
25	van Adrichem	Arnoldus		Doctoral Student	FIMM
	Other Researchers				
	Mirtti	Tuomas		Postdoctoral Researcher	Faculty of Medicine and FIMM
	Stenman	Jakob		Senior Researcher	HUS and FIMM
	Other Key Persons				
	Pitkänen	Kimmo		Coordinator (PhD)	FIMM
	Västrik	Imre		Coordinator (PhD)	FIMM



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

BACKGROUND INFORMATION

Name of the RC's responsible person: Kallioniemi, Olli

E-mail of the RC's responsible person:

Name and acronym of the participating RC: Personalized Molecular Medicine, P-Molmed

The RC's research represents the following key focus area of UH: 6. Kliininen tutkimus – Clinical research

Comments for selecting/not selecting the key focus area: This new RC on personalized medicine links closely to clinical research, but has a much wider reach than that.

The ultimate aim is to impact on the change of health care from the current traditional approach to a more targeted, molecularly oriented personalized health care. Health care in the Western world is often considered to be in a crisis and at a turning point, with costs that will escalate beyond the capabilities of the societies. As explained later, the adoption of personalized medicine will be one of the key factors that must happen, and this will impact not just clinical research, but also society at large, including health care institutions, patients, healthy people, funders, ministries and political decision makers as well as companies active in this area. Therefore, we are not focusing only on traditional medical research, but on impacting the society at large by research, research training, information management, and research projects focusing on implementation. This is an area where we expect to have a profound change in the society in the next five years.

1 FOCUS AND QUALITY OF RC'S RESEARCH (MAX. 8800 CHARACTERS WITH SPACES)

- **Description of the RC's research focus, the quality of the RC's research (incl. key research questions and results) and the scientific significance of the RC's research for the research field(s).**

The RC on personalized molecular medicine has its origins in the Institute for Molecular Medicine Finland (FIMM), Nordic EMBL Partnership for Molecular Medicine at the University of Helsinki, launched just three years ago in 2008. The project on personalized molecular medicine is a flagship project of the entire institute, and FIMM is strongly committed to promote this RC.

This RC is a new entity and mostly addressing future challenges. However, in the past 2-3 years, it already has had a significant academic and technological track record, including raising funding for the RC work.

This RC will address the future challenges of health care by focusing on personalized molecular medicine. The RC will include academic research, PhD training and practical implementation and society impact going hand in hand. The aims of the RC are as follows:

- 1) Carry out research on personalized molecular medicine, with high-profile science and health benefits jointly considered.
- 2) Create technical expertise and internationally competitive infrastructures for facilitating personalized medicine.
- 3) Carry out research training.
- 4) Increase society impact arising out of the above, by generating capabilities, compelling scientific arguments for personalized molecular medicine and increasing awareness



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

5) Facilitate implementation of personalized medicine in the health care sector at large by creating strong networks that involve patients, physicians, health care providers, ministries, companies and other key stakeholders.

In this RC, we will focus scientifically initially on three specific research topics, 1) predicting the risk of cardiovascular disease by using genomics and molecular profiling data from large-scale Finnish population cohorts, 2) developing personalized medicine strategies to assess the most optimal therapies to individual leukemia patients, acute myeloid leukemias in particular and 3) integrating systems for automated molecular, imaging and clinical decision algorithms in cancer. These research projects are meant to provide examples of the concrete future possibilities of personalized medicine and will provide a critical mass of experts in research, infrastructure and training. However, these fields will later be expanded to other indications, such as other chronic diseases and all types of cancers, with more collaborators joining this RC.

The RC will also contribute to key national and international infrastructures to advance personalized medicine. In Finland, FIMM is coordinating translational research network under the Biocenter Finland umbrella organization and is already a key player in advancing personalized medicine. FIMM is the Finnish hub for an international infrastructure network for translational research (EATRIS) and is closely involved in the international efforts for biobanking (BBMRI), bioinformatics (ELIXIR) and chemical biology (EU-OPENSREEN). All these fields are particularly critical for advancing the foundations of personalized medicine, with particular attention being placed in this RC for making biobanking part of the medical care of most patients.

We will use an entirely new strategy to provide feedback from academic research to the clinical diagnostic and therapeutic decision making of recurrent and treatment-refractory leukemia patients with no evidence-based medicine or other treatment options available. We feel that research and clinical medicine have been not only unlinked, but brought miles apart in the regulatory, legal and ethical framework in academic hospitals, and it is time to bring them close together. Thus, we will set up clinical biobanking of all AML cases throughout Finland, in a manner that the samples are amenable to both research studies but also available to clinical diagnostics should it become necessary to e.g. compare primary vs. recurrent samples. Furthermore, we will make the data from the molecular profiles of the individual patient cases available to the clinicians. We will also set up personalized medicine drug screening to individualize and optimize drug combinations given to patients. Therefore, this RC will drive both biobanking practices, as well as a pilot projects in personalized medicine, which could both initiate a new wave of thinking and new rapid advances in the adoption of molecular medicine.

The scientific significance of the RC's research for the research field(s).

From the scientific standpoint, the RC is particularly timely as the recent technological developments have allowed both normal and cancer genomes being sequenced. For example, at the end of 2010, we have already received full genomic sequences from about 100 Finnish individuals. In the next 3-4 years, 25,000 fully sequenced cancer genomes will be available, along with other molecular profiling data. There has been a boom of high-impact publications from human genomics that forms the scientific base of this RC. There have been multiple successful efforts (e.g. Ripatti et al., Lancet, 2010) to also advance the genetics to clinical use, but this effort is still largely a future goal of the RC. Translating this enormous amount of information to the medical practice is one of the most significant challenges of our life-time, and will require both new approaches but also a new generation of trained scientists and medical professionals, capable of understanding, prioritizing and computerized interpretation of the data. Medical decisions at the personalized level will in the future be facilitated and guided (not



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

dictated) by computer-decision based approaches, and therefore increased efforts to facilitate this will be urgently needed.

Implementation of personalized medicine in the health care means that we will see the current definition of disease based on gross anatomical and physiological means (cancer, cardiovascular disease, Alzheimer's disease, arthritis etc.) to be divided into a number of smaller and smaller molecularly defined entities. These entities will eventually complement, if not in many cases replace, the current definitions of disease, which date back to the early days of medicine. Therefore, molecular understanding is a fundamental first step, but this will not lead anywhere unless we can turn this into a diagnostic process that is routinely practiced, and which will impact on therapeutic decisions and will eventually lead to improved efficiency of health care.

Finland has been a world leader in human genomics research, with a major strength being in the registries, well-educated population, high-quality standardized medical care and a trust to authorities and the medical profession. We believe that the same advances will help to propel personalized medicine forward in Finland and we have set our goal of making Finland a leading country in implementing personalized medicine.

- **Ways to strengthen the focus and improve the quality of the RC's research.**

Strong collaborations are sought between scientists, clinical experts and patients to advance new types of research efforts in personalized medicine.

We will bridge the current, ever-widening gap between biomedical research and health care sector by new strategies. For example, our patient consent forms and biobanking procedures will not disconnect research and clinical treatment as is usually done, but will allow us to use biobanked specimens for clinical diagnostics, and will allow us to pass information to clinicians for consideration as part of treatment.

We will enhance educational and society impacts in an interconnected way. The RC will have to address not only scientific goals, but extremely complex society questions for changing current practices of health care.

We will need world-class experts to give credibility and excitement to the efforts. We are fortunate to have Finland Distinguished Professor Jonathan Knowles (former Head of Research at Hoffman La Roche in Basel) a globally renowned expert in personalized medicine, as a key contributor.

2 PRACTISES AND QUALITY OF DOCTORAL TRAINING (MAX. 8800 CHARACTERS WITH SPACES)

- How is doctoral training organised in the RC? Description of the RC's principles for recruitment and selection of doctoral candidates, supervision of doctoral candidates, collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes, good practises and quality assurance in doctoral training, and assuring good career perspectives for the doctoral candidates/fresh doctorates.

This RC benefits directly from the research training adapted at FIMM, along with excellent training provided by local and national graduate schools, such as the Helsinki Biomedical Graduate School (HBGS), national Graduate School of Clinical Investigation (CLIGS), and national school in drug discovery and diagnostics, the Drug Discovery Graduate School (DDGS). As an EMBL-associated international molecular medicine institution, FIMM recently adapted the EMBL model for international recruitment of new PhD students. With an announcement, facilitated by the EMBL's brand name and outreach, we



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

received 243 PhD student applications from 41 nationalities in the last round. This number of applications is an increase from the first such call last year, which produced 68 applications from 21 nationalities, demonstrating a significant rise in global visibility and interest in the research programs of the Institute.

Recruitment and selection:

Selection of PhD students at the institute level begins by annual international call, the aim of which is to recruit high quality students and provide training, in an EMBL style. Application review is conducted at an institute level by an international committee, including group leaders and the research training coordinator. Criteria against which candidates are assessed include: molecular medicine relevance, quality of scientific background, experience, and skills, goals, interest in research at FIMM, communication and interpersonal skills, and international experience.

The recruitment process includes several rounds of increasing selectivity. Applications are first examined for relevance, qualifications, and research interests that fit the FIMM profile. Select applicants are reviewed more thoroughly, discussed, and ranked by the committee. 8-15 are selected for videoconferencing interview, and the top 5-6 are selected for on-site interviews and a specific evaluation requested from their referees. Interviews occur together in one day and consist of one-on-one meetings, visits to research groups, candidate scientific presentations, meeting current students, and tours. The performance of the applicants is then discussed and 2-4 are recommended for positions. The offers are initially for one year covering the period of early training (6 months; see below) and the start of the PhD studies (6 months). Pending a successful first year, an extended contract is offered.

Supervision:

Students selected at the institute-level first engage in rotational training for 6-9 months, during which they are supervised by the research training coordinator and 2-3 group leaders. After this stage, students are supervised primarily by one group leader.

New students first attend a minisymposium in which group leaders present projects available. Students are then matched to a group for a period of 3 months, a research rotation. During the last week of the rotation, students present their findings in an institute-wide poster session. Prior to the end of the first rotation, students are matched for a second 3 month rotation, culminating in talks as part of the FIMM seminar series. Near the end of the second rotation, students select, in cooperation with their rotation research mentors and the research training coordinator, a group in which to complete their studies. If a decision cannot be reached or the student would like to gain additional expertise, a third 3 month research rotation is possible from which a written report is submitted and selection of a group ensues.

After joining a research group, students are supervised primarily by the group leader. In some cases, a senior or postdoctoral researcher is also involved. Supervision involves complete mentoring toward the PhD degree, including development of a specific research plan, discussion of results and planning, development of communication and presentation skills, and analysis of published literature. Students also join FIMM by direct recruitment to a research group and do not participate in the research rotations described above, and these students are supervised by their group leader.

Faculties and graduate schools:

Students, especially those in this RC apply to, meet the requirements of, and earn their degrees typically from the Faculty of Medicine. In addition to joining a faculty at the University, many students apply to and are awarded a position in a local or national graduate school such as HBGS. Through doctoral



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

programs, students are guided in scientific and complementary skills training. In addition, they are required to form a thesis committee and annually assess their progress toward the degree. In turn, supervisors and other FIMM PIs participate in organizing and teaching courses. Three FIMM researchers sit on the HBGS curriculum committee in order to facilitate integrated training. In the upcoming year, courses will be offered by FIMM researchers in functional genomics, personalized medicine, biobanking, and pathological imaging. To better integrate FIMM PhD training with HBGS, we proposed, jointly with HBGS, to the Academy of Finland, for several positions in the FIMM-EMBL style allowing students to more easily participate in HBGS curriculum, with the addition of FIMM-specific events of research rotations, annual symposia, scientific visits, FIMM seminars, retreats, poster sessions, and journal club meetings.

Good practises and quality assurance:

To ensure good practice and quality, this RC has a highly selective recruitment process and assesses student progress through several mechanisms including rotations and reports. Groups are small, allowing close, continued supervision by group leaders and interaction with all group members. Since most students are in a doctoral program, progress is also monitored annually through program-wide and thesis committee meetings. Finally, through seminars and the retreat and the Nordic EMBL Molecular Medicine Network (NMMN) meeting in which students, postdoctoral researchers, and group leaders from all three Nordic EMBL nodes come together to discuss research projects and tour core infrastructure and technologies, students present their findings on a regular basis. All of these efforts are geared toward ensuring the highest quality in training.

Assuring career perspectives: For a strong societal impact, we need to have people educated in personalized medicine in all facets of society and the health care system, thus training the future leaders in personalized medicine and translational research is of critical importance. The training and capabilities of postdoctoral researchers and doctoral and master's students, must substantially differ from those of traditional biomedically trained backgrounds, who often lack strong medical perspectives. For example, for research training within this RC and at FIMM in general, we expect students to have deep knowledge of not only their research project, but also biobanking and molecular profiling technologies and translational/personalized medicine approaches, thereby assuring rich career perspectives for these students. We also collaborate with TRANSMED, a translational medicine and research focused Master's degree program in which some students engage in projects in personalized medicine at FIMM and our researchers participate in course instruction. Finally, while international training and PhD education are key, we also must reach out to Finnish MDs and help to steer national development and implementation of personalized medicine. This outreach is of prime importance in our future development.

- RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

Strengths: EMBL empowered international PhD student recruitment, rotations, training and professional training practices, strong links to the local biomedical training (HBGP), national grad schools (e.g. drug discovery, diagnostics), combination of high-profile research, technologies and clinical context in the FIMM concept.

Challenges: Reaching out to the clinical training and clinical graduate schools, deeper incorporation of the RC's aims into the graduate programs. By far the most significant challenge is the impact on the health care system, which we fully realize, and research and training are the best ways to approach this in the long run.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

Actions: Incorporation of personalized medicine themes into the existing graduate programs, not just within this RC, but widely in the Meilahti campus, the clinics, as well as nationally and internationally. We will consider the need to set up a specific graduate program along the theme of personalized medicine. Building stronger links to the training of pregraduate, postgraduate, and CME training of MDs.

3 SOCIETAL IMPACT OF RESEARCH AND DOCTORAL TRAINING (MAX. 4400 CHARACTERS WITH SPACES)

- Description of how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).

Health care accounts for about 7.5% of the GDP in Finland, with an increasing trend due to the aging population. In some countries, this percentage is twice that of Finland. Indirectly via the health and well-being, the impact of health care to the society is much larger. Therefore, improving efficacy and performance of health care has a huge impact. One of the solutions to health care challenges nationally and globally is personalized medicine.

Personalized medicine gains strength from the recent advances in molecular medicine that will lead to the redefinition of diseases. The other element strongly impacting on the future is the integration of medical and molecular information, which must be harnessed, interpreted, made available and acted upon in a wise manner. The third trend is increasing awareness and willingness of the patients and people to take care of their own health, the application of internet, social media and personalized health management and monitoring systems. We will initiate a series of efforts to increase awareness of personalized medicine and this RC at the society level.

1) We will engage key stakeholders necessary to adopt personalized medicine to high-level discussions. Chancellor of the University of Helsinki will chair a major national symposium and issue invitations to high-profile stakeholders, such as Ministers and the European Commission, major companies, hospital directors, other health care providers and funders, Academy of Finland, Tekes, Sitra, patient organizations, ethical experts, researchers and physicians active in the area, as well as companies. The help of the chancellor in advancing this society interaction is critical. The expected outcome of these efforts is both significant publicity to the personalized medicine, as well as a series of initiatives, practical plans and funding initiatives that will push adaptation of personalized medicine.

2) We will work very closely with national stakeholders in the private sector. Tekes as an applied research funding agency is interested in personalized medicine, and will be collaborating in raising awareness and links to companies. We will work with two national umbrella organizations, Salwe Inc. in the health care sector and Tivit in the IT sector as well as with many other private companies to launch collaborative proposals and joint work. We are already engaged in discussions with Duodecim, a not-for-profit company of the Finnish physicians, with an interest in developing software to assist in future personalized treatment decisions.

3) Our newly-funded Innovative Medicines Initiative (IMI) project with the big pharma and the European commission (PREDECT), will be a major driver of society impact.

4) We will need to have people educated with the personalized medicine in all levels of the society and health care system, thus training the future leaders in personalized medicine is of critical importance.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

5) New health care procedures are often initially adopted by individual patients, private clinics, and only after that they will be propagated to the public sector. This means that the RC must keep eyes open to new ways of translating personalized medicine, beyond interactions with the public university clinic next door.

- Ways to strengthen the societal impact of the RC's research and doctoral training.

1) Research planning to more directly address personalized medicine and human health. Our research should be published in top journals, but also be of interest to the public and communicated well to the media for its immediate health implications.

2) New ideas to solve scientific challenges. For example, we have plans with the European Bioinformatics Institute to engage the global biomedical researcher and bioinformatics community to interpret complex molecular profiling data from individual patients (see below point 5). Computerized decision making is another field of interest.

3) Patients/ individuals are globally empowered by e.g. internet, social media and home-based and patient-initiated health testing. These trends will be taken into account to deliver personalized medicine for individuals, not just institutions.

4) We will continue to work with Finnish and international companies to advance the field. Sometimes companies to implement the plans may not exist, and we will need to promote launch spin-off companies, which likely will play an important role in the process.

4 INTERNATIONAL AND NATIONAL (INCL. INTERSECTORAL) RESEARCH COLLABORATION AND RESEARCHER MOBILITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the RC's research collaborations and joint doctoral training activities and how the RC has promoted researcher mobility.

The RC is again here benefitting from the launch and concepts of the Institute for Molecular Medicine Finland (FIMM) and its Nordic EMBL Partnership for Molecular Medicine. As the RC on personalized medicine is the key scientific and society impact focus point of the entire FIMM, we will describe here also the FIMM collaborations as they pertain to this RC as well.

FIMM is an international research institute focusing on building a bridge from discovery to medical applications. FIMM is part of the Nordic EMBL Partnership for Molecular Medicine, together with the European Molecular Biology Laboratory (EMBL), and corresponding Oslo and Umeå centres in Norway and Sweden. At the national level, FIMM is a joint research institute of the University of Helsinki, the Hospital District of Helsinki and Uusimaa (HUS), the National Institute for Health and Welfare (THL) and the VTT Technical Research Centre of Finland. Therefore, FIMM naturally bridges both international and national collaboration. FIMM is a unique research institute from the point of view of the intersectoral research, which is gaining in importance in Finland. The host institutes of FIMM belong to three different Ministries.

This RC is also benefiting from the links of the FIMM National Network for Molecular Medicine, a group of 15 top scientists in the field of molecular medicine in Finland. The RC is closely integrated with several technological platform programs of the Biocenter Finland (www.bf.fi). As already mentioned, the RC is also linked to all the national and international infrastructures (e.g. EATRIS translational research, BBMRI biobanks, ELIXIR bioinformatics and EU-OPENSOURCE chemical biology) that strongly support the scientific base and international links of the RC and provide significant funding (2,8 M€ for 2011). This RC



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

is also receiving funding from the Innovative Medicines Initiative (IMI), a joint collaboration of EU's big pharma and researchers (1,4 M€ for 2011-15).

This RC is also jointly developing its research efforts with those of the Faculty of Medicine at the University of Helsinki. One of the key focus areas of the Faculty of Medicine and the Hospital District of Helsinki and Uudenmaa Hospital research goals is personalized medicine. One of the key programs for society impact (e.g. fund raising efforts) at the University of Helsinki is also personalized medicine, so this RC is closely linked with the goals of the Meilahti medical research organizations as a whole, including benefits to the University of Helsinki directly.

An essential component and a key founding feature of the EMBL, as well as that of FIMM (and subsequently this RC), is the international mobility. All our group leaders must have engaged in international mobility and most of them are hired directly from abroad (US x 3, Sweden x 1, Luxembourg x 1, France x 1). At the moment all positions are open to international applicants, the PhD programs advertise globally. We do not yet have statistics for this RC, but at the FIMM level, the staff comes from 19 nationalities so far.

International Finland Distinguished Professors will be a key asset to drive the goals forward with e.g. Jonathan Knowles and Juni Palmgren as examples.

- RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

Strengths: International environment resulting from EMBL links and administrative procedures, such as recruitment. Under-one-roof concept marrying biobank, molecular medicine research, technology cores and translational unit. Links to three ministries, national infrastructures and four ESFRI international infrastructures support the strong technological base of the RC. Good existing contacts with the companies in the field (e.g. Salwe). FIMM and therefore the RC as a whole are uniquely placed at the intersection of the society to tackle key questions of broad nature, such as personalized medicine.

Challenges and action: Get the multitude of international partnerships better aligned to benefit the core mission of the RC. The immediate society impact will first be national, and later international. We will work more closely with clinicians at the HUS, but will also directly engage in contacts with private clinics, patient organizations and individuals via internet, social media, regular media and respected partners, such as Duodecim, the Finnish not-for-profit physician organization.

5 OPERATIONAL CONDITIONS (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).

The RC is based on five research groups at the Institute for Molecular Medicine Finland FIMM (Kallioniemi, Knowles, Lundin, Ripatti, Wennerberg) and two at the Faculty of Medicine/HUS (Porkka, Mustjoki). The groups were selected based on those who have the most direct links to personalized medicine and based on how implementation to the health care sector can most readily be done.

Our goal is to achieve concrete society benefits, and envision that in 5 years from now, our RC, FIMM and the Meilahti and Finnish medical community is a world-leader in implementing personalized medicine in selected areas of this RC. The three areas of research activity and doctoral training for the RC are 1) predicting the risk of cardiovascular disease by using genomics and molecular profiling data from large-scale Finnish population cohorts (Ripatti, Knowles, Lundin, Kallioniemi), 2) developing



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

personalized medicine strategies to assess the most optimal therapies to individual leukemia patients, acute myeloid leukemias in particular (Porkka, Mustjoki, Kallioniemi, Wennerberg) and 3) integrated systems for automated molecular, imaging and clinical decision algorithms in cancer (Lundin, Ripatti, Knowles, Kallioniemi).

All these research efforts will closely link to one another and will provide synergistic support to one another. For example, the clinical decision algorithms and web-based data handling and analysis technologies initially developed for cancer by Lundin's group, can be adapted for handling and processing information from Ripatti's efforts in cardiovascular risk predictions and later possibly also in leukemias. Most of the researchers at FIMM are engaged in this research with 100% commitment, while clinical researchers (Porkka, Mustjoki) will need to manage the clinical duties as well.

As explained above for infrastructures, the RC is benefitting from enormously strong, international-level infrastructures that support its activities in biobanking, translational research, bioinformatics, sequencing, high-throughput drug testing etc. The RC is also gaining strength from FIMM's role at the intersection of biomedical research, translational research, public health and clinical research and practical health care, with links to the programs run by three different Ministries.

- RC's strengths and challenges related to operational conditions, and the actions planned for their development.

Strengths: Strong links to FIMM science, technologies, biobanking and translational unit. Links to international infrastructures, with a unique intersection between four international ESFRI efforts, biobanking, translation, bioinformatics and chemical biology. RC is positioned at the intersection between health and research.

Challenges: Impacting a change in the medical profession is difficult and slow, as the field is complex and often conservative. Scientific evidence is needed to drive the change.

Actions: We need larger networks than the present 7 group leaders to initiate any change in the medical sector. Therefore, the RC's societal impact will be done with a much larger network than described here. For example, although not formally part of the RC, the rest of the FIMM group leaders are also linked to the RC's future activities, and we also plan to widely collaborate with the Faculty of Medicine as well as with HUS, THL and VTT partner institutes of FIMM, and then engage all the societal stakeholders into a discussion. Chancellor has promised to help in societal interaction.

6 LEADERSHIP AND MANAGEMENT IN THE RESEARCHER COMMUNITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the execution and processes of leadership in the RC, how the management-related responsibilities and roles are distributed in the RC and how the leadership- and management-related processes support high quality research, collaboration between principal investigators and other researchers in the RC, the RC's research focus and strengthening of the RC's know-how.

The leadership of this RC will be tightly linked with the operational activities of the Institute for Molecular Medicine Finland (FIMM), where RC coordinator Olli Kallioniemi is a Director, and where all the RC's group leaders are directly linked with (Knowles FiDiPro Professor, Ripatti and Wennerberg as FIMM-EMBL Group Leaders, Lundin to-be-nominated as a Research Director 2/2011, Porkka is a board member at FIMM and close collaborator along with Satu Mustjoki whose primary affiliation is at the Faculty of Medicine and HUS).



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

The project on personalized molecular medicine is a flagship project of the entire institute, and therefore FIMM is strongly committed to promote this RC. The RC will therefore benefit from the executional, administrative, infrastructural and collaborative capabilities that FIMM has generated. In particular, the area of society impact is such that a loose academic research collaborative group will not otherwise have the capability to act as a major player with a strong society interaction. Having the FIMM support will be critical towards advancing the society impact that this RC wants to accomplish.

Although the RC is strongly scientifically focused on the three goals indicated, these only serve as examples and concrete projects that help to demonstrate the benefits of personalized molecular medicine. Changes are needed in most areas of the medical profession and health care, but obviously some areas of medicine need to show the way. For example, we have selected hematology and leukemias as examples, as this area of medicine has by far the longest track record in propagating personalized molecular medicine.

- RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes.

Our RC is uniquely positioned in generating society impact and influencing health care policies based on a strong track record of scientific achievements, technological expertise, availability of biobanks and registry data in Finland, information management (e.g. Johan Lundin and Samuli Ripatti), links to medical profession (e.g. Kimmo Porkka), industrial and society impact (e.g. Jonathan Knowles).

We will create a number of new ideas to solve scientific challenges in personalized medicine and to drive the society impact. For example, with the European Bioinformatics Institute, we have plans to engage the global biomedical researcher and bioinformatics community to interpret complex molecular profiling data from individual patient samples (anonymous with patient consent and ethical review) and communicate the findings back to the physicians in real time to help treatment of difficult cases.

7 EXTERNAL COMPETITIVE FUNDING OF THE RC

- Listing of the RCs external competitive funding, where:
 - the funding decisions have been made during 1.1.2005-31.12.2010, and
 - the administrator of the funding is/has been the University of Helsinki
- Academy of Finland (AF) - total amount of funding (in euros) AF has decided to allocate to the RC members during 1.1.2005-31.12.2010: 803240
- Finnish Funding Agency for Technology and Innovation (TEKES) - total amount of funding (in euros) TEKES has decided to allocate to the RC members during 1.1.2005-31.12.2010: 2718000
- European Union (EU) - total amount of funding (in euros) EU has decided to allocate to the RC members during 1.1.2005-31.12.2010: 2104330
- European Research Council (ERC) - total amount of funding (in euros) ERC has decided to allocate to the RC members during 1.1.2005-31.12.2010: 0
- International and national foundations – names of international and national foundations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the foundations: American Thoracic Society - LAM Treatment Alliance



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

- Cancer Foudation
 - Jane and Aatos Erkko Foundation
 - Hengityssairauksien tutkimussäätiö
 - K.A. Johansson Foundation
 - Sigrid Jusélius Foundation
 - Väinö and Laina Kivi Foundation
 - The LAM Foundation
 - Veritautien Tutkimussäätiö
 - total amount of funding (in euros) from the above-mentioned foundations: 844950
- Other international funding - names of other international funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the funding organizations:
 - total amount of funding (in euros) from the above-mentioned funding organizations:
- Other national funding (incl. EVO funding and Ministry of Education and Culture funded doctoral programme positions) - names of other national funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the funding organizations: Ministry of Education and Culture
 - Biocenter Finland
 - Biocentrum Helsinki
 - HUS (EVO Funding)
 - total amount of funding (in euros) from the above-mentioned funding organizations: 1533000

8 RC'S STRATEGIC ACTION PLAN FOR 2011–2013 (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the RC's future perspectives in respect to research and doctoral training.

As the RC is new, and activities only started really in 2010, most of the description above has focused on the future plans, not past achievements. The main points of the research activities are summarized below for 2011-2013:

 - We will formally launch and execute all the three subprojects, with clear goals defined for biobanks, science, technologies, translational aims, education and society impact.
 - In the subproject on 1) predicting the risk of cardiovascular disease by using genomics and molecular profiling data from large-scale Finnish population cohorts (Ripatti, Knowles, Lundin, Kallioniemi), we will try to achieve a concrete understanding of the combined role of genetics and metabolic profiling in predicting risk to cardiovascular disease. We will impact on the society by defining practical implementation of personalized risk factor estimations for cardiovascular disease on the web, intended for lay audience, along with a clinician support tool to integrate risk factors for nutritional and medical interventions.
 - In the subproject 2) developing personalized medicine strategies to asses the most optimal therapies to individual leukemia patients, acute myeloid leukemias in particular (Porkka, Mustjoki, Kallioniemi, Wennerberg) we will develop nation-wide biobanking of AMLs, comprehensive molecular profiles of



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

patients, testing for drug sensitivity and integration of all data into an information management system for guiding personalized AML therapy in partice in the participating centres.

- In the subproject 3) integrated systems for automated molecular, imaging and clinical decision algorithms in cancer (Lundin, Ripatti, Knowles, Kallioniemi), we will work based on Lundin group's expertise on imaging and web-based tools to link molecular, pathological (imaging) and clinical data together on 1000s of patients. The current tools have been best implemented in breast cancer (Finprog study), but will be expanded here to prostrate cancer as well as the cardiovascular disease risk factors indicated above.

- In all the 3 projects above, we will try to achieve and make available, all the molecular profiling tools that might help the patients and the clinicians in treatment selection.

9 SHORT DESCRIPTION OF HOW THE RC MEMBERS HAVE CONTRIBUTED TO THE COMPILATION OF THE STAGE 2 MATERIALS (MAX. 1100 CHARACTERS WITH SPACES).

All group leaders contributed to the joint strategy of the RC and agreed upon the basic profiles of the RC. All group leaders provided information on their own group's activities, and funding details. Olli Kallioniemi wrote the basic text on the RC overall plans, with Gretchen Repasky contributing to the educational part, Kimmo Pitkänen and Imre Västrik on society interaction, Jonathan Knowles on the importance of personalized medicine, Samuli Ripatti on cardiovascular plans and Johan Lundin on imaging, informatics and clinical decision making. Most group leaders provided feedback on the written report. FIMM administrative support was critical for personnel, financial and other details.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

P-Molmed/Kallioniemi

1 Analysis of publications

- Associated person is one of Olli-Pekka Kallioniemi , John Patrick Mpindi , Jonathan Knowles ,
Juho Petteri Konsti , Caroline Heckman , Johan Edvard Lundin , Nina Linder ,
Tiina Elina Lehtimäki , Mikael Edvard Lundin , Kimmo Porkka ,
Samuli Olli Ripatti , Satu Mustjoki , Jukka Matti Vakkila , Anna Kreutzman ,
Leena Karhinen , Emmi Tikkanen , Kristér Wennerberg , Gretchen Repasky ,
Tonge Brunhilda Ebai , Arnoldus Johannes - Arjan van Adrichem ,

Publication type	Publication Year						Total Count 2005 - 2010
	2005	2006	2007	2008	2009	2010	
A1 Refereed journal article	16	11	13	21	26	47	134
A2 Review in scientific journal					1		1
A3 Contribution to book/other compilations (refereed)			4				4
A4 Article in conference publication (refereed)			2		2	2	6
B1 Unrefereed journal article			1	1	3		5
B2 Contribution to book/other compilations (non-refereed)					1		1
B3 Unrefereed article in conference proceedings						1	1
D1 Article in professional journal						2	2
H1 Patents			1				1



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

P-Molmed/Kallioniemi

2 Listing of publications

A1 Refereed journal article

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INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

P-Molmed/Kallioniemi

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INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

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P-Molmed/Kallioniemi

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INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

P-Molmed/Kallioniemi

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UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

P-Molmed/Kallioniemi

2010

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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

P-Molmed/Kallioniemi

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Speliotes, EK, Willer, CJ, Berndt, SI, Monda, KL, Thorleifsson, G, Jackson, AU, Allen, HL, Lindgren, CM, Luan, J, Maegi, R, Randall, JC, Vedantam, S, Winkler, TW, Qi, L, Workalemahu, T, Heid, IM, Steinthorsdottir, V, Stringham, HM, Weedon, MN, Wheeler, E, Wood, AR, Ferreira, T, Weyant, RJ, Segre, AV, Estrada, K, Liang, L, Nemes, J, Park, J, Gustafsson, S, Kilpeläinen, TO, Yang, J, Bouatia-Naji, N, Esko, T, Feitosa, MF, Kutalik, Z, Mangino, M, Raychaudhuri, S, Scherag, A, Smith, AV, Welch, R, Zhao, JH, Aben, KK, Absher, DM, Amin, N, Dixon, AL, Fisher, E, Glazer, NL, Goddard, ME, Heard-Costa, NL, Hoesel, V, Hottenga, J, Johansson, A, Johnson, T, Ketkar, S, Lamina, C, Li, S, Moffatt, MF, Myers, RH, Narisu, N, Perry, JRB, Peters, MJ, Preuss, M, Ripatti, S, Rivadeneira, F, Sandholt, C, Scott, LJ, Timpson, NJ, Tyrer, JP, van Wingerden, S, Watanabe, RM, White, CC, Wiklund, F, Barlassina, C, Chasman, DI, Cooper, MN, Jansson, J, Lawrence, RW, Pellikka, N, Prokopenko, I, Shi, J, Thiering, E, Alavere, H, Alibrandi, MTS, Almgren, P, Arnold, AM, Aspelund, T, Atwood, LD, Balkau, B, Balmforth, AJ, Bennett, AJ, Ben-Shlomo, Y, Bergman, RN, Bergmann, S, Biebermann, H, Blakemore, AIF, Boes, T, Bonnycastle, LL, Bornstein, SR, Brown, MJ, Buchanan, TA, Busonero, F, Campbell, H, Cappuccino, FP, Cavalcanti-Proenca, C, Chen, YI, Chen, C, Chines, PS, Clarke, R, Coin, L, Connell, J, Day, INM, den Heijer, M, Duan, J, Ebrahim, S, Elliott, P, Elosua, R, Ericksdottir, G, Erdos, MR, Eriksson, JG, Facheris, MF, Felix, SB, Fischer-Posovszky, P, Folsom, AR, Friedrich, N, Freimer, NB, Fu, M, Gagat, S, Gejman, PV, Geus, EJC, Gieger, C, Gjesing, AP, Goel, A, Goyette, P, Grallert, H, Graessler, J, Greenawald, DM, Groves, CJ, Gudnason, V, Guiducci, C, Hartikainen, A, Hassanali, N, Hall, AS, Havulinna, AS, Hayward, C, Heath, AC, Hengstenberg, C, Hicks, AA, Hinney, A, Hofman, A, Homuth, G, Hui, J, Igl, W, Iribarren, C, Isomaa, B, Jacobs, KB, Jarick, I, Jewell, E, John, U, Jorgensen, T, Jousilahti, P, Jula, A, Kaakinen, M, Kajantie, E, Kaplan, LM, Kathiresan, S, Kettunen, J, Kinnunen, L, Knowles, JW, Kolcic, I, Koenig, IR, Koskinen, S, Kovacs, P, Kuusisto, J, Kraft, P, Kvaloy, K, Laitinen, J, Lantieri, O, Lanzani, C, Launer, LJ, Lecocq, C, Lehtimäki, T, Lettre, G, Liu, J, Lokki, M, Lorentzon, M, Luben, RN, Ludwig, B, Manunta, P, Marek, D, Marre, M, Martin, NG, McArdle, WL, McCarthy, A, McKnight, B, Meitinger, T, Melander, O, Meyre, D, Midthjell, K, Montgomery, GW, Morken, MA, Morris, AP, Mulic, R, Ngwa, JS, Nelis, M, Neville, MJ, Nyholt, DR, O'Donnell, CJ, O'Rahilly, S, Ong, KK, Oostra, B, Pare, G, Parker, AN, Perola, M, Pichler, I, Pietiläinen, KH, Platou, CGP, Polasek, O, Pouta, A, Rafelt, S, Raitakari, O, Rayner, NW, Ridderstrale, M, Rief, W, Ruokonen, A, Robertson, NR, Rzehak, P, Salomaa, V, Sanders, AR, Sandhu, MS, Sanna, S, Saramies, J, Savolainen, MJ, Scherag, S, Schipf, S, Schreiber, S, Schunkert, H, Silander, K, Sinisalo, J, Siscovick, DS, Smit, JH, Soranzo, N, Sovio, U, Stephens, J, Surakka, I, Swift, AJ, Tammesoo, M, Tardif, J, Teder-Laving, M, Teslovich, TM, Thompson, JR, Thomson, B, Toenjes, A, Tuomi, T, van Meurs, JBJ, van Ommen, G, Vatn, V, Viikari, J, Visvikis-Siest, S, Vitart, V, Vogel, CIG, Voight, BF, Waite, LL, Wallaschofski, H, Walters, GB, Widen, E, Wiegand, S, Wild, SH, Willemsen, G, Witte, DR, Wittman, JC, Xu, J, Zhang, Q, Zgaga, L, Ziegler, A, Zitting, P, Beilby, JP, Farooqi, IS, Hebebrand, J, Huikuri, HV, James, AL, Kähönen, M, Levinson, DF, Macciardi, F, Nieminen, MS, Ohlsson, C, Palmer, LJ, Ridker, PM, Stumvoll, M, Beckmann, JS, Boeing, H, Boerwinkle, E, Boomsma, DI, Caulfield, MJ, Chanock, SJ, Collins, FS, Cupples, LA, Smith, GD, Erdmann, J, Froguel, P, Greenberg, H, Gyllenstein, U, Hall, P, Hansen, T, Harris, TB, Hattersley, AT, Hayes, RB, Heinrich, J, Hu, FB, Hveem, K, Illig, T, Jarvelin, M, Kaprio, J, Karpe, F, Khaw, K, Kiemeny, LA, Krude, H, Laakso, M, Lawlor, DA, Metspalu, A, Munroe, PB, Ouwehand, WH, Pedersen, O, Penninx, BW, Peters, A, Pramstaller, PP, Quertermous, T, Reinehr, T, Rissanen, A, Rudan, I, Samani, NJ, Schwarz, PEH, Shuldiner, AR, Spector, TD, Tuomilehto, J, Uda, M, Uitterlinden, A, Valle, TT, Wabitsch, M, Waeber, G, Wareham, NJ, Watkins, J, Wilson, JF, Wright, AF, Zillikens, MC, Chatterjee, N, McCarrroll, SA, Purcell, S, Schadt, EE, Visscher, PM, Assimes, TL, Borecki, IB, Deloukas, P, Fox, CS, Groop, LC, Haritunians, T, Hunter, DJ, Kaplan, RC, Mohlke, KL, O'Connell, JR, Peltonen, L, Schlessinger, D, Strachan, DP, van Duijn, CM, Wichmann, H, Frayling, TM, Thorsteinsdottir, U, Abecasis, GR, Barroso, I, Boehnke, M, Stefansson, K, North, KE, McCarthy, MI, Hirschhorn, JN, Ingelsson, E, Loos, RJF, MAGIC 2010, 'Association analyses of 249,796 individuals reveal 18 new loci associated with body mass index', *Nature Genetics*, vol 42, no. 11, pp. 937-948.

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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

P-Molmed/Kallioniemi

- Thorgeirsson, TE, Gudbjartsson, DF, Surakka, IL, Vink, JM, Amin, N, Geller, F, Sulem, P, Rafnar, T, Esko, T, Walter, S, Gieger, C, Rawal, R, Mangino, M, Prokopenko, I, Maegi, R, Keskitalo, K, Gudjonsdottir, IH, Gretarsdottir, S, Stefansson, H, Thompson, JR, Aulchenko, YS, Nelis, M, Aben, KK, den Heijer, M, Dirksen, A, Ashraf, H, Soranzo, N, Valdes, AM, Steves, C, Uitterlinden, AG, Hofman, A, Toenjes, A, Kovacs, P, Hottenga, JJ, Willemsen, G, Vogelzangs, N, Doering, A, Dahmen, N, Nitz, B, Pergadia, ML, Saez, B, De Diego, V, Lezcano, V, Garcia-Prats, MD, Ripatti, SO, Perola, M, Kettunen, J, Hartikainen, A, Pouta, A, Laitinen, J, Isohanni, M, Shen, H, Allen, M, Krestyaninova, M, Hall, AS, Jones, GT, van Rij, AM, Mueller, T, Dieplinger, B, Haltmayer, M, Jonsson, S, Matthiasson, SE, Oskarsson, H, Tyrtingsson, T, Kiemenev, LA, Mayordomo, JI, Lindholt, JS, Pedersen, JH, Franklin, WA, Wolf, H, Montgomery, GW, Heath, AC, Martin, NG, Madden, PAF, Giegling, I, Rujescu, D, Jaervelin, M, Salomaa, V, Stumvoll, M, Spector, TD, Wichmann, H, Metspalu, A, Samani, NJ, Penninx, BW, Oostra, BA, Boomsma, DI, Tiemeier, H, van Duijn, CM, Kaprio, J, Gulcher, JR, McCarthy, MI, Palotie, L, Thorsteinsdottir, U, Stefansson, K, ENGAGE Consortium **2010**, 'Sequence variants at CHRN3-CHRNA6 and CYP2A6 affect smoking behavior', **Nature Genetics**, vol 42, pp. 448-453.
- Vihinen, PP, Hernberg, M, Vuoristo, M, Tynnela, K, Laukka, M, Lundin, J, Ivaska, J, Pyrhonen, S **2010**, 'A phase II trial of bevacizumab with dacarbazine and daily low-dose interferon-alpha 2a as first line treatment in metastatic melanoma', **Melanoma Research**, vol 20, pp. 318-325.
- Visapää, H, Hotakainen, K, Lundin, J, Ala-Opas, MY, Stenman, U **2010**, 'The Proportion of Free PSA and Upgrading of Biopsy Gleason Score after Radical Prostatectomy', **Urologia Internationalis**, vol 84, no. 4, pp. 378-381.
- Waterworth, DM, Ricketts, SL, Song, K, Chen, L, Zhao, JH, Ripatti, S, Aulchenko, YS, Zhang, W, Yuan, X, Lim, N, Luan, J, Ashford, S, Wheeler, E, Young, EH, Hadley, D, Thompson, JR, Braund, PS, Johnson, T, Struchalin, M, Surakka, I, Luben, R, Khaw, K, Rodwell, SA, Loos, RJF, Boehnke, SM, Inouye, M, Deloukas, P, Elliott, P, Schlessinger, D, Sanna, S, Scuteri, A, Jackson, A, Mohlke, KL, Tuomilehto, J, Roberts, R, Stewart, A, Kesaeniemi, YA, Mahley, RW, Grundy, SM, McArdle, W, Cardon, L, Waeber, G, Vollenweider, P, Chambers, JC, Boehnke, M, Abecasis, GR, Salomaa, V, Jaervelin, M, Ruukonen, A, Barroso, I, Epstein, SE, Hakonarson, HH, Rader, DJ, Reilly, MP, Witteman, JCM, Hall, AS, Samani, NJ, Strachan, DP, Barter, P, van Duijn, CM, Kooner, JS, Peltonen, L, Wareham, NJ, McPherson, R, Mooser, V, Sandhu, MS, Wellcome Trust Case Control Consor **2010**, 'Genetic Variants Influencing Circulating Lipid Levels and Risk of Coronary Artery Disease', **Arteriosclerosis, Thrombosis, and Vascular Biology**, vol 30, pp. 2264-U566.
- Widen, E, Ripatti, S, Cousminer, DL, Surakka, I, Lappalainen, T, Jaervelin, M, Eriksson, JG, Raitakari, O, Salomaa, V, Sovio, U, Hartikainen, A, Pouta, A, McCarthy, MI, Osmond, C, Kajantie, E, Lehtimäki, T, Viikari, J, Kahonen, M, Tyler-Smith, C, Freimer, N, Hirschhorn, JN, Peltonen, L, Palotie, A **2010**, 'Distinct Variants at LIN28B Influence Growth in Height from Birth to Adulthood', **American Journal of Human Genetics**, vol 86, no. 5, pp. 773-782.
- Wienke, A, Ripatti, S, Palmgren, J, Yashin, A **2010**, 'A bivariate survival model with compound Poisson frailty', **Statistics in Medicine**, vol 29, pp. 275-283.
- Zhang, L, Nebane, NM, Wennerberg, K, Li, Y, Neubauer, V, Hobrath, JV, McKellip, S, Rasmussen, L, Shindo, N, Sosa, M, Maddry, JA, Ananthan, S, Piazza, GA, White, EL, Harsay, E **2010**, 'A High-Throughput Screen for Chemical Inhibitors of Exocytic Transport in Yeast', **ChemBioChem**, vol 11, pp. 1291-1301.

A2 Review in scientific journal

2009

- Porkka, K, Mustjoki, S, Simonsson, B **2009**, 'Suboptimal treatment responses in chronic myeloid leukemia : milestones and mechanisms', **Expert Review of Hematology**, vol 2, pp. 81-91 .

A3 Contribution to book/other compilations (refereed)

2007

- Elonen, E, Porkka, K **2007**, 'Pahanlaatuisten veritautien lääkehoidon solu- ja molekyyli-tason kohteet', **Veritaudit, Duodecim, Helsinki**, pp. 69-83.
- Knuutila, S, Kairisto, V, Porkka, K **2007**, 'Syto- ja molekyyli-genetiikka', **Veritaudit, Duodecim, Helsinki**, pp. 112-133.
- Porkka, K, Elonen, E **2007**, 'Harvinaiset lymfoproliferatiiviset taudit', **Veritaudit, Duodecim, Helsinki**, pp. 441-453.
- Porkka, K, Koistinen, P **2007**, 'Krooninen myeloinen leukemia', **Veritaudit, Duodecim, Helsinki**, pp. 324-334.

A4 Article in conference publication (refereed)

2007

- Karhemo, PR, Syrjakari, H, Kivinen, P, Valmu, L, Lundin, J, Joensuu, H, Laiho, M, Bono, P, Laakkonen, P **2007**, 'Proteomic profiling of invasive cancer cells reveals a novel prognostic marker for human breast cancer.', **EJC supplements** 5.
- Sihto, H, Puputti, M, Heikkilä, R, Lehtimäki, T, Holli, K, Kataja, V, Turpeenniemi-Hujanen, T, Isola, J, Lundin, J, Joensuu, H **2007**, 'Breast cancer detection in mammography screening has independent influence on survival when cancer size and biological subtype are accounted for.', **EJC supplements** 5.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

P-Molmed/Kallioniemi

2009

Konsti, J, Ahonen, T, Lundin, M, Joensuu, H, Pietikainen, M, Lundin, J **2009**, *Texture classifiers for breast cancer outcome prediction*, Virchows Archiv 455 SPRINGER.

Lundin, J, Konsti, J, Lundin, M **2009**, *Development of an online image analysis platform for digital whole slide specimen*, Virchows Archiv 455 SPRINGER.

2010

Szymas, J, Lundin, M, Lundin, J **2010**, *A web-based examination system for students using WebMicroscopy for learning oral pathology*, Virchows Archiv 457 SPRINGER.

Szymas, J, Lundin, M **2010**, *Five years of experiences with WebMicroscope for teaching basic and oral pathology in a practical course*, Virchows Archiv 457 SPRINGER.

B1 Unrefereed journal article

2007

Lundin, J **2007**, 'The Nottingham Prognostic Index - from relative to absolute risk prediction', **European Journal of Cancer Prevention**, vol 43, pp. 1498-1500.

2008

Borze, FI, Mustjoki, S, Juvonen, E, Knuutila, S **2008**, 'Oligoarray comparative genomic hybridization in polycythemia vera and essential thrombocythemia: [letters to the editor]', **Haematologica**, vol 93, no. 7, pp. 1098-1100.

2009

Aebersold, R, Kallioniemi, O, Zupan, B **2009**, 'Report on EU-USA workshop: how systems biology can advance cancer research (27 October 2008)', **Molecular oncology**, vol 3, no. 1, pp. 9-17.

Lundin, J **2009**, 'Pionjärer i global hälsa: [ledare]', **Finska Läkaresällskapets Handlingar**, vol 169, no. 2, pp. 2-3.

Lundin, J **2009**, 'Kommunikationens olidliga lätthet: [ledare]', **Finska Läkaresällskapets Handlingar**, vol 169, no. 1, pp. 2.

B2 Contribution to book/other compilations (non-refereed)

2009

Heckman, CA, Holopainen, TT, Alitalo, K **2009**, 'Molecular Targeting of Lymphangiogenesis and Tumor Metastasis', in L Stanley (ed.), **From Local Invasion to Metastatic Cancer**, Humana Press, pp. 283-295.

B3 Unrefereed article in conference proceedings

2010

Konsti, J, Lundin, M, Joensuu, H, Lundin, J **2010**, *Automated vision quantitative assessment of Ki-67 proliferation index in a nationwide series of patients with breast cancer*, Virchows Archiv 457 SPRINGER.

D1 Article in professional journal

2010

Kere, J, Ripatti, SO, Perola, M **2010**, 'Monitekijäisten tautien genetiikka', **Duodecim**, vol 126, no. 19, pp. 2305-2310.

Myllykangas, LT, Paunio, T, Lundin, JE, Marjamaa, A, Silander, K, Pennanen, P, Aarnio, M, Oksanen, MK, Dias, J, Pesonen, S, Hemminki, AE **2010**, 'Ulkomaiset lääkärit, hammaslääkärit ja tieteelliset jatko-opiskelijat Suomessa', **Suomen lääkärilehti**, vol 41, pp. 3309-3314.

H1 Patents

2007

Laakkonen, PM, Porkka, K, Hoffman, JA, Ruoslahti, E **2007**, *Peptides that home to tumor lymphatic vasculature and methods of using same*, 7671021.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

P-Molmed/Kallioniemi

1 Analysis of activities 2005-2010

- Associated person is one of Olli-Pekka Kallioniemi , John Patrick Mpindi , Jonathan Knowles ,
Juho Petteri Konsti , Caroline Heckman , Johan Edvard Lundin , Nina Linder ,
Tiina Elina Lehtimäki , Mikael Edvard Lundin , Kimmo Porkka ,
Samuli Olli Ripatti , Satu Mustjoki , Jukka Matti Vakkila , Kristér Wennerberg , Anna Kreutzman , Gretchen Repasky ,
Leena Karhinen , Emmi Tikkanen , Tonge Brunhilda Ebai , Arnoldus Johannes - Arjan van Adrichem ,

Activity type	Count
Prizes and awards	4
Editor of research journal	1
Peer review of manuscripts	8
Membership or other role in review committee	4
Membership or other role in research network	4
Membership or other role in national/international committee, council, board	19
Membership or other role of body in private company/organisation	1
Participation in interview for written media	13
Participation in radio programme	1
Participation in TV programme	2
Participation in interview for web based media	1



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

P-Molmed/Kallioniemi

2 Listing of activities 2005-2010

Prizes and awards

Olli-Pekka Kallioniemi ,

AACR Team Science Award, Olli-Pekka Kallioniemi, 2008

IFCC Abbott Award, Olli-Pekka Kallioniemi, 2008

Johan Edvard Lundin ,

Educational Technology Award, Johan Edvard Lundin, 01.01.2005 → 31.12.2011, Finland

Best Presentation at a Scientific Session, Johan Edvard Lundin, 20.09.2010, United States

Editor of research journal

Johan Edvard Lundin ,

Editor-in-Chief, Finska Läkaresällskapets Handlingar, Johan Edvard Lundin, 01.01.2005 → 31.12.2010

Peer review of manuscripts

Johan Edvard Lundin ,

Reviewer, European Journal of Cancer, Johan Edvard Lundin, 01.01.2004 → ...

Samuli Olli Ripatti ,

Reviewed manuscripts for the Alcoholism: Clinical and Experimental Research, Samuli Olli Ripatti, 2005 → 2010

Reviewed manuscripts for the Biometrical Journal, Samuli Olli Ripatti, 2005 → 2010

Reviewed manuscripts for the Biostatistics Journal, Samuli Olli Ripatti, 2005 → 2010

Reviewed manuscripts for the European Journal of Human Genetics, Samuli Olli Ripatti, 2005 → 2010

Reviewed manuscripts for the Genetic Epidemiology, Samuli Olli Ripatti, 2005 → 2010

Reviewed manuscripts for the Journal of Computational and Graphical Statistics, Samuli Olli Ripatti, 2005 → 2010

Reviewed manuscripts for the Lifetime Data Analysis Journal, Samuli Olli Ripatti, 2005 → 2010

Membership or other role in review committee

Johan Edvard Lundin ,

Tuumorikudoksen geeniprofilointiin perustuvat testit rintasyövän hoidossa, Johan Edvard Lundin, 24.08.2010 → ..., Finland

Samuli Olli Ripatti ,

Member in review committee: ZonMW, Samuli Olli Ripatti, 2007 → ...

ERC Advance Grant referee, Samuli Olli Ripatti, 2009 → ..., Belgium

ERC starting grant referee, Samuli Olli Ripatti, 2009 → ..., Belgium

Membership or other role in research network

Samuli Olli Ripatti ,

Member in Nordic Center of Excellence for Disease Genetics: Harmonization of control database, Samuli Olli Ripatti, 2007 → 2010

Network in Academia:P3G, Working Group 2, Samuli Olli Ripatti, 2008 → ...

Project manager in Biostatistics group (GENESTAT) in EU FP6 coordinated action PHOEBE, Samuli Olli Ripatti, 2008 → 2009

Steering Group Member in EU FP7 project ENGAGE, cardiovascular risk factors, statistical genetics, Samuli Olli Ripatti, 2008 → ...



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

P-Molmed/Kallioniemi

Membership or other role in national/international committee, council, board

Olli-Pekka Kallioniemi ,

AACR, Olli-Pekka Kallioniemi, 2001 → ..., United States
Human Protein Atlas Initiative, Olli-Pekka Kallioniemi, 2006 → ..., Sweden
CREATE-Health, Olli-Pekka Kallioniemi, 2007 → ..., Sweden
International Cancer Genome Sequencing Consortium, Olli-Pekka Kallioniemi, 2007 → 2008
Biocenter Finland, Olli-Pekka Kallioniemi, 2008 → ..., Finland
Biocentrum Helsinki, Board member, Olli-Pekka Kallioniemi, 2008 → ..., Finland
ESFRI, Olli-Pekka Kallioniemi, 2008 → ...
HBGS, Olli-Pekka Kallioniemi, 2008 → ..., Finland
Nordic EMBL, Olli-Pekka Kallioniemi, 2008 → ...
Oslo Cancer Biomedicine Consortium, Olli-Pekka Kallioniemi, 2008 → ..., Norway
University of Helsinki, Olli-Pekka Kallioniemi, 2008 → ..., Finland
AACR, Olli-Pekka Kallioniemi, 2009 → ..., United States
EBI-EMBL, Olli-Pekka Kallioniemi, 2009 → ...
ERI-ICP, Olli-Pekka Kallioniemi, 2009 → ...
European Academy of Cancer Societies, Olli-Pekka Kallioniemi, 2009 → ...
WIN Consortium, Olli-Pekka Kallioniemi, 2009 → ...
AACR, Olli-Pekka Kallioniemi, 2010 → ..., United States
BF, Drug Discovery and Chemical Biology Initiative DDCB, Olli-Pekka Kallioniemi, 2010 → ..., Finland
German Consortium for Translational Cancer Research, Olli-Pekka Kallioniemi, 2010 → 2011, Germany

Membership or other role of body in private company/organisation

Johan Edvard Lundin ,

American Medical Informatics Association, Johan Edvard Lundin, 05.02.2006 → 31.12.2011, United States

Participation in interview for written media

Olli-Pekka Kallioniemi ,

New law to set up genetic bank, Olli-Pekka Kallioniemi, 04.2009, Finland
Academy of Finland, Science Breakfast: Henkilökohtainen lääketiede avaa tietä yksilöllisille hoidoille, Olli-Pekka Kallioniemi, 18.11.2010, Finland
Maailman tutkituin syöpä, Olli-Pekka Kallioniemi, 15.10.2010, Finland
Syövän hoitoa räätälöidyisti, Olli-Pekka Kallioniemi, 07.2010, Finland

Jonathan Knowles ,

Academy of Finland, Science Breakfast: Henkilökohtainen lääketiede avaa tietä yksilöllisille hoidoille, Jonathan Knowles, 18.11.2010
Laboratoriolääketiede ja näyttely 2010, Jonathan Knowles, 2010
Lääke, sijoitus terveyteen ja työkykyyn, Jonathan Knowles, 2010, Finland
Maailman tutkituin syöpä, Jonathan Knowles, 2010
Medical research afternoon for science journalists, Jonathan Knowles, 2010
Tautigeenitieto auttaa sairauksien hoidossa, Jonathan Knowles, 03.10.2010, Finland

Samuli Olli Ripatti ,

Interview in "Ajassa" magazine "Ambassador of genes", personal profile of Samuli Ripatti, Samuli Olli Ripatti, 09.2010 → ...
Interview in Tiede magazine ("Science"): "Where do Finns come from?";, Samuli Olli Ripatti, 09.2010



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RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

P-Molmed/Kallioniemi

Samuli Ripatti's Interview in Helsingin Sanomat about the origin on Finns and 1000 genomes project, Samuli Olli Ripatti, 17.03.2010

Participation in radio programme

Samuli Olli Ripatti ,

Samuli Ripatti's interview in Finnish National Radio1, Reseptori Science Program about "Finnish genes", Samuli Olli Ripatti, 07.07.2010

Participation in TV programme

Samuli Olli Ripatti ,

Interview in seven o'clock news in MTV3 Finnish National TV, Samuli Olli Ripatti, 16.03.2010

TV program "Puoli seitsemän", Samuli Olli Ripatti, 14.04.2010

Participation in interview for web based media

Jonathan Knowles ,

Månadens porträtt, Jonathan Knowles, 2010, Sweden



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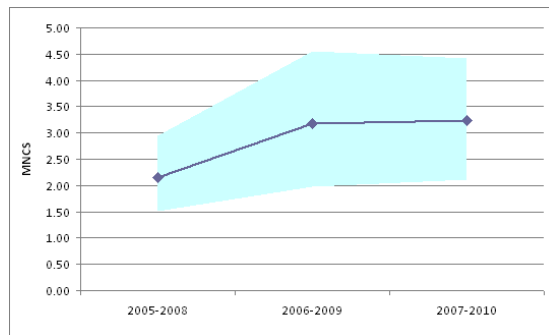
Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010
by CWTS, Leiden University, the Netherlands

Research Group: Kallioniemi O

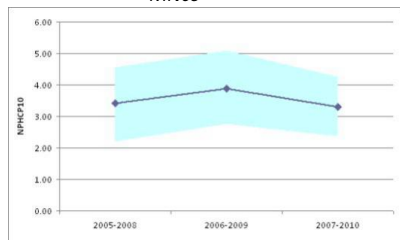
Basic statistics

Number of publications (P)	119
Number of citations (TCS)	1,524
Number of citations per publication (MCS)	13.48
Percentage of uncited publications	28%
Field-normalized number of citations per publication (MNCS)	2.88
Field-normalized average journal impact (MNJS)	2.22
Field-normalized proportion highly cited publications (top 10%)	3.08
Internal coverage	.93

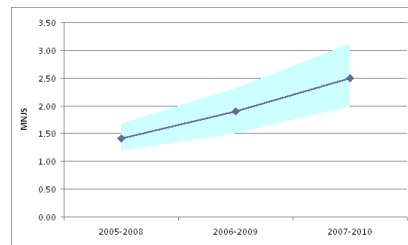
Trend analyses



MNCS

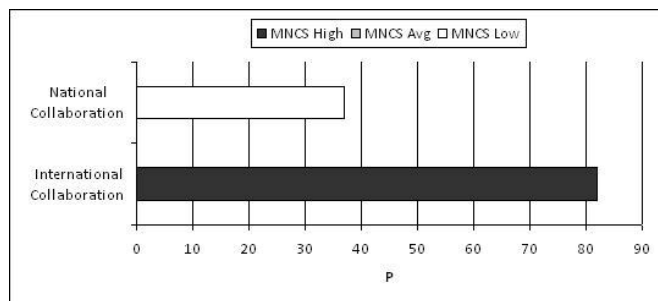


THCP10



MNJS

Collaboration



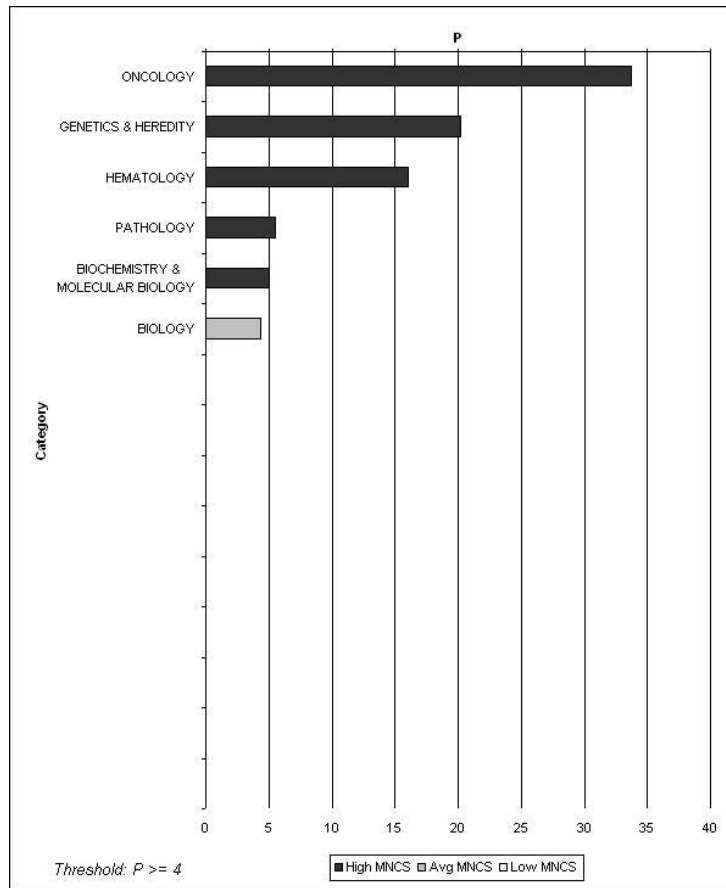
Performance (MNCS) by collaboration type



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Research profile



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