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

RC-Specific Evaluation of PHABIO – Pharmaceutical Biology

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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: Biological, Agricultural and Veterinary Sciences

Participation category:
3. 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

RC’s responsible person: Vuorela, Heikki

RC-specific keywords:
Pharmacognosy, pharmaceutical biology, pharmaceutical microbiology, phytochemistry, pharmaceutical biotechnology, medicinal chemistry, systems biology, HTS, cell signalling, antioxidants

Keywords: Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community

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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 lead 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 Pyhältö  
Director of Strategic Planning and Development, Dr Ossi Tuomi  
Doctoral candidate, MSoSc Jussi Vauhkonen
Panel members

CHAIR
Professor Ary A. Hoffman
Ecological genetics, evolutionary biology, biodiversity conservation, zoology
University of Melbourne, Australia

VICE-CHAIR
Professor Barbara Koch
Forest Sciences, remote sensing
University of Freiburg, Germany

Professor Per-Anders Hansson
Agricultural engineering, modeling, life cycle analysis, bioenergy
Swedish University of Agricultural Sciences

Professor Danny Huylebroeck
Developmental biology
Katholieke Universiteit Leuven, Belgium

Professor Jonathan King
Virus assembly, protein folding
Massachusetts Institute of Technology MIT, USA

Professor Hannu J.T. Korhonen
Functional foods, dairy technology, milk hygiene
MTT Agrifood Research Finland

Professor Kristilina Kruus
Microbiological biotechnology, microbiological enzymes, applied microbiology
VTT Technical Research Centre of Finland

Professor Joakim Lundeberg
Biochemistry, biotechnology, sequencing, genomics
KTH Royal Institute of Technology, Sweden

Professor Dominiek Maes
Veterinary medicine
Ghent University, Belgium

Professor Olli Saastamoinen
Forest economics and policy
University of Eastern Finland

Professor Kai Simons
Biochemistry, molecular biology, cell biology
Max-Planck-Institute of Molecular Cell Biology and Genetics, Germany

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 the members from the other panels and by one evaluator outside the panels.
External Expert
Professor Anders Linde
Oral biochemistry
Faculty of Odontology
Göteborg University
Sweden

Experts from the Other Panels
Professor Caitlin Buck, from the Panel of Natural Sciences
Professor Ritske Huismans, from the Panel of Natural Sciences
Professor Johanna Ivaska, from the Panel of Medicine, biomedicine and health sciences
Professor Lea Kauppi, from the Panel of Natural Sciences
Professor Holger Stark, from the Panel of Natural Sciences
Professor Peter York, from the Panel of Medicine, biomedicine and health 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 Moliainen, 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 Kaltera, 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. TUHAT\(^3\) compilations on publications and other scientific activities\(^4\)
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 panelists as compared to the previous evaluations was the character of the evaluation as a meta-evaluation. The panelists 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
   - 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
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)**

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.

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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
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 has mentioned different fields in pharmaceutical biology as targets. General topics in phytochemistry, cell biology, microbiology, analytical chemistry, biotechnology and natural compounds have been addressed. With the relatively small size of this RC, they have reached high output and great international leadership in separation of natural products and developing and validation of high throughput screens.

Within the last few years the RC has been extremely successful in building up and connecting to international networks. This can be seen in a large number of publications and a few patents.

Despite the numerous achievements, a clear focus cannot be described for the plans for the next period, e.g. the development of biological screening methods is very broad and unclear concerning in vitro measurements, enzyme screenings, membrane receptor screenings and whole cell assays. These different classes may be performed in high- or low-throughput screening etc. The difficulty in the description of the biological properties within the class of natural compounds can clearly be seen, but the resources and knowledge from other RCs could contribute to the screening very well.

The same may be true for biotechnology where protein production could be useful for numerous other RCs. Different combined foci within the University of Helsinki (UH) could strengthen each RC as well as the whole topic in the UH. The Viikki campus area provides good opportunities for close collaborations.

Numeric evaluation: 3 (Very good)

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

There is a good training program for the PhD students. The outlook for good positions is good although the general number of free positions for excellent academics is limited. The teaching workload for the PhD students as well as for the supervisors at different levels is not clear, but the impression is that there is an overload or misbalance of too much teaching leaving a smaller part for research.
The recruiting system relays on a selection of the students among the masters' students or by using an open call. In order to recruit the best students open calls should be preferred. The students are enrolled to different graduate schools which guarantee well structured studies.

The overall duration of PhD studies seems generally too long compared to international standards. The practice of the needed publications should be worked on in order to find a balanced adaption. The difficulty with a general judgement of the number of publications, problems with impact factors etc. has largely been discussed in other the work, but quality should always be better handled than quantity, and it is recommended that particular attention is directed to targeting to higher impact journals in the fields of pharmacology and pharmacy and plant science for such quality outputs. Instead, 4-6 publications for a PhD thesis is a lot, and this requirement should be reconsidered.

With the different faculties, there seem to be different PhD student programs. With a general core structure on a number of RCs or faculties and then a different specialized course for the detailed problems of the RC, the work-load may be reduced and outcome increased.

It is not clear if it is optional to choose from one to three supervisors. A number from two to three seems to be more appropriate. Furthermore, since the RC is very small, national and international collaboration in training doctoral students is essential to guarantee high quality and a large scope.

The gender problem may be raised generally in respect to the higher classification of students and PhD students. It is not restricted to this RC, but rather a general question.

Numeric evaluation: 3.5 (Very good)

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 educational program for PhD students is well worked out since all of the students receive good jobs in Finland or outside after graduation. The high reputation of the RC can greatly help in this respect. The broad education with the specific problems of the PhD theses make them almost ideal candidates in pharmaceutical industry and related job positions.

The total duration and the number of publications needed seem to be too high in comparison to international standards. This may be another question which can generally be asked.

The preparation of new audiovisual material should be acknowledged and increased with this and other RCs. With respect to e-learning or blended learning, such projects are taken with great interest by the students and can on the other hand be transferred to international cooperation in education.

Numeric evaluation: 3 (Very good)

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
The RC has greatly improved during the last evaluation concerning international exchange. The total number of six visits from the laboratory and considering that four were done by the same highly active student is not extraordinarily high. This exchange area may be further improved and supported by the supervisors.

Numerous exchange programs are performed with other European countries as well as non-European countries. Most of the financing comes currently from the highly competitive and respected EU. However, the full potential of European projects concerning exchange possibilities may still be increased in number and in diversity, with the excellent number of EU projects, especially those where the RC has project leadership.

**Numeric evaluation: 4 (Excellent)**

### 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**

Administrative work and teaching duties seem to take a lot of time from research. This is true since two RC members have led the faculty for three years. In such circumstances, it may be appropriate for the relevant faculty/faculties or the UH to provide additional support (e.g. a postdoctoral appointment for a fixed period) to support the faculty members heavily involved in administration to continue develop their research programmes, thereby maintaining the strengths of the RC. Since the number of post-docs has slightly decreased within the last evaluation period, the supervision and teaching capabilities have not. Therefore in most faculties for natural sciences, the conditions to achieve excellent results become more difficult.

In this respect the RC has done a very good job with the PhD students.

The room facilities and the conditions of instruments are unclear from the broad description. The Viikki campus provides good opportunities to exploit the various instruments located in the campus.

### 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**

The RC has a management group consisting of five PIs. The management structure and distribution of responsibilities are judged to be appropriate.
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

It is generally very difficult to secure external funding when researching in the field of natural products and pharmacognosy, or as now termed; pharmaceutical biology. But the RC has been funded by various sources to circa 1.45 MEUR, which is good. With over 50% of this sum coming from EU, the RC is encouraged to try to build on this strong support for their research, which also adds to the international standing of and potential for additional external collaboration and postgraduate student exchange for the RC.

The financing of the group and the external support could be further optimized. The high contribution from the EU is in general highly recommendable, but it is also a big risk. Only one EU-project was mentioned in the report. A more diverse funding situation should be envisaged within different projects to get support at lower risk of failure in one. The national financing sources especially the Academy of Finland and the Finnish Funding Agency for Technology and Innovation (Tekes) should be better used.

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

To focus on the overlap of existing projects as well as on the order of priority on projects seem to be highly useful for the next period.

The RC could carefully consider the strategic aspects and consider the focus areas in their research. A focused strategic plan for 2011–2013 should be regenerated.

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 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 RC is one of the leading national research teams in Pharmaceutical Biology. It has achieved excellent internationalization with some parts of leadership and good output in the form of paper and patents. The innovative character has highly increased within the last evaluation period. If possible, the quantity may be reduced to higher quality of papers.

With the relatively small size of the RC, they have achieved high output and very good visibility.
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') seems to be appropriate.

Numeric evaluation: 3 (Very good)

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

The processes employed were fair and appropriate.

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

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

2.12 RC-specific main recommendations

As this RC already has a number of international co-operations and networks, it would be the next step to get a leadership role in one of the coming international projects. It is to be noted that the RC is currently leading an EU project.

The RC could carefully consider the strategic aspects and consider the focus areas in their research. A focused strategic plan for the next years should be regenerated.

The RC is relatively small, it might be advantageous for the RC to partner with other groups in the UH.

A more diverse funding situation should be envisaged.

Patent exploitation with industrial co-operations and interactions should be enhanced.

2.13 RC-specific conclusions

This RC has a high output and represents a successful group providing quality research training, but it is encouraged to develop a clearer focus on plans for the next few years around research and is also encouraged to reduce the length of time required to train doctoral candidates.

2.14 Preliminary findings in the Panel-specific feedback

The panel considers that PHABIO represents a quality RC with excellent international connections and strong paper and patent outputs. However, there is potential for improvement through the development of a more targeted and strategic research plan. Doctoral training is of a high level but the candidature seems too long when compared to international standards. Funding from EU sources could be expanded. Leadership and management appear appropriate given the small size of the RC.

2.15 Preliminary findings in the University-level evaluation

This RC evaluation raises issues that have already been summarized in the UH level feedback, particularly around the length of time required to complete doctoral training and the steps that might be taken to increase EU applications.

The university should carefully think how help can be provided for the research groups in the area of:
• EU-project coordination to encourage the RCs to act more actively in EU funded projects,
• Patenting and innovation policy to generate IPR for the university and to exploit the many findings made at the university. This would have a positive impact to the society and improve the impact.
• Encouraging the RCs to collaborate in real research projects.
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: Pharmaceutical Biology (PHABIO)

LEADER OF THE RESEARCHER COMMUNITY: Professor Heikki Vuorela, Faculty of Pharmacy

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’ 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: Vuorela, Heikki  
E-mail: Heikki.Vuorela@helsinki.fi  
Phone: 0405516502  
Affiliation: Faculty of Pharmacy, Div. Of Pharmaceutical Biology, PO Box 56, 00014 University  
Street address: Viikinkaari 5E

### 2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): Pharmaceutical Biology  
Acronym for the participating RC (max. 10 characters): PHABIO  

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):

The core of the RC consists of professors Raimo Hiltunen and Heikki Vuorela from the Division of Pharmaceutical Biology and senior group leader Päivi Tammela from the Centre for Drug Research. The senior group leader serves also as an essential link between the Division and the Centre. Pharmaceutical biology is a research field that focuses on drugs of biogenic origin. It combines phytochemistry, cell biology, microbiology, analytical chemistry, biotechnology and several other disciplines with the aim to cover multidimensional aspects of drugs of natural origin. This approach requires interdisciplinary expertise from biochemical to systems biology level. The research of the RC encompasses in multifaceted way the scope of modern pharmaceutical biology. The RC has highly recognized long-term expertise in natural products as a source of novel bioactive substances for a wide spectrum of applications.

The RC’s principal investigators share similar aims in their research, and these topics of research are shared with all researchers in the RC, which gives a natural motivation to form the RC cluster. The RC cluster members collaborate extensively in research, in doctoral training and in undergraduate teaching. Especially the senior group leader Tammela’s expertise gives outstanding novel entries to undergraduate curriculum development. All the members make unified efforts for finding new funding opportunities.

The research of this RC is multidisciplinary in character and the strategic goal is studies on plants, microbes and animals in order to find new medicinal compounds and nutritional substances.

To reach the strategic goal the focal points in the RC’s research are:

1) Development of biological screening methods and application of systems biological methods
2) Development and use of analytical chemical methods for biological materials
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

3) Studies for the chemical constituents in the bioactive extracts and fractions
4) Studies on biotechnological production methods

3 SCIENTIFIC FIELDS OF THE RC

Main scientific field of the RC's research: biological, agricultural and veterinary sciences
RC's scientific subfield 1: Chemistry, Medicinal
RC's scientific subfield 2: Biotechnology and Applied Microbiology
RC's scientific subfield 3: Plant Sciences
RC's scientific subfield 4: --Select--
Other, if not in the list:

4 RC'S PARTICIPATION CATEGORY

Participation category: 3. 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

Justification for the selected participation category (MAX. 2200 characters with spaces): Justification for the selected category is based on the fact that the research of this RC is uniquely multidisciplinary in character, and the strategic goal is to carry out studies on plants, microbes and animals in order to find new medicinal compounds and nutritional substances.
In order to reach this goal, the focal points of the RC research need to cover the following areas thus making the research uniquely multidisciplinary distinct from mainstream research:
1) Development of biological screening methods and application of systems biological methods
2) Development and use of analytical chemical methods for biological materials
3) Studies for the chemical constituents in the bioactive extracts and fractions
4) Studies on biotechnological production methods
The research and education of the RC has industrial and societal aspects, and all these elements are needed, and thus widen the research and education field of the unit in order to be successful.
This RC is in Finland the only research and education unit in Pharmacy that provides vast high-quality expertise in pharmaceutical biology, integrating biological and natural sciences into pharmacy. The research and education gives exceptionally holistic view on the themes related to the strategic goal. The persons that got their doctoral or graduate degree from this RC have extraordinary possibilities to serve as experts in national and international administration, industry, wholesale companies and research institutes as well as pharmacies in EU. Without exception, all the students have been employed to good positions in Finland or in EU after graduation.
Due to the multidisciplinary nature and relatively vast research area the RC needs to be evaluated by keeping in mind the specific features of the community as a small but effective unit.
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):
Pharmaceutical biology is a research field that focuses on drugs of biogenic origin. It combines phytochemistry, cell biology, microbiology, analytical chemistry, biotechnology and several other disciplines with the aim to cover multidimensional aspects of drugs of natural origin. This approach requires interdisciplinary expertise from biochemical to systems biology level. The research of the RC encompasses in multifaceted way the scope of modern pharmaceutical biology. The RC has highly recognized long-term expertise in natural products as a source of novel bioactive substances for a wide spectrum of applications. Doctors trained within the RC gain a set of skills and knowledge that enables them to network and collaborate nationally and internationally. They are provided with knowledge for several interwoven fields, creating unique expertise that has significance from scientific as well as from societal point of view. The doctoral training within the RC provides experts also for the needs of health-care authorities (e.g. Finnish Medicines Agency, FIMEA) and pharmaceutical industry.

Doctoral candidates in the RC are selected and accepted based on the criteria set by the Faculty’s Research Education Policy. Students are members of the Graduate School in Pharmaceutical Research and follow the study curriculum (in total 60 ECTS of theoretical studies, selected based on their study subject), which includes for instance the defence of the research plan after two years of doctoral training. One to three supervisors (selection is made based on the expertise needed in each particular subject) are nominated for each student and they prepare a study and research plan which is evaluated and accepted by the research affairs committee of the Faculty. Supervisors organise regularly meetings with their students to follow the progress of their studies. As part of the training, the students also attend international scientific meetings to present their results and to communicate with other scientists in the field.

Significance of the RC’s research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): University of Helsinki has outlined a long-term policy for its research and doctoral education and in the spirit of university’s strategic objectives the research conducted at the RC Pharmaceutical Biology promotes these high standards and high profile currently and in the long term. The RC offers a uniquely multidisciplinary unit within the University of Helsinki but also on a national level, and therefore the significance of its research and doctoral training has a high impact scientifically as well as from societal point of view. The RC pays great attention to the development of academic careers at different levels (as outlined in the university’s Research Policy), which is shown through the changes in the community members’ career status during the evaluation period. Despite the compact size of the RC, the training of doctors has been during the evaluation period above the aim set per year (in total 11 Ph.D. theses published during the evaluation period, aim: 6/6 years). The RC promotes the strengthening of research-oriented teaching and development of curriculum by integrating the doctoral candidates’ research and gained expertise into the curriculum, especially on master level courses. The RC also employs undergraduate students from 1st to 5th year students, which promotes the long-term training of future doctoral candidates and scientists from the very beginning of their undergraduate studies.

RC members, professors Hiltunen and Vuorela have served as the Dean and Vice-Dean (responsible for research affairs) of the Faculty of Pharmacy for two full 3-year terms during the evaluation period. Through these administrative roles, they have had a significant impact on the current strategic and operational
status of the research and doctoral training in the Faculty of Pharmacy (including the current status of the Centre for Drug Research). Between 2004 and 2009, prof. Vuorela chaired the Board of the CDR and during this period the CDR obtained a permanent status and funding within university.

**Keywords:** Pharmacognosy, pharmaceutical biology, pharmaceutical microbiology, phytochemistry, pharmaceutical biotechnology, medicinal chemistry, systems biology, HTS, cell signalling, antioxidants

### 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): In the report of the Research Assessment Exercise 2005, the panel stated that the Division of Pharmaceutical Biology has a strong background in natural products separation and extensive experience in development, validation and implementation of high-throughput screens. The Division, with CDR, has the expertise and the technological platform to perform modern activity-directed natural products discovery. As an opportunity of the Division, the panel noticed the use of modern paradigms of drug discovery and compound profiling to generate new drug leads. Since 2005 RC has promoted the quality of the research and doctoral training. Nine out of 11 doctoral theses published during the period under review have focus on biological evaluation of natural products, two of them approved with distinction by the Faculty.

The PIs serve as members of national and international committees, scientific societies, and as evaluators, reviewers and members of the editorial advisory boards of scientific journals. Tammela is involved in the highly competed BioCenter Finland funded network "Drug Discovery and Chemical Biology". Through the development of RC, the infrastructure and equipment is modern, and is complemented through collaborations. International quality has been enhanced by expanded cooperation through on-going multinational projects EU FP7 funded ForestSpeCs and MAREX, and partnership agreements with foreign universities (Austria, Lebanon, Russia, UK, etc.). Internationality is also evidenced by 1) the scientific publications produced by RC, 2) RC’s attractiveness to foreign doctoral candidates and postdoctoral fellows, and 3) research mobility during the evaluation period. The success in obtaining highly competitive international grants is one proof of quality of RC’s research. Also on national level, RC has been successful in obtaining competitive grants. RC members have received awards for merits in research and societal impact. RC uses international experts as examiners and opponents (82% from abroad) for doctoral theses, which furthermore promotes RC’s aim to attain high quality in doctoral training through evaluation against internationally recognised best practices.

**Comments on how the RC’s scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces):** Similar research and doctoral training as in the RC is not done within Finland, so the scientific productivity and doctoral training should be compared to European level laboratories. Similar international units can be found for example from the Uppsala university, Universitat Basel, Leiden University, and University of Ljubljana. In the evaluation, it is to be noted that journals that are highly recognised on pharmaceutical biology research field are not comparable in impact factors to journals in e.g. medical or analytical chemistry fields due to the lower number of offered articles.
RC-SPECIFIC STAGE 1 MATERIAL (registration form)

Description of the RC's publishing strategy: The RC publishes in international peer-reviewed journals, which cover a wide range of research fields due to the interdisciplinary nature of the research. Target journals are specifically selected according to the research area of the work in question, which means that our papers are published in journals such as the Journal of Natural Products, Planta Medica, Apoptosis but also in the Journal of Medicinal Chemistry and Analytical Biochemistry. Doctoral theses published from the RC are of international quality, which is guaranteed by publishing the articles included in the theses in peer-reviewed international journals and by using internationally well-recognised examiners and opponents.
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<td>Faculty of Pharmacy</td>
</tr>
<tr>
<td>Mikkola</td>
<td>Maarit</td>
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<td>Nurmi</td>
<td>Anna</td>
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<td>Faculty of Pharmacy</td>
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<td>Nybond</td>
<td>Susanna</td>
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<td>Pohjala</td>
<td>Leena</td>
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<tr>
<td>Riihimäki</td>
<td>Laura</td>
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<tr>
<td>Tammela</td>
<td>Päivi</td>
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</tr>
<tr>
<td>Vuorela</td>
<td>Heikki</td>
<td>x</td>
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<tr>
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<td>Pia</td>
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<tr>
<td>Yrjönen</td>
<td>Teijo</td>
<td></td>
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<td>Faculty of Pharmacy</td>
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<tr>
<td>Akhgari</td>
<td>Amir</td>
<td></td>
<td>Doctoral candidate</td>
<td>VTT</td>
</tr>
</tbody>
</table>
Name of the RC’s responsible person: Vuorela, Heikki

E-mail of the RC’s responsible person: heikki.vuorela@helsinki.fi

Name and acronym of the participating RC: Pharmaceutical Biology, PHABIO

The RC’s research represents the following key focus area of UH: 1. Maailman perusrakenne, materiaalit ja luonnonvarat – The basic structure, materials and natural resources of the physical world

Comments for selecting/not selecting the key focus area: The RC carries out multidimensional studies on natural resources (plants, microbes and animals) in order to find new medicinal compounds and nutritional substances. The research done on finding novel and/or progressed ways to use existing natural resources and on improving our knowledge on their potential, can lead to outcomes that have great significance for the scientific community, but also for the society.

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 strategic goal is to carry out studies on plants, microbes and animals in order to find new medicinal compounds and nutritional substances.

In order to reach this goal the focal points of the RC research need to cover the following areas thus making the research uniquely multidisciplinary distinct from mainstream research:

1) Development of biological screening methods and application of systems biological methods
2) Development and use of analytical chemical methods for complex biological materials
3) Studies of the Isolation and structure determination of chemical constituents in bioactive extracts and fractions
4) Studies on biotechnological production methods

The main areas of RC research have been the four focus areas described above. The research has resulted 80 peer-review publications and several patents.

The research and education of the RC has industrial as well as societal aspects, and all these elements are needed, and thus widen the research and education field of the unit in order to be successful.

This RC is the only research and education unit within the field of pharmacy in Finland that provides broad high-quality expertise in pharmaceutical biology, integrating biological and natural sciences into pharmacy. The research and education gives an exceptionally holistic view on the themes related to the strategic goal.

In the report of the Research Assessment Exercise 2005, the panel stated that the Division of Pharmaceutical Biology has a strong background in natural products separation and extensive experience in development, validation and implementation of high-throughput screens. The Division, with CDR, has the expertise and the technological platform to perform modern activity-directed natural products discovery. As an opportunity of the Division, the panel noticed the use of modern paradigms of drug discovery and compound profiling to generate new drug leads. Since 2005 RC has promoted the quality of the research and doctoral training. Nine out of 11 doctoral theses published during the period
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under review have focused on biological evaluation of natural products, two of them approved with distinction by the Faculty.

Through the development of RC, the infrastructure and equipment is modern, and is complemented through collaborations. International quality has been enhanced by expanded cooperation through ongoing multinational projects EU FP7 funded ForestSpeCs and MAREX, and partnership agreements with foreign universities (Austria, Lebanon, Russia, UK, etc.). Internationality is also evidenced by 1) the scientific publications produced by RC, 2) RC’s attractiveness to foreign doctoral candidates and postdoctoral fellows, and 3) research mobility during the evaluation period. The success in obtaining highly competitive international grants is one proof of quality of RC’s research. Also on national level, RC has been successful in obtaining competitive grants. RC members have received awards for merits in research and societal impact. RC uses international experts as examiners and opponents (82% from abroad) for doctoral theses, which furthermore promotes RC’s aim to attain high quality in doctoral training through evaluation against internationally recognized best practices.

Similar research and doctoral training as in the RC is not done anywhere else in Finland, so the scientific productivity and doctoral training should be compared to European level laboratories. Similar international units can be found for example from the Uppsala University, University of Basel, Leiden University, and University of Ljubljana. In the evaluation, it is to be noted that journals that are highly recognized on pharmaceutical biology research field are not comparable in impact factors to journals in e.g. medical or analytical chemistry fields due to the lower number of offered articles.

• Ways to strengthen the focus and improve the quality of the RC’s research.

For the description you have max. 1100 characters with spaces

More regular research seminars in the RC, where the latest results are presented and opened for discussion with the aim to improve the performance of the research. This will also lead to a better general knowledge among the staff at which stage the different projects are.

It might also be helpful to better define the research groups: who’s in charge of which project, who belongs to which group and what are the function of different group members. Regular meetings to discuss the progress of the research.

The development of the instrumental status must be improved through the applying of funds for that purpose.

2 PRACTICES 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 practices and quality assurance in doctoral training, and assureing good career perspectives for the doctoral candidates/fresh doctorates.

Doctoral candidates in the RC are selected and accepted based on the criteria set by the Faculty’s Research Education Policy. Students are members of the Graduate School in Pharmaceutical Research and follow the study curriculum (in total 60 ECTS of theoretical studies, selected based on their study subject), which includes for instance the defence of the research plan after two years of doctoral training. One to three supervisors (selection is made based on the expertise needed in each particular subject) are nominated for each student and they prepare a study and research plan which is evaluated and accepted by the research affairs committee of the Faculty. Supervisors organise regularly meetings with their students to follow the progress of their studies. As part of the training, the students also
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attend international scientific meetings to present their results and to communicate with other scientists in the field.

Doctoral students are recruited either i) among talented undergraduate students whom are conducting their master’s thesis in the division and show ability to continue their studies, or ii) using open recruitment application processes for positions in multidisciplinary projects. The manager of each project recruit researchers according to principles set by the Faculty. The supervision of doctoral candidates is mostly based on mentorship; the supervisor acts as a mentor for the apprentice, which is an effective way of supervision.

Supervision of the doctoral students is organized in collaboration between professors and senior researchers. Every doctoral student has a professor or a senior researcher, a docent, as a supervisor at the RC. Postdoctoral fellows and senior researchers take part in supervising the doctoral candidates. If the work is done in collaboration with other units, the doctoral candidate usually has another supervisor in the other unit to compliment the expertise.

The research of RC is based on international and national collaboration (see table in 4). The RC is in close collaboration with other units, including other divisions, faculties, and universities in Finland but also abroad. Examples of close collaborative universities are: Åbo Akademi University in Turku Finland, University of Turku, Finland, Tampere University of Technology in Finland, University of Oulu in Finland, National Public Health Institute in Oulu Finland, Phillipi-University Marburg in Germany, University of Tartu in Estonia and American University of Beirut in Lebanon. In addition, RC is in close collaboration with other units in the University of Helsinki, e.g., Institute of Biotechnology, Faculty of Agriculture and Forestry and Department of Basic Veterinary Sciences. Collaboration inside the Faculty of Pharmacy is close to several groups at the Centre for Drug Research, Division of Pharmaceutical Chemistry and Division of Pharmacology and Toxicology.

The doctoral thesis is based on four to six published articles in peer-reviewed international journals to guarantee the quality of the thesis. The research is done accordingly to meet the requirements set for high quality results. The studies included into the doctoral degree (60 credits) are selected to complement and deepen the knowledge related to the research topic of each candidate, and pharmacognosy in general. The courses may be selected from the Faculty of Pharmacy in the University of Helsinki but the candidates are encouraged to study also in other faculties to deepen their expertise on more specific topics. The Graduate School of Pharmaceutical Research organizes preliminary examination for all students. The topic of the preliminary examination can be selected from nine options according to the interest of the doctoral candidate and the topic of research. The doctoral candidate has to show ability to plan research and prove knowledge of the research field for a board of experts in the defense of the research proposal. The Graduate School of Pharmaceutical Research organizes courses for doctoral students on specific topics on advanced level that may be included in the studies.

The RC is the only facility in Finland that teaches pharmacognosy as a main subject. Pharmacognosy is an applied subject that includes pharmacology of natural products, applied biology and analytical chemistry, among others. Because of the nature of the subject the doctors who have graduated from the RC have wide variety of options for their careers, e.g., academia, regulatory affairs and pharmaceutical industry. The doctors who have completed their degree in the RC have continued their careers as, e.g., a Responsible Pharmacist in pharmaceutical industry, a regulatory authority in EU, a Scientific Project Manager in pharmaceutical industry, a Procedure Specialist of registration and marketing authorization of drugs and natural products, Pharmacist, as well as post-doc researchers in academia. UH has started a tenure track project to assure the career of young talented doctors at academia.
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- RC’s strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

RC’s strength is the thesis that is based on the published articles in peer-reviewed journals. The length and quality of each paper and the impact factor of the journal should be taken into account when deciding the content of the thesis which is the current practice in the RC.

The courses included in the doctoral degree vary much between the candidates according to research topic. Discussions between the supervisor and the candidate about the studies help to keep the set of courses relevant to the degree.

The recruitment system can be developed further so that the students in the Faculty of Pharmacy would be more aware of the possibilities in pursuing a doctoral degree after finishing their master’s degree. They could also start their scientific career alongside the master level studies. Approximately half of the doctoral candidates in RC come outside of the Faculty of Pharmacy which is strength because they bring their expertise from other faculties and universities.

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

Pharmaceutical biology is a research field that focuses on drugs of biogenic origin. It combines phytochemistry, cell biology, microbiology, analytical chemistry, biotechnology and several other disciplines with the aim to cover multidimensional aspects of drugs of natural origin. This RC is the only research and education unit within the field of pharmacy in Finland that provides broad high-quality expertise in pharmaceutical biology, integrating biological and natural sciences into pharmacy. The research and education gives an exceptionally holistic view on the themes related to the strategic goal. The research done in the RC focuses on subjects that may lead into discoveries with high societal impact (discovery tools for new drugs, potential for discovering of new drugs). Doctors trained within the RC gain a set of skills and knowledge that enables them to network and collaborate nationally and internationally. They are provided with knowledge for several interwoven fields, creating unique expertise that has significance from scientific as well as from societal point of view. The persons who have obtained their doctoral or graduate degree from this RC have excellent background to serve as experts on several public and private sectors (national and international pharmaceutical authorities, industry, wholesale companies and research institutes, as well as pharmacies in EU). The doctoral training within the RC provides experts for the needs of health-care authorities (e.g. Finnish Medicines Agency, FIMEA) and pharmaceutical industry. Without exception, all the students have been employed to good positions in Finland or in EU/globally after graduation.

The RC offers a uniquely multidisciplinary unit within the University of Helsinki but also on a national level, and therefore the significance of its research and doctoral training has a high impact scientifically as well as from a societal point of view. The RC pays great attention to the development of academic careers at different levels (as outlined in the university’s Research Policy), which is shown through the changes in the community members’ career status during the evaluation period. Despite the compact size of the RC, the training of doctors during the evaluation period has been above the aim set per year (in total 11 Ph.D. theses published during the evaluation period, aim: 6/6 years). The RC promotes the strengthening of research-oriented teaching and development of curriculum by integrating the doctoral candidates’ research and gained expertise into the curriculum, especially on master level courses. The RC also employs undergraduate students from 1st to 5th year students, which promotes the long-term...
training of future doctoral candidates and scientists from the very beginning of their undergraduate studies.

The RC members are collaborating with public and private sector. Senior RC members are highly acknowledged experts in the pharmaceutical field, and they are frequently asked to provide expert opinions on issues related to their expertise areas. The RC is also collaborating with the private sector in product development group, for example with Thermo Fisher Scientific (manufacturer of plate readers, dispensers and other instrument used in screening).

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

The importance of pharmaceutical biotechnology in drug discovery has grown considerably during the last decades as evidenced by the abundance of peptide- and protein-structured medicinal products approved by the pharmaceutical authorities in recent years. This has also reflected on the curriculum requirements of pharmacy students who need to obtain sufficient basic knowledge of pharmaceutical biotechnology and protein-based pharmaceuticals, an area that has not been given adequate attention by the Faculty of Pharmacy earlier. With this in mind the RC has now begun to develop its expertise within pharmaceutical biotechnology. One doctoral researcher on biotechnology has been recruited for this purpose from August 2010.

The research in natural substances is thought to be a fascinating subject by the general public and the RC is often asked to give interviews related to on-going projects. However, many researchers find these interviews tedious, but should be encouraged to think of such activities as beneficial for the RC.

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

The RC is actively collaborating on national and international level. This is best highlighted by on-going multinational research projects. Excellent example of international collaboration is the EU FP7 project MAREX which involves altogether 19 partners from 13 countries. The RC is not only an active research partner in the project, the project is also coordinated by the RC (scientific coordinator Prof. Vuorela, administrative coordinator Dr. Tammela). In addition RC has established collaborations with St. Petersburg’s Medical Academy (Russia), University of Surrey (UK), Dublin City University (Ireland), University of Vienna, (Austria), University of Geneva (Switzerland). The PIs have past and on-going joint doctoral training activities with national and international collaborators, such American University of Beirut (Lebanon), Tampere University of Technology (Finland), and VTT (Finland).

Researcher mobility abroad is highly encouraged within the RC, on all levels. During 2005-2010, the RC members made six scientific visits abroad, and 12 international researchers/students visited the RC. The PIs actively support other RC members in organising research visits to national and international laboratories, and also seek opportunities to invite researchers from abroad to visit the RC. On-going EU FP7 projects, ForestSpecS and MAREX, are good platforms for researcher mobility.

Collaboration is also reflected in publications. RC has domestic and/or foreign co-authors in the papers. Every year the RC members attend essential international conferences, workshops and symposia.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

**RC-SPECIFIC STAGE 2 MATERIAL**

Table 4.1. Percentage from refereed journal publications

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<th>2010</th>
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<td>No co-author outside the unit</td>
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<td>0</td>
<td>22</td>
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<td>Domestic co-author</td>
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<tr>
<td>Foreign co-author</td>
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<td>39</td>
<td>45</td>
<td>6</td>
<td>31</td>
<td>55</td>
</tr>
<tr>
<td>Both domestic and foreign co-authors</td>
<td>0</td>
<td>22</td>
<td>11</td>
<td>35</td>
<td>25</td>
<td>36</td>
</tr>
</tbody>
</table>

Table 4.2. Visits abroad: In the following, list postdoctoral researchers and Ph.D. students.

- El-Najjar Nahed Universitätsklinikum Erlangen Germany 12.08-1.2009, Ph.D. student
- El-Najjar Nahed Universitätsklinikum Erlangen Germany 6.2008, Ph.D. student
- El-Najjar Nahed Universitätsklinikum Erlangen Germany 10-11.2007, Ph.D. student
- El-Najjar Nahed Otto-Von-Guerick Universität Magdeburg Germany 9.2007, Ph.D. student

Table 4.3. Visits to RC from abroad

- Silvia Marco, Complutense University of Madrid, M.Sc. thesis 2010 4 mths
- Irene Casas, Complutense University of Madrid, M.Sc. thesis 2009 6 mths
- Anna Pósafalvi, Univ. of Debrecen, HUNGARY laboratorial 2008 1 mth
- Gregor Lorbek, Univ. of Ljubljana, SLOVENIA laboratorial 2008 mth
- Nazanin Bakhtyari Golbamaki, Università degli Studi di Milano, ITALY laboratorial 2007 2 mths
- Samar Nabboutová, Charles UniPrague, CZECH REPUBLIC, M.Sc. thesis 2004 7 mths
- Vlasta Zavadova Charles UniPrague, CZECH REPUBLIC, M.Sc. thesis 2006 3 mths
- Barbara Polin, Madrid, SPAIN, Laboratory training 2006 2 mths
- Mar Santamaría, Univ. of Barcelona, Barcelona, SPAIN laboratorial 2006 1 mth
- Elisenda Pérez, Univ. of Barcelona, SPAIN laboratorial 2006 1 mth
- Maria Pulido, Univ. of Barcelona, SPAIN laboratorial 2005 1 mth
- Marieke Vansteelandt, University of Nantes, FRANCE laboratorial 2005 1 mth

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

The RC has an excellent global network of collaborators which provides a solid basis for national and international research collaboration and possibilities for researcher mobility. On-going multinational EU FP7 projects offer great opportunities for new initiatives in collaboration, but the RC needs to make efforts to maximally benefit from these possibilities. Enhancing researcher mobility is sometimes challenged by the teaching curriculum; it can be difficult to find suitable period to make a scientific visit abroad if the teaching duties span throughout the year. The RC will seek for solutions to improve the possibilities of all RC members to take such sabbatical periods. The RC would benefit from establishing a
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Researcher Mobility Programme that would integrate the activities in more detail, and would describe short-term and long-term plans for mobility activities. For younger RC members, it would be beneficial to set up a list of collaborators that would be open for scientific visits, and a visit period should be included into the curriculum of each doctoral student.

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 core of the RC consists of professors Raimo Hiltunen and Heikki Vuorela from the Division of Pharmaceutical Biology and senior group leader Päivi Tammela from the Centre for Drug Research. The senior group leader serves also as an essential link between the Division and the Centre. The RC is situated at the Viikki Campus of the UHEL. This Campus harbours a unique combination of biological and pharmaceutical sciences, providing a dynamic and stimulating environment for multidisciplinary research. Since the research of this RC is multidisciplinary in character and the strategic goal focuses on studying plants, microbes and animals in order to find new medicinal compounds and nutritional substances, the research infrastructure needs for the RC are wide-ranging. Within the RC the research infrastructure available mainly concentrates on instruments related to analysis of natural products (analytical instruments such as HPLC, GC-MS) and to bioactivity screening (liquid handling workstations, multimode plate readers, etc.) and facilities for microbiological work and animal cell culturing. Infrastructures used by the RC at the other divisions of the Faculty include for example additional analytical instrumentation (LC-MS, FT-IR) and molecular biology instrumentation. On the Viikki Campus there are several additional research infrastructures available for the RC (e.g. service facilities at the Institute of Biotechnology such as the Light Microscopy Unit).

  As a unit, the RC is rather small (2005: 18 members, 2010: 17 members). However, the staff of the unit teaches 28 cu/year on the Bachelor level and 37 cu/year at the Master level plus supervises thesis work, 5-10 students/year, on the Master and Doctor level. All of the academic staff is teaching, although exceptions are made for example when a doctoral student is finalizing his or her thesis. Under this teaching load, it is sometimes difficult to keep a good balance between research and teaching duties. Notably, during the period of 2005-2010 the ratio between doctoral students and postdoctoral staff has decreased from 1.5 to 0.7 which has improved the supervision of doctoral students as well as the success in obtaining competed external funding for the RC.

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

  The multidisciplinary environment and infrastructures available at the Viikki Campus offer good possibilities to operate in line with the strategic focus of the RC. However, improvement of operational conditions is a challenge for the unit due to lack of instrumental development within the unit. Challenges are also encountered in keeping the balance between research and teaching duties: the organization of research periods for the academic staff is difficult, because the teaching duties are spread all over the academic year and because the unit is quite small, i.e. it is difficult to find stand-ins. During the last year, the RC has analysed in great detail the teaching curriculum of the unit and made total renovations to several courses. Main purpose for this act was to re-think the course contents aiming to streamline the use of human resources. This will hopefully aid in the improving the balance between research and teaching duties among the RC staff.
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 RC consists of the Division of Pharmaceutical Biology and the Bioactivity Screening Group of the Centre for Drug Research. Professor Raimo Hiltunen is the Head of the Division of Pharmaceutical Biology and professor Heikki Vuorela is responsible for the research activities within the Division. Senior group leader Päivi Tammela leads one of the research groups of the Centre for Drug Research. The leadership in the RC is based on continuous collaboration between two equal partners, i.e. the Division of Pharmaceutical Biology and the Bioactivity Screening Group of the Centre for Drug Research. This collaboration is organized and managed in a project-wise manner enabling the detailed control of several concurrent and interdisciplinary research projects. The exact roles of PIs in various projects differ depending on the nature of the project and the agreements between the two parties. All three PIs meet regularly to oversee the progress of the ongoing projects and to discuss matters related to possible future prospects.

According to the University’s Strategic Plan 2010-2012 and the Faculty’s Research Policy, academic leaders are responsible for research, teaching and societal interaction. The personnel in the present RC is divided into subgroups depending on research projects. Each research project has a principal investigator (PI) (professor or university lecturer). Coordination and management of the projects are based on leadership of the principal investigators who are responsible among others for management by strategies and leadership of the project’s operations including scheduling and fundings.

In the present RC PIs are Professor Raimo Hiltunen, Professor Heikki Vuorela and university researcher Päivi Tammela. RC’s PIs will make clear connections between strategic objectives and the operative level. PIs monitor key figures in a timely fashion. Among others PIs organize research premises for the investigators and general requisites needed for the research.

Professors Hiltunen and Vuorela have also served as the Dean and Vice-Dean (responsible for research affairs) of the Faculty of Pharmacy for two full 3-year terms during the evaluation period. Through these administrative roles, they have had a significant impact on the current strategic and operational status of the research and doctoral training in the Faculty of Pharmacy (including the current status of the Centre for Drug Research). During the leadership of Prof. Hiltunen the Faculty of Pharmacy was founded at 2004 and the faculty practices were started. Between 2004 and 2009, prof. Vuorela chaired the Board of the CDR and during this period the CDR obtained a permanent status and funding within university.

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

The group is fairly small and the researchers have co-operated for years. Professors Hiltunen and Vuorela have a long-term collaboration in research and a large experience in managing of collaborative research projects. The managing of this RC is trouble-free and supportive for true academic thinking. Actions planned for developing the processes at issue will be carried out in accordance with University’s Programme for Leadership, Management and Support Services 2010–2012. Principal investigators as leaders of their own research projects will monitor key figures in timely fashion and define clear roles and responsibilities which everyone can understand. Leaders of RC will create efficient communication channels for the distribution of timely information at appropriate intervals.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

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: **24800**

- 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: **100000**

- 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: **803600**

- 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:

- 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: CIMO
  - Finish Pharmaceutical Society
  - Swedish Cultural Foundation in Finland
  - Finnish Cultural Foundation
  - Societas pro Fauna et Flora Fennica
  - Oskar Öflund Foundation
  - total amount of funding (in euros) from the above-mentioned foundations: **180000**

- 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: University Grants Commission, India
  - total amount of funding (in euros) from the above-mentioned funding organizations: **250**

- 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: University of Helsinki
  - Graduate school in Pharmaceutical Research
  - CIMO
  - Research Funds of the University of Helsinki
  - Chancellor of the University of Helsinki
  - Farmasian opettajien ja tutkijoiden yhdistys
  - Suomen provisorsiyhdistys
  - total amount of funding (in euros) from the above-mentioned funding organizations: **309000**
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

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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.
  The importance of pharmaceutical biotechnology in drug discovery has grown considerably during the last decades as evidenced by the abundance of peptide- and protein-structured medicinal products approved by the pharmaceutical authorities in recent years. This has also reflected on the curriculum requirements of pharmacy students who need to obtain sufficient basic knowledge of pharmaceutical biotechnology and protein-based pharmaceuticals, an area that has not been given adequate attention by the Faculty of Pharmacy earlier. With this in mind the RC has now begun to develop its expertise within pharmaceutical biotechnology.

- Leadership and management in the RC see # 6 see guidelines of the Faculty and research policy of the University
- Composition of doctors degree
  o admission rules accepted by the faculty of pharmacy see also Research Policy of the Faculty
  o duties (e.g. teaching) and rights of the PhD-students (rights of the staff)
  o duties and rights of supervisors
  o at least one of the supervisors must have expertise in the subjects of PhD-research, Supervisors’ position within the relevant study field, activity in research and published work.
  o employment after doctor graduation, tenure track; post doc-studies
- Strategy: To combine methods and techniques of systems biology to phytochemistry
  o focus: as described in 1
  o Research Policy of the University

- Composition of doctors degree
  o theoretical studies (60 ECTS out of 300 ECTS)
  o personal study plan together with student and supervisor
  o practical studies
  o defense of the research plan of the student
  o written thesis
  o public criticism
- Fundings: Graduate School in Pharmaceutical Research/EU etc./Tekes/Finnish Academy
  The main strategic activities of RC are 1) to develop the funding for maintaining and obtaining new laboratory equipments 2) to develop further expertise within pharmaceutical biotechnology 3) to develop further the good practices in the doctoral education especially in the supervision practices 4) to develop further the practices of RC in applying grants.
The compilation of the Stage 2 material was initiated by the PIs, who designated responsible persons among the RC members to different sections of the material (for example, doctoral students were asked to prepare first drafts for section 2 Practices and quality of doctoral training). After combining the first drafts, the material was circulated among the RC members and subjected to commenting and corrections. Revised versions were frequently opened for discussions before submitting the final version of the material.
# Analysis of publications

- Associated person is one of: Joni Kimmo Oskari Alvesalo, Keyvan Dastmalchi, Damien Dorman, Damien.Dorman@helsinki.fi, Manu Eeva, Nahed El-Najjar, Pia Johanne Fyhrqvist, Pia.Fyhrqvist@helsinki.fi, Anna Gallen, Anna.Gallen@helsinki.fi, Shafiu Haque, shafiu.haque@helsinki.fi, Raino Hilunen, Raino.Hilunen@helsinki.fi, Yvonne Homb, Yvonne.Homb@helsinki.fi, Päivi Järvinen (née Oinonen), pavi.jarvinen@helsinki.fi, Kari Kreander, Into.Laakso, Into.Laakso@helsinki.fi, Tiina Anita Lantto, Tiina.Lantto@helsinki.fi, Susanna Nybond, susanna.nybond@helsinki.fi, Leena Pohjalainen, Leena.Pohjalainen@helsinki.fi, Laura Riihimaki, Laura.Riihimaki@helsinki.fi, Päivi Tammela, Päivi.Tammela@helsinki.fi, Laura H.Riikonen, Teijo Yrjönen, teijo.yrjonen@helsinki.fi, Amir Behzad Akhgari Nazarlou, amir.akhgari@helsinki.fi

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<th>Publication type</th>
<th>2005</th>
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<tr>
<td>A1 Refereed journal article</td>
<td>11</td>
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<td>A2 Review in scientific journal</td>
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<td>A3 Contribution to book/other compilations (refereed)</td>
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<td>C2 Edited book, compilation, conference proceeding or special issue of journal</td>
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<td>D1 Article in professional journal</td>
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<td>D3 Article in professional conference proceedings</td>
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<td>D5 Text book or professional handbook or guidebook or dictionary</td>
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<td>E1 Popular article, newspaper article</td>
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<td>H1 Patents</td>
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</table>
2 Listing of publications

A1 Refereed journal article

2005
Hox, YZ, Zhao, GR, Yuan, YJ, Zhu, GG, Hiltunen, R 2005, 'Inhibition of rat vascular smooth muscle cell proliferation by extract of Liguicistum chuanxiong and Angelica sinensis', Journal of Ethnopharmacology, vol 100, no. 1-2, pp. 140-144.


2006


2007
PHABIO/Vuorela


2007


Hämäläinen, M, Nieminen, R, Vuorela, P, Heinonen, M, Mollan, E 2007, 'The Anti-inflammatory effects of flavonoids: genistein, kaempferol, quercetin, and daidzein inhibit STAT-1 and NF-B activations, whereas flavone, isorhamnetin, naringenin, and pelargonidin inhibit only NF-B activation along with their inhibitory effect on IFN-α expression and NO production in activated macrophages', Mediators of Inflammation, vol 2007, art. 46973, 10 s.


PHABIO/Vuorela


2008


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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

Natural product communications, vol 5, no. 9, pp. 1453-1456.


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PHABIO/Vuorela


2006


2007

2008

2009

B1 Unrefereed journal article

2008
Fyhrqvist, PJ 2008, 'Combretum and Terminalia species in traditional medicine in Mbeya region, southwestern Tanzania', Non-wood news.. vol 17, pp. 56-57.

2009

C2 Edited book, compilation, conference proceeding or special issue of journal

2006

D1 Article in professional journal

2005
PHABIO/Vuorela


2010

D3 Article in professional conference proceedings

2006

D5 Text book or professional handbook or guidebook or dictionary

2008

E1 Popular article, newspaper article

2005

H1 Patents

2009

2010

I1 Audiovisual materials

2007
Botanical E-learning material (Native medicinal plants in Finland): Luonnonvaraiset lääkekasvit. Farmakognosian opiskelua tukeva Open Access –verkkomateriaali
1 Analysis of activities 2005-2010

- Associated person is one of Joni Kimmo Oskari Alvesalo, Keyvan Dastmalchi, Damien Dormen, Damien.Dorman@helsinki.fi, Manu Eeva, Nahed El-Najjar, Pia Johanna Fyhrqvist, Pia.Fyhrqvist@helsinki.fi, Anna Gallen, Anna.Gallen@helsinki.fi, Shafiu Haque, shafiu.haque@helsinki.fi, Raimo Hilunter, Raimo.Hilunter@helsinki.fi, Yvonne Holm, Yvonne.Holm@helsinki.fi, Päivi Järvinen (nee Orasinen), pasi.jarvinen@helsinki.fi, Kari Kivander, Into Laakso, into.laakso@helsinki.fi, Tiina Anita Lantto, tina.lantto@helsinki.fi, Susanna Nybond, susanna.nybond@helsinki.fi, Leena Pohja, Leena.Pohja@helsinki.fi, Laura Rohmaki, Laura.Rohmaki@helsinki.fi, Tiina Riihimaki, Laura.H.Riihimaki@helsinki.fi, Päivi Tammela, Päivi.Tammela@helsinki.fi, Heikki Vuorela, Heikki.Vuorela@helsinki.fi, Pia Vuorela, Pia.Vuorela@helsinki.fi, Tero Wennberg, Teijo Yrjönen, teijo.yrjonen@helsinki.fi, Amir Behzad Ashghari Nazarlou, amir.ashghari@helsinki.fi

<table>
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<th>Activity type</th>
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<td>Supervisor or co-supervisor of doctoral thesis</td>
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<td>Prizes and awards</td>
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<tr>
<td>Editor of research journal</td>
<td>25</td>
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<tr>
<td>Peer review of manuscripts</td>
<td>152</td>
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<td>Editor of special theme number</td>
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<td>Assessment of candidates for academic posts</td>
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<td>Membership or other role in review committee</td>
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<td>Membership or other role in research network</td>
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<tr>
<td>Membership or other role in national/international committee, council, board</td>
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<td>Membership or other role in public Finnish or international organization</td>
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<td>Membership or other role of body in private company/organisation</td>
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<td>Other tasks of an expert in private sector</td>
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<td>Participation in interview for written media</td>
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<td>Participation in radio programme</td>
<td>1</td>
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</table>
2 Listing of activities 2005-2010

Supervisor or co-supervisor of doctoral thesis

Damien Dorman, Damien.Dorman@helsinki.fi
Dracocephalum moldavica L. and Melissa officinalis L.: Chemistry and Bioactivities Relevant in Alzheimer's Disease Therapy, Damien Dorman, 2004 → 2008, Finland

Raimo Hiltunen, Raimo.Hiltunen@helsinki.fi
Väitöskirja: Kreander, Kari: A Study on Bacteria-Targeted Screening and in vitro Safety Assessment of Natural Products, Raimo Hiltunen, 21.04.2006, Finland
Väitöskirja: Wennberg, Tero: Computer-assisted separation and primary screening of bioactive compound, Raimo Hiltunen, 31.03.2006, Finland
Väitöskirja: Avesalo, Joni: Drug Discovery Screening and the Application of Genomics and Proteomics in the Drug Development for Chlamydia pneumoniae, Raimo Hiltunen, 19.05.2007, Finland
Väitöskirja: Traditional medicinal use and biological activities of some plant extracts of African Combretum Loefl., Terminali L. and Pteleopsis Engl. Species (Combretaceae), Raimo Hiltunen, 16.11.2007, Finland
Väitöskirja: Dastmalchi, Keyvan: Dracocephalum moldavica L. and Melissa officinalis L.: Chemistry and Bioactivities Relevant in Alzheimer’s Disease Therapy, Raimo Hiltunen, 21.11.2008, Finland
Väitöskirja: Nummi, Anna: Health from Herbs? Antioxidant studies on selected Lamiaceae herbs in vitro and in humans, Raimo Hiltunen, 29.03.2008, Finland
Väitöskirja: Galkin, Anna: Evaluation of Natural Products in Apoptosis, Protein Kinase C Activation and Caco-2 Cell Permeability, Raimo Hiltunen, 28.11.2009, Finland
Väitöskirja: Riihimäki-Lampén, Laura: Interactions of Natural Products with beta_lactoglobulins, Members of the Lipocalin Family, Raimo Hiltunen, 27.11.2009, Finland
Väitöskirja: Eeva, Manu: Plant Secondary Metabolites in Pcedeanum palustre and Angelica archangelica and their Plant Cell Cultures, Raimo Hiltunen, 21.05.2010, Finland

Päivi Tammela, Päivi.Tammela@helsinki.fi
Supervision of doctoral thesis of Kari Kreander, Päivi Tammela, 2004 → 2006, Finland
Supervision of PhD thesis of Leena Pohjala, Päivi Tammela, 2006 → 2010, Finland
Supervision of doctoral thesis of Susanna Nybond (on-going), Päivi Tammela, 2010 → ..., Finland

Heikki Vuorela, Heikki.Vuorela@helsinki.fi
Supervision of the thesis of Manu Eeva, University of Helsinki, Heikki Vuorela, 1995 → 2010, Finland
Supervision of the thesis of Wennberg Tero, University of Helsinki, Heikki Vuorela, 2000 → 2006, Finland
Supervision of the thesis of El-Najjar Nahed,University of Helsinki, Heikki Vuorela, 2007 → 2010, Finland

Prizes and awards

Raimo Hiltunen, Raimo.Hiltunen@helsinki.fi
Albert Wuokko Award to Young Scientist, Päivi Tammela, 17.11.2006, Finland

Yvonne Holm, Yvonne.Holm@helsinki.fi
Vuoden kouluaja, Yvonne Holm, 08.11.2007, Finland

Päivi Tammela, Päivi.Tammela@helsinki.fi
Albert Wuokko Award to Young Scientist, Päivi Tammela, 17.11.2006, Finland
Jack L. Beal Award, Päivi Tammela, 14.07.2010, United States

Heikki Vuorela, Heikki.Vuorela@helsinki.fi
Knight, First Class, of the Order of the White Rose of Finland, Heikki Vuorela, 12.2008, Finland
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

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

PHABIO/Vuorela

Editor of research journal

Damien Dorman , Damien.Dorman@helsinki.fi
The Open Food Science Journal, Damien Dorman, 2009 → …

Raimo Hiltunen , Raimo.Hiltunen@helsinki.fi
Flavour and Fragrance Journal, Raimo Hiltunen, 01.01.2005 → 31.12.2005, United Kingdom
Food Chemistry, Raimo Hiltunen, 30.05.2005 → 31.12.2005, United States
Journal of Flavour and Fragrance, Raimo Hiltunen, 01.01.2005 → 31.12.2005, United Kingdom
PCA Phytochemical Analysis, Raimo Hiltunen, 01.01.2005 → 31.12.2005
Phytotherapy and Phytopharmacology, Raimo Hiltunen, 01.01.2005 → 31.12.2005, Germany
Transplant Immunology, Raimo Hiltunen, 06.02.2005 → 31.12.2005, United States
Journal of Chromatography A, Raimo Hiltunen, 14.08.2006 → 24.08.2006
Journal of Essential Oil, Raimo Hiltunen, 01.01.2006 → 31.12.2006
Journal of Ethnopharmacology, Raimo Hiltunen, 13.02.2006 → 03.08.2006, Netherlands
Journal of Separation Sciences, Raimo Hiltunen, 01.01.2006 → 31.12.2006
PCA Phytochemical Analysis, Raimo Hiltunen, 02.08.2006 → 31.12.2006
Planta Medica, Raimo Hiltunen, 01.01.2006 → 31.12.2006, Germany
Planta Medica, Raimo Hiltunen, 01.01.2006 → 31.12.2006, Germany
Journal of Agricultural and Food Chemistry, Raimo Hiltunen, 16.02.2007 → 31.12.2007, United States
Journal of Separation Science, Raimo Hiltunen, 08.05.2007 → 31.12.2007
LWT-Food Science and Technology, Raimo Hiltunen, 29.03.2007 → 31.12.2007, Switzerland
Planta Medica, Raimo Hiltunen, 25.05.2007 → 31.12.2007, Germany

Heikki Vuorela , Heikki.Vuorela@helsinki.fi
Member of the Editorial Board of the Journal Planta Medica, Heikki Vuorela, 2002 → …
Member of the Editorial Board of the Journal "Molecules", Heikki Vuorela, 2008 → …, Switzerland

Peer review of manuscripts

Damien Dorman , Damien.Dorman@helsinki.fi
Annals of Epidemiology, Damien Dorman, 2005
Berliner und Münchener Tierärztliche Wochenschrift, Damien Dorman, 2005
Flavour and Fragrance Journal, Damien Dorman, 2005 → …
Food Chemistry, Damien Dorman, 2005 → …
Food Technology and Biotechnology, Damien Dorman, 2005 → …
Italian Journal of Food Science Rivista Italiana di scienza degli alimenti, Damien Dorman, 2005 → …
Journal of Agricultural and Food Chemistry, Damien Dorman, 2005 → …
Lebensmittel-Wissenschaft und-Technologie, Damien Dorman, 2005 → …
Basic & Clinical Pharmacology & Toxicology, Damien Dorman, 2006
European Food Research and technology (Zeitschrift für Lebensmitteluntersuchung und -Forschung A ), Damien Dorman, 2006 → …
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

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

PHABIO/Vuorela

Journal of the Science of Food and Agriculture, Damien Dorman, 2006
Process Biochemistry, Damien Dorman, 2006
Talanta, Damien Dorman, 2006
Bioresource Technology, Damien Dorman, 2007
Journal of Food Biochemistry, Damien Dorman, 2007
Natural Product Communications, Damien Dorman, 2010
Pharmaceutical Biology, Damien Dorman, 2010

Raimo Hiltunen, Raimo.Hiltunen@helsinki.fi

Flavour and Fragrence Journal: Dynamics of Essential Oil Biosynthesis in Relation to Inflorescence and Glandular Ontogeny in Slavia sclarea L., Raimo Hiltunen, 06.10.2005
Flavour and Fragrence Journal: Components of the Volatile Oil from Straw of Oryza sativa L., Raimo Hiltunen, 03.08.2005
Flavour and Fragrence Journal: Essential Oil of the Leaves of Sacandra glabra (Thunb.) Nakai, Raimo Hiltunen, 10.04.2005
Flavour and Fragrence Journal: Essential oil composition of leaf, flower and stem of Styrax (Styrax officinalis L.) from South-East France, Raimo Hiltunen, 12.07.2005
Flavour and Fragrence Journal: Identification analysis of volatile components of essential oil by combining GC-FTIR and GC-MS., Raimo Hiltunen, 10.05.2005
Flavour and Fragrence Journal: Volatile compounds diversification in two Prosopis farcta (Banks et Sol. Eig. Fabales, Fabaceae = Leguminosae) population, Raimo Hiltunen, 10.04.2005
Food Chemistry: Detection of some fruit quality characteristics of blackberry genotypes using high performance liquid chromatography, Raimo Hiltunen, 30.05.2005
Journal of ETHNOPHARMACOLOGY: Antibacterial activities of medicinal plants used for the treatment of diarrhoea in Limpopo Province, South Africa., Raimo Hiltunen, 04.08.2005
Journal of ETHNOPHARMACOLOGY: Chemical and biological comparisons on Evodia related species of different locations and conditions., Raimo Hiltunen, 02.09.2005
Journal of ETHNOPHARMACOLOGY: Comparative chemical and analgesic properties of essential Comparative chemical and analgesic properties of essential, Raimo Hiltunen, 31.06.2005
Journal of ETHNOPHARMACOLOGY: Comparative pharmacognostic studies of three Phyllanthus species., Raimo Hiltunen, 29.03.2005
Journal of ETHNOPHARMACOLOGY: Composition and antibacterial activity of essential oil of Lippia graveolens HBK.(Verbenaceae), Raimo Hiltunen, 18.01.2005
Journal of ETHNOPHARMACOLOGY: Compounds from Salvia Hyargeia roots active against the ovarian cancer cell line., Raimo Hiltunen, 29.03.2005
Journal of ETHNOPHARMACOLOGY: Cytotoxicity and in vitro susceptibility of Entamoeba Cytotoxicity and in vitro susceptibility of Entamoeba, Raimo Hiltunen, 05.11.2005
Journal of ETHNOPHARMACOLOGY: Detection of microbial contaminants and potential biodegradation of herbal medicines for HIV/AIDS, Raimo Hiltunen, 03.08.2005
Journal of ETHNOPHARMACOLOGY: Essential oil analysis and ant cancerc activity of leaf essential oil of Croton flavens L. fro Guadeloupe., Raimo Hiltunen, 17.01.2005
Journal of ETHNOPHARMACOLOGY: Flavonoids composition and antimicrobial activity of Cirsium rivulare (Jacq.) All. Flowers., Raimo Hiltunen, 17.01.2005
Journal of ETHNOPHARMACOLOGY: Pharmacologically active natural products in the defence secretion of Palembus oculatus (Tenebrionidae, Coleoptera), Raimo Hiltunen, 29.03.2005
Journal of ETHNOPHARMACOLOGY: Phytochemical Composition of Essential oil from Seeds of Zingiber roseum Roscoe and Its Antipasimic Activity in Rat Duodenum., Raimo Hiltunen, 06.10.2005
Journal of ETHNOPHARMACOLOGY: Post-coital antifertility activity of Achyranthes aspera Linn. Root, Raimo Hiltunen, 29.03.2005
Journal of ETHNOPHARMACOLOGY: Some pharmacological activities of ethanolic extract and compounds of Croton macrostachys roots., Raimo Hiltunen, 02.09.2005
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

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

PHABIO/Vuorela

Journal of ETHNOPHARMACOLOGY: Tissue lipid lowering effect of a traditional Nigerian antidiabetic infusion of Rauwolfia vomitoria foliage &amp; Citrus aurantium fruit., Raimo Hiltunen, 06.10.2005

Journal of ETHNOPHARMACOLOGY: Hepatoprotective effect via alpha1I collagen expression inhibition from Rosmarinus officinalis extract., Raimo Hiltunen, 01.09.2005

Journal of ethnopharmacology: Antibacterial activity of Quercus ilex bark’s extracts., Raimo Hiltunen, 03.08.2005

Phytochemical Analysis (PCA): Liquid Chromatography with Atmospheric Pressure Chemical Ionization and Electrosoaray Ionization Mass Spectrometry for Analysis of Angelica sinensis, Raimo Hiltunen, 29.03.2005

Transplant Immunology: Baohuoside-1 Inhibits Activated T Cell Proliferation AT G1-S Phase Transition, Raimo Hiltunen, 09.04.2005


Planta Medica: Activity of quinones from Teak (Tectona grandis L.f.) on fungal cell wall stress., Raimo Hiltunen, 09.05.2006

Planta Medica: East Indian Sandalwood and alpha-Santalol Odor Increase Physiological and Self-Rated Arousal in Humans, Raimo Hiltunen, 14.02.2006

Journal of Separation Science: Separation and evaluation of free radical-scavenging activity of phenol components of green, brown and black leaves of Bergenia crassifolia by using HPTLC-DPPH. method, Raimo Hiltunen, 08.05.2007


Planta Medica: Analysis of the Essential Oils of Centaurea pulita, Growing Wild in Algeria and C. affinis Growing Wild in Greece. Investigation of their Antimicrobial Activities, Raimo Hiltunen, 02.05.2007

Planta Medica: Monoglycerides and Fatty acids from Ibervillea sonorae root: Isolation and Hypoglycemic Activity, Raimo Hiltunen, 02.01.2007

BRITISH JOURNAL OF NUTRITION: Effects of main fatty acids in tea seeds on glucose-induced the cytotoxicity in RF/6A cells, Raimo Hiltunen, 15.08.2008

British Journal of Nutrition: Effects of main fatty acids in tea seeds on glucose-induced the cytotoxicity in RF/6A cells, Raimo Hiltunen, 28.07.2008


Journal of Agricultural and Food Chemistry: In vitro anti-inflammatory activity of larch (Larix decidua L.) sawdust, Raimo Hiltunen, 01.08.2008

Journal of Agricultural and Food Chemistry: Isolation and structure elucidation of antioxidant polyphenols from quince (Cydonia vulgaris), Raimo Hiltunen, 09.01.2008

Journal of Chromatography A: Phytochemical analysis of herbal medicines using liquid chromatography coupled with mass spectrometry, Raimo Hiltunen, 27.03.2008

LWT- Food Science and Technology: Antifungal activity of Rubus ulmifolius Schott standardized in vitro culture, Raimo Hiltunen, 16.05.2008

LWT- Food Science and Technology: Composition and non-volatile taste components of Hypsizigus marmoreus, Raimo Hiltunen, 12.09.2008

LWT- Food Science and Technology: Cyphomandra betacea Sendt. phenolics protect LDL from oxidation and PC12 cells from oxidative stress, Raimo Hiltunen, 20.09.2008

Natural Product Communications: Essential oils of Dennettia tripetala G. Baker stem bark and Leaf Constituents and biological activities, Raimo Hiltunen, 10.07.2008

Phytochemical Analysis: Angelica sinensis should be Angelica sinensis (Oliv.) Diels, Raimo Hiltunen, 21.08.2008

Phytochemical Analysis: Optimization and comparison of five methods for extraction of bioactive components from Angelica sinensis., Raimo Hiltunen, 31.03.2008

Planta Medica: A Rapid Method for Quantitative Determination of Triterpenoids and Formononetin in Rhizomes of Black Cohosh (Actaea racemosa L.) and Dietary Supplements by using UPLC-UV-ELS Detection, Raimo Hiltunen, 30.05.2008

Planta Medica: Characterization of Chemical Constituents in Guan Xin II Detection of Liquid Chromatography Coupled with Electrosoaray Ionization-Mass Spectrometry, Raimo Hiltunen, 29.02.2008

Planta Medica: Comparison of Phenolic Compounds of Rhubarbs in Section Desertica with Rheum palmatum by HPLC-DAD-ESI-MS, Raimo Hiltunen, 18.02.2008
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

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

PHABIO/Vuorela

Planta Medica: Fingerprint Analysis of Fuzhisan and Quantitation of Components Baicalin and Ginsenoside Rb1 by HPLC-DAD-ELSD, Raimo Hiltunen, 07.11.2008
Planta Medica: Isolation of two new prenylflavonoids with the effects on cytokine production in vitro from Epimedium brevicornum, Raimo Hiltunen, 08.12.2008
Planta Medica: Metabolome Analysis of the Ephedra Plant Using UPLC-Q-TOF-MS, Raimo Hiltunen, 23.10.2008
LWT - Food Science and Technology: Physicochemical and microbiological characterization of the dehydration processing of red pepper fruits for paprika production, Raimo Hiltunen, 30.10.2009
LWT - Food Science and Technology: Physicochemical and microbiological characterization of the dehydration processing of red pepper fruits for paprika production, Raimo Hiltunen, 09.10.2009
LWT - Food Science and Technology: Physicochemical and microbiological characterization of the dehydration processing of red pepper fruits for paprika production, Raimo Hiltunen, 05.10.2009
Natural Prod. Communications: Composition of the Essential Oil of Chaerophyllum aromaticum L. (Apiaceae) Growing WH in Austria, Raimo Hiltunen, 10.03.2009
Planta Medica: Chemical Fingerprinting of Rhizome of Anemone raddeana Regel and Quantitative Analysis of Its Major Constituents by HPLC, Raimo Hiltunen, 15.07.2009
Planta Medica: Comparative analysis of Sambucus nigra and Sambucus australis flowers: development and validation of an HPLC method for raw material quantification and preliminary stability study, Raimo Hiltunen, 29.04.2009
Planta Medica: Triterpenoids and Iridoid Glycosides from Gentiana dahurica Cytotoxic against MCF-7 Human Breast Cancer Cells, Raimo Hiltunen, 10.09.2009
Journal of Pharmaceutical and Biomedical Analysis: Method Development and Validation for HPLC Assay of Hopantenic Acid in Human Plasma and, Raimo Hiltunen, 27.01.2010
Journal of Separation Science: Determination of polyphenols in wines by liquid chromatography with UV spectrometric detection, Raimo Hiltunen, 19.11.2010
LWT - Food Science and Technology: Changes of enka enriched bread during storage, Raimo Hiltunen, 07.10.2010
LWT - Food Science and Technology: Phenolic profile of seventeen Portuguese wild mushrooms, Raimo Hiltunen, 10.07.2010
LWT - Food Science and Technology: Probabilistic Shelf Life Assessment of White Button Mushrooms through Sensorial Properties, Raimo Hiltunen, 09.06.2010
LWT-Food Science and Technology: Effect of heat treatment of sorghum grains on storage stability of flour, Raimo Hiltunen, 21.12.2010
Planta Medica: Sesquiterpenoids from Inula britannica, Raimo Hiltunen, 29.08.2010

Yvonne Holm , Yvonne.Holm@helsinki.fi
Flavour and Fragrance Journal, Yvonne Holm, 01.01.2005 → 31.12.2005, United Kingdom
Flavour and Fragrance Journal, Yvonne Holm, 01.01.2006 → 31.12.2006, United Kingdom
Journal of Chromatography A, Yvonne Holm, 01.01.2010 → 31.12.2010, Netherlands

Into Laakso , into.laakso@helsinki.fi
Peer reviewer: Food Chemistry, Into Laakso, 17.06.2005, United Kingdom
Peer reviewer: Journal of Agricultural and Food Chemistry, Into Laakso, 06.04.2005, United States
Peer reviewer: Journal of Chromatography B, Into Laakso, 27.04.2005, Netherlands
Peer reviewer: Journal of Agricultural and Food Chemistry, Into Laakso, 26.04.2006, United States
Peer reviewer: Italian Journal Food Science, Into Laakso, 31.05.2006, Italy

Päivi Tammela , Paivi.Tammela@helsinki.fi
Peer review for Biochemical Systematics and Ecology, Päivi Tammela, 2005
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

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Peer review for European Journal of Pharmaceutical Sciences, Päivi Tammela, 2005
Peer review for European Journal of Pharmacology, Päivi Tammela, 2009
Peer review for Bioorganic & Medicinal Chemistry, Päivi Tammela, 11.02.2010
Peer review for Current Topics in Medicinal Chemistry, Päivi Tammela, 27.05.2010, Netherlands

Heikki Vuorela , Heikki.Vuorela@helsinki.fi
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 22.06.2005
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 01.07.2005
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 18.04.2005
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 25.01.2005
Reviewer in Journal of Chromatography A, Heikki Vuorela, 09.08.2005
Reviewer in Journal of Chromatography A, Heikki Vuorela, 07.03.2005
Reviewer in Planta Medica, Heikki Vuorela, 08.06.2005
Reviewer in Planta Medica, Heikki Vuorela, 11.11.2005
Reviewer in Chromatographia, Heikki Vuorela, 26.10.2006
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 30.06.2006
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 09.01.2006
Reviewer in Journal of Chromatography A, Heikki Vuorela, 03.08.2006
Reviewer in Planta Medica, Heikki Vuorela, 03.01.2006
Reviewer in Planta Medica, Heikki Vuorela, 12.04.2006
Reviewer in Planta Medica, Heikki Vuorela, 12.04.2006
Reviewer in Planta Medica, Heikki Vuorela, 03.08.2006
Reviewer in Planta Medica, Heikki Vuorela, 25.09.2006
Reviewer in Planta Medica, Heikki Vuorela, 25.09.2006
Reviewer in Planta Medica, Heikki Vuorela, 12.12.2006
Reviewer in Chromatographia, Heikki Vuorela, 01.10.2007
Reviewer in Chromatographia, Heikki Vuorela, 26.06.2007
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 08.10.2007
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 29.06.2007
Reviewer in Journal of Chromatography A, Heikki Vuorela, 23.03.2007
Reviewer in Planta Medica, Heikki Vuorela, 23.03.2007
Reviewer in Chromatographia, Heikki Vuorela, 12.09.2008
Reviewer in Chromatographia, Heikki Vuorela, 12.06.2008
Reviewer in Chromatographia, Heikki Vuorela, 26.03.2008
Reviewer in Chromatographia, Heikki Vuorela, 26.04.2008
Reviewer in Chromatographia, Heikki Vuorela, 24.01.2008
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Reviewer in Pharmaceutical Biology, Heikki Vuorela, 16.09.2008
Reviewer in Pharmaceutical Biology, Heikki Vuorela, 02.12.2008
Reviewer in Planta Medica, Heikki Vuorela, 29.09.2008
Reviewer in Planta Medica, Heikki Vuorela, 26.08.2008
Reviewer in Planta Medica, Heikki Vuorela, 20.05.2008
Reviewer in Chromatographia, Heikki Vuorela, 24.04.2009
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 07.05.2009
Reviewer in Pharmaceutical Biology, Heikki Vuorela, 26.05.2009
Reviewer in Analytical Chemistry, Heikki Vuorela, 03.02.2010
Reviewer in Chromatographia, Heikki Vuorela, 17.12.2010
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 15.12.2010
Reviewer in European Journal of Pharmaceutical Sciences, Heikki Vuorela, 20.07.2010
Reviewer in Journal of Chromatography A, Heikki Vuorela, 02.11.2010

Editor of special theme number
Raimo Hiltunen, Raimo.Hiltunen@helsinki.fi
Planta Medica vol. 72 September 2006: 54th Annual Congress on Medicinal Plant Research, Raimo Hiltunen, 09.2006, Germany

Assessment of candidates for academic posts
Heikki Vuorela, Heikki.Vuorela@helsinki.fi
Evaluation of Docentship (Ph.D.) Juha-Pekka Salminen, University of Turku, Heikki Vuorela, 24.01.2005, Finland
Evaluation of Docentship (Ph.D.) Tolonen Ari), University of Oulu, Heikki Vuorela, 14.10.2005, Finland

Membership or other role in review committee
Raimo Hiltunen, Raimo.Hiltunen@helsinki.fi
Islannin ja Akureyrin yliopistojen perustutkintojen akkreditointi, Raimo Hiltunen, 16.10.2007 → 18.10.2007, Iceland
Islannin, Reykjavíkin ja Islannin Maatalousyliopiston jatkotutkintojen akkreditointianomusten arviointi, Raimo Hiltunen, 11.01.2009 → 16.01.2009, Iceland

Into Laakso, into.laakso@helsinki.fi
Member of the Review Panel Meeting of the CSIC (Madrid, Spain), Into Laakso, 21.09.2005 → 23.09.2005, Spain

Membership or other role in research network
Raimo Hiltunen, Raimo.Hiltunen@helsinki.fi
Farmakopeakomitean jäsen vuosina 1993 - 2009, Raimo Hiltunen, 1993 → 2009, Finland
Dekaan, Raimo Hiltunen, 01.01.2004 → 31.12.2009, Finland

Päivi Tammela, Päivi.Tammela@helsinki.fi
Member of Vikki Research Group Organisation, Päivi Tammela, 2007 → ..., Finland
Administrative co-ordinator of the FP7 project MAREX, Päivi Tammela, 01.08.2010 → 31.07.2014
Member of American Society of Microbiology, Päivi Tammela, 2010 → …, United States

Heikki Vuorela, Heikki.Vuorela@helsinki.fi
Chairman of the Research Council of the Faculty of Pharmacy, Heikki Vuorela, 2004 → 2009, Finland
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Expert member of the Faculty Council, Faculty of Pharmacy, Heikki Vuorela, 2004 → 2009, Finland

Vice Dean (Research) in the Faculty of Pharmacy, Heikki Vuorela, 2004 → 2009

Chairman of the Board of the Viikki Drug Discovery and Development Technology Center (DDTC), Heikki Vuorela, 2005 → 2009

Chair of the Teaching Skills Evaluation Committee in the Faculty of Pharmacy, Heikki Vuorela, 04.2010 → ...

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

Anna Galkin , Anna.Galkin@helsinki.fi

Board of practical training, Anna Galkin, 2007 → 2010, Finland

Student selection board, Anna Galkin, 2010 → 2011, Finland

Raimo Hiltunen , Raimo.Hiltunen@helsinki.fi

Helsingin yliopisto, Viikin kampusneuvottelukunta, Raimo Hiltunen, 2004 → 2009, Finland

Gesellschaft für Arzneipflanzenforschung Society for Medicinal Plant Research (GA), Raimo Hiltunen, 01.01.2005 → 31.12.2005, Germany

International Symposium on Essential Oils (ISEO), Raimo Hiltunen, 01.01.2005 → 31.12.2005, Germany

International Symposium on Essential Oils (ISEO), Raimo Hiltunen, 01.01.2006 → 31.12.2006, Germany

The Society for Medicinal Plant Researcher Gesellschaft fuer Arzneipflanzenforschung -GA, Raimo Hiltunen, 29.08.2006 → 02.09.2006, Germany

International Symposium on Essential Oils (ISEO) (Member of the Board of Directors; Member of the Organizing Committee 1980 lähtien), Raimo Hiltunen, 01.01.2007 → 31.12.2007, Germany

The Society for Medicinal Plant Researcher - Gesellschaft fuer Arzneipflanzenforschung -GA, Raimo Hiltunen, 02.09.2007 → 06.09.2007, Germany

Yvonne Holm , Yvonne.Holm@helsinki.fi

ESCO Working Group on Botanicals, Yvonne Holm, 15.04.2008 → 10.03.2009

Uuselintarvikelautakunta, Yvonne Holm, 18.05.2009 → 2011

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Board member of Graduate School of Pharmaceutical Research, Tiina Anita Lantto, 2008 → 2009, Finland

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Deputy Member of the Committee of Research Affairs, Päivi Tammela, 2004 → 2006, Finland

Member of Admissions Board, Päivi Tammela, 2005 → 2008, Finland

Deputy Member of the Committee of Educational Affairs, Päivi Tammela, 01.01.2006 → 31.12.2006, Finland

Member of the Advisory Committee of the UNDP/DDC Arab States Programme, Päivi Tammela, 2008 → ...

Deputy Member of the Committee of Educational Affairs, Päivi Tammela, 2010 → ...

Heikki Vuorela , Heikki.Vuorela@helsinki.fi

Board Member of The Scientific Board of the International Society for Planar Separation, Heikki Vuorela, 2001 → 2008, Hungary

Board member of GA - Society for Medicinal Plant and Natural Product Research, Heikki Vuorela, 2006 → 2009, Germany

Co-Chairman of organizing committee- 54st Annual Congress of the Society for Medicinal Plant Research, Heikki Vuorela, 2006

Member of the scientific committee in the Annual Congress of the GA-Society for Medicinal Plant Research, Heikki Vuorela, 2006

Membership or other role in public Finnish or international organization

Raimo Hiltunen , Raimo.Hiltunen@helsinki.fi

Palmenian johtokunta, Raimo Hiltunen, 1986 → 2010, Finland

Farmasian koulutusalaakoordinaattori, Raimo Hiltunen, 2003 → 2006, Finland

Helsingin yliopiston ja ammattikorkeakoulujen neuvottelukunta, Raimo Hiltunen, 2004 → 2006, Finland

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Puolustustaloudellinen suunnittelukunta: terveydenhuoltosektori, Raimo Hiltunen, 2004 → 2010, Finland
Opetusministeriö (tutkintorakennusuudistus Bologna prosessi), Raimo Hiltunen, 01.01.2005 → 31.12.2005, Finland
Sosiaali- ja terveysministeriö: Lääketalous, Raimo Hiltunen, 01.01.2005 → 31.12.2005, Finland
Sosiaali- ja terveysministeriön asettama lääketieteen yhteydessä toimiva farmakopeakomitea, Raimo Hiltunen, 01.01.2006 → 31.12.2006, Finland
Puolustustaloudellinen suunnittelukunta - Terveydenhuollon sektori, Raimo Hiltunen, 01.01.2007 → 31.12.2007, Finland

Yvonne Holm, Yvonne.Holm@helsinki.fi
Asiantuntijalausuntojen kirjoittaminen perinteisistä rohdosvalmisteista Lääketaitoksele, Yvonne Holm, 01.05.2006 → 31.10.2006, Finland

Päivi Järvinen (née Oinonen), paivi.jarvinen@helsinki.fi
Member of the board, Farmasian opettajien ja tutkijoiden yhdistys (FOTY)/ Pharmacy Teachers and Researchers Association, Päivi Järvinen (née Oinonen), 2005 → 2010, Finland
Deputy Member, Opintoasiantuntimikunta, Päivi Järvinen (née Oinonen), 2010 → 2011
Member, Apteekkijärjestystä, Päivi Järvinen (née Oinonen), 2010 → 2011
Heikki Vuorela, Heikki.Vuorela@helsinki.fi
Chairman of The ethic Committee for Human Studies in The Faculty of Agriculture and Forestry in The University of Helsinki, Heikki Vuorela, 1998 → 2009, Finland
Member of the Advisory Committee of the UNDP/DDC Arab States Programme, Heikki Vuorela, 2008 → ...

Membership or other role of body in private company/organisation

Anna Galkin, Anna.Galkin@helsinki.fi
Administrative board of Helsingin provisorikerho, Anna Galkin, 2010 → 2011, Finland

Raimo Hiltunen, Raimo.Hiltunen@helsinki.fi
Suomen Apteekkariliiton ja farmasian koulutuksen pysyvä neuvottelukunta, Raimo Hiltunen, 2004 → 2009, Finland
Pohjois-Pohjanlainen Osakunta, inspehtori, Raimo Hiltunen, 01.01.2007 → ..., Finland

Yvonne Holm, Yvonne.Holm@helsinki.fi
Opintotutkimuskunta, Yvonne Holm, 2004 → 2006, Finland
Tutkimusneuvottelututkimustyöryhmä, Yvonne Holm, 2004 → 2006, Finland
Opetuksen kehittämistyöryhmä, Yvonne Holm, 2007 → 2008, Finland
Opintotutkimuskunta, Yvonne Holm, 2007 → 2009, Finland
Svenska verksamhetsnämnden, Yvonne Holm, 2007 → 2009, Finland
Suomen farmaseuttinen yhdistys, Yvonne Holm, 2009 → ..., Finland
Yliopistokollegio, Yvonne Holm, 01.06.2009 → 28.02.2010, Finland
Yliopistokollegio, Yvonne Holm, 01.03.2010 → 31.12.2013, Finland

Other tasks of an expert in private sector

Anna Galkin, Anna.Galkin@helsinki.fi
Pharmaceutical adviser, Anna Galkin, 01.06.2008 → ..., Finland

Päivi Tammela, Pävi.Tammela@helsinki.fi
Deputy Responsible Pharmacist, Päivi Tammela, 29.04.1999 → ..., Finland

Participation in interview for written media

Raimo Hiltunen, Raimo.Hiltunen@helsinki.fi
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Luontaistuotealan Messut Pohjankartano, Oulu, Raimo Hiltunen, 01.01.2005 → 31.12.2011, Finland

Koulutustalisisuus luontaistuotekaupialle, Raimo Hiltunen, 01.12.2007 → 31.12.2011, Finland

Yvonne Holm, Yvonne.Holm@helsinki.fi
Lehti: Elämänhalu, Yvonne Holm, 01.01.2000 → 31.12.2011, Finland

Tiina Anita Lantto, tiina.lantto@helsinki.fi
Soluviestinnän tutkimuksesta, Tiina Anita Lantto, 2009, Finland

Päivi Tammela, Päivi.Tammela@helsinki.fi
Pohjatyötä uusien lääkkeiden hyväksi, Päivi Tammela, 2007, Finland
Tonneittain tuohta, Päivi Tammela, 18.06.2009, Finland

Participation in radio programme

Päivi Tammela, Päivi.Tammela@helsinki.fi
Radio interview, Päivi Tammela, 05.04.2006, Finland
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING
AT THE UNIVERSITY OF HELSINKI
by CWTS, Leiden University, the Netherlands

Research Group: Vuorela H

**Basic statistics**

- Number of publications (P): 72
- Number of citations (TCS): 390
- Number of citations per publication (MCS): 5.42
- Percentage of uncited publications: 22%
- Field-normalized number of citations per publication (MNCS): 1.41
- Field-normalized average journal impact (MNJS): 1.09
- Field-normalized proportion highly cited publications (top 10%): 1.35
- Internal coverage: .84

**Trend analyses**

**Collaboration**

**Performance (MNCS) by collaboration type**
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Research profile

[Bar chart showing research profile categories including Pharmacy, Food Science & Technology, Chemistry, Medicinal, Chemistry, Applied, Plant Sciences, Chemistry, Analytical, with a threshold of P >= 3 and High, Avg, Low H-indices indicated]