Panel 8 - Medicine/Clinical
Department of Clinical Sciences, Lund (incl Medical Radiation Physics)
Department of Clinical Sciences, Malmö

Evaluation material for
Department of Clinical Sciences, Lund (incl Medical Radiation Physics)
[Faculty of Medicine]

Form 1 Data from common data bases (3 pages)
1.1 Personnel structure 2003 and 2007
   Numbers of PhD and Lic exams 2007
   Number of PhD students 2007
1.2 Revenues and total costs
1.3 Number of publications 2003-2007

Form 2 and 3. Departmental Reports
Form 2 Descriptions of Research Activities and Strategic Research Aspects
   [Basic description, SWOT analysis, Strong research areas, Future plans] (39 pages)
Form 3 Quantitative summary of research activities and academic reputation
   (7 pages)

Specific comments: Note the all Medical faculty departments show a revenue from the ALF system. This is explained in the basic description from the Faculty of Medicine.

* Renewal Indicators, question 2 was omitted due to definition problems
### Personnel Structure in March 2003 and March 2007

Abbreviations used: Full time eq = Full time equivalents, NP=not permanently employed

<table>
<thead>
<tr>
<th>Department</th>
<th>Title</th>
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<th>NP</th>
<th>2007</th>
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The different personnel categories are explained in the document *University_Positions.pdf*
All figures are given in kSEK (1 SEK appr. 0.11 Euro, 1 SEK appr. 0.15 USD).

**TOTAL**

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<tr>
<th>Dept.</th>
<th>Revenue_costs</th>
<th>2003</th>
<th>2006</th>
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**Revenue Undergraduate Education**

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**Revenue Sources Research**

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**Depreciation on equipment financed by research grants**

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<td>05</td>
<td>04</td>
<td>03</td>
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| Other publications                               | Years |          |          |          |          |          |          |
|                                                  | 07    | 06       | 05       | 04       | 03       | 02       | TOT      |
| Doctoral theses, monograph                       |       |          |          |          |          |          | 1        |
| Doctoral theses, composite                       |       |          |          |          |          |          | 57       |
| Licentiate theses                                |       |          |          |          |          |          | 0        |
| Working papers                                   |       |          |          |          |          |          | 1        |
| Reports                                          | 1     | 4        | 3        | 3        | 5        | 2        | 18       |
| Other scholarly articles                         | 32    | 22       | 15       | 36       | 28       | 35       | 168      |
| Book translations                                |       |          |          |          |          |          | 0        |
| Book reviews                                     | 0     | 1        | 0        | 0        |          |          | 1        |
| Popular science publications                     | 10    | 11       | 3        | 9        | 6        |          | 39       |
| TOTAL                                           | 100   | 88       | 69       | 74       | 100      | 69       | 500      |

### Document Type Definitions

**Journal article:** articles published in scientific science journals

**Scientific Review:** a journal article, which is a secondary account of a scientific field

**Conference proceeding/paper:** A paper that is part of a presentation at a conference, workshop etc.

**Book chapter:** a part of a book

**Book:** one-time publication that is complete in itself

**Edited volumes:** a book or a volume from conference, for which a department member was an editor

**Doctoral thesis:** doctoral dissertations defended at the department, published as monographs (books) or composites (summary+papers)

**Licentiate thesis:** thesis required to obtain a licentiate degree

**Working paper:** an “informal”, un-refereed publication with the intention to present a scientific or scholarly idea or problem with the intention to mark priority and invite comments

**Report:** a publication published in a report, technical report series or as the presentation of results from a commissioned task.

**Translation:** the translation of an original work.

**Book review:** an essay or article that gives a critical evaluation of a book (of books)

**Popular science publications:** an account in a news paper or other journal that is primarily directed to the general public rather than the scientific community

### Explanation:

To be defined as a Scientific Publication, the publication
- shall present new knowledge in a form that allows control the results or allows use of the results in new research
- is written in a language and has a distribution which makes it accessible to all researchers who might have an interest in it
- ought to be published in a publication channel with routines including some scientific review procedure
Form 2. Descriptions of Research Activities and Strategic Research Aspects
(NB This form is the most important source of information for the evaluators!)

Department: Clinical Sciences Lund

Head of Department (submitter): Roland Andersson

2.1 General description of the department and research activities
Instructions: Describe the department under the following headings:

- Organisation and administration of unit (incl. significant changes the last 5 yrs)
- Special resources (unique equipment etc.)
- General description of total research profile
- Special multi- and interdisciplinary activities
- Interactions within the department
- Relation between research and teaching
  - Research impact on teaching
  - Research based education material (textbooks, courses, graduate education)
- Relation to and interactions with other departments within LU
- Standing of the department in a national / international context

Text:

The Department of Clinical Sciences, Lund, is by far the largest department within Lund University. Clinical Sciences, Lund, is structured in four sections with totally 37 units, lead by a professor or corresponding, each unit including several research groups. Below we have highlighted the most successful research activities within the different specialties.

Sections I-II

**EMERGENCY MEDICINE**

consists clinically of 5 wards with 20-26 beds each and an emergency unit that admits 60-70 000 patients per year. The academic unit serves teaching of medical and nursing students and other staff, and perform research in the clinic and in laboratories at the Biomedical Center (BMC). The research profile is mainly directed towards cardiovascular disorders and we approach it from all angles necessary for a truly translational research. We study coronary ischemic conditions, vascular problems in congestive heart failure, aging problems, angiopathia in diabetes, vascular dysfunction in smoking and hypertension, inter alia. Most of these problems can also be studied experimentally.

We collaborate with different other departments for clinical studies, e.g., cardiology, clinical physiology, neurodisciplines, including departments at UMAS. Concerning basic science work, we collaborate with BMC. We have a free flow of colleagues that are invited to different projects. We have a good collaboration with other departments at USiL, LTH and Natural Science departments; applicable e.g., to EKG research on how to evaluate in emergency cases. Many collegues have projects with Ideon Research Park.

**ANAESTHESIA AND INTENSIVE CARE**

The unit consists of 8 research groups, each with its own leader. The research is both clinical and experimental, and comprises studies on sepsis, general trauma, neurotrauma, cool protection after
cardiac arrest, lung function in prematures issues regarding coagulation, and anaesthesia. Our unit has national specialty for malignant hyperthermia. Anesthesia and Intensive care is a multidisciplinary clinical field with strong connections to general and thoracic surgery, pediatric as well as physiology, also characterizing the research. The unit is involved in both clinical and preclinical education for medical and dental students, and nurses. The research has had a large impact on the treatments of patients, but also on teaching. Two wide spread textbooks and chapters in larger textbooks have been produced during the last years. The unit has a very high impact internationally regarding research in head trauma, cooling after heart arrest and lung premature research.

CARDIOLOGY
One professor, 6 ass. professors (independent research group leaders), several other research positions and totally 14 PhD students are included within the unit.
Cell transfection molecular pharmacology, large animal infarction model MRI and SPECT, platelet pharmacodynamic methods. Cell sorting and isolation cardiac progenitors. Several mouse knockout models. LUNDEARTGENE biobank. Signal-averaged P wave analysis (PSA-ECG) and frequency analysis of fibrillatory ECG (FAF-ECG) Monophasic action potentials (MAP). Phase II and phase III units.
Basic cardiology education and a selective course in acute coronary syndrome.
Part of the strong research environment “Vascular Wall”. Formed Lund Heart Research Center 2007, for clinical heart research (http://www.med.lu.se/english/klinvetlund/cardiology/lhrc).
Formed Center for Integrative Electrocardiology together with Institute of Technology for new approaches to registration and analysis of cardiac signals.
The only complete cardiology unit in Sweden (Heart transplant, electrophysiology, ICD, PCI, percutaneous valve intervention) with translational research ranging from genetics in large biobanks, cardiac progenitor development, knockout mice, molecular pharmacology, arrhythmia research, cardiac device development, platelet research to phase II-II studies.

RESPIRATORY MEDICINE AND ALLERGOLOGY
The unit has two professors. Several basic and clinical research groups form translational research teams. There is one well-equipped clinical research lab for patient phenotyping of patients and subjects from epidemiological samples with asthma and COPD, and the groups have good possibilities to perform invasive studies using bronchoscopic methods as well as non-invasive samples from the airways. Furthermore, there is abundant possibilities to get tissue for cellular characterization from bronchoscopic samples of tissue from bronchi as well as from lung tissue achieved by transbronchial biopsies, methods that have not been used in these diseases earlier. Tissue are used from lung operations and transplantations in well-characterised patients as well as control smokers, without disease and never-smokers. The inflammatory patterns in the tissue from these subjects are then used for testing hypotheses on the inflammatory events in both diseases. The basic research groups in the team are working with matrix biology, of uttermost importance for the disease development in asthma and COPD, cellular morphology dealing with receptors and markers of importance for the development of inflammation, as well as genetic methods. The different groups interact with weekly seminars. This research is in the frontline of respiratory inflammatory research.

MEDICINE
The unit includes the clinical specialties general internal medicine, endocrinology-diabetology, and gastroenterology-clinical nutrition and is lead by a professor. The unit has strong research profiles within diabetes and gastroenterology with part of the focus on nutritional aspects and has an active laboratory science that is well integrated with the clinical science. It is actively engaged
in teaching activities. Postgraduate courses eg for the European Nutrigenomics Network and diabetes program have been arranged. Some research is interdisciplinary involving collaboration with several departments within the diabetes program or within informal gastroenterological and immunological networks. As indicated by the publication in well-recognized journals, invitations to give lectures at conferences etc, the diabetes research and the lipid signalling studies are internationally well competitive.

MEDICAL ETHICS
Courses in medical ethics are given by staff members at Lund University, at various clinics of the university hospital, and at hospitals in the region. Medical ethics is an interdisciplinary research and teaching subject. Research is carried out by, or together with, researchers with their basic training in different faculties (medicine, humanities, law, theology, etc.). The main focus of the research and teaching is on actual clinical problems, as well as on contemporary problems in medical research ethics, and contemporary risk analysis.

The dissertations have themes of ethical aspects of CPR, foregoing treatment, existential issues, children, birth, transplantation, paternalism, cardiology, heart disease and substitute judgement. The present dissertations are about ethical aspects on stem cells, difficult information, transplantation and vaccination. We work with issues related to Caesarean section, nanotechnology, palliative care, paediatric, research misconduct and risk.

Several units are and have been involved in the research: Belgium, Denmark, England, Finland, Iceland, Italy, Spain, Sweden, Switzerland, the Netherlands, and USA. Ethical problems regarding biomedicine, nano-medicine, medical decision making, medical risk analysis, contemporary research, are discussed with our students. Several of the books used and recommend are research-based material.

We interact especially with units involved in research activities and cooperates with several other departments and faculties within LU. Medical Ethics has a very strong international reputation. It has played a key part in many EU-projects. From a national perspective it has, for many years, been leading. One of the researcher received the prestigious The Fulbright-Hildeman Grant 2004/05 and was in the same period Guest Professor at University of Texas at Austin, USA.

NEPHROLOGY
The unit has two major research groups funded by VR, The Renal Physiology Group, and the Vasculitis Group. Among other groups, the Nephrotic Syndrome Group has also been internationally successful. The research groups work more or less independently from each other, but there is also internal collaboration. The Renal Physiology Group deals with integrative physiology of transglomerular transport, more specifically the causes of microalbuminuria, and also transport kinetics in peritoneal dialysis (PD). The Vasculitis Group deals with the pathogenesis of vasculitis and certain types of glomerulonephritis using cellular, immunological, and molecular biology technologies. Both groups have unique access to a well-characterized patient material and a bio-bank material from (2000) patients who have been biopsied for various glomerular disorders. Both groups have vast international contacts and collaborations, and are involved in teaching, post-graduate education, production of textbook chapters, and via networking, collaborate with other departments within and outside Lund University. The Renal Physiology Group is part of the Vascular Wall Program, while the Vasculitis Group has a central position in the Blood and Defense Program. The Nephrology unit in Lund is scientifically probably the highest ranking nephrology unit in Sweden, and also has a high stature internationally.

THORACIC SURGERY
A major resource is the operation theatre for big animal research with 10 tables. Advanced equipment for hemodynamic and respiratory measurements, X-ray, ultrasound etc. Lung transplantation with special reference to Non-Heart-Beating Donor and re-conditioning of rejected donor lungs. Cardiac arrest patho-physiology and cardiopulmonary resuscitation. Prolonged heart preservation and transplantation. Vacuum-assisted treatment of mediastinitis. Development of a transcatheter mitral valve repair device. Studies of the effects of extracorporeal circulation on the brain. The experimental and clinical research has been noticed around the world. Leading centres on lung transplantation and cardiopulmonary resuscitation regularly come to be taught in these topics. Broad cooperation between different specialities at the University Hospital and the Faculty of Engineering at Lund University. World leading unit in work on lung transplantation, lung reconditioning and cardiopulmonary resuscitation.

Section III

DERMATOLOGY
The Dermatology and Venereology unit live in symbiosis with the Department of Dermatology, Lund University Hospital. Four main research groups are each lead by principal clinical investigators. The research profile is skin inflammation at the interface between host and environment, more specifically innate immunity, allergy and itch. A revised edition of a textbook for undergraduate students has been published. Research collaboration exists with the Departments of Chemistry and Physics, Faculty of Natural Sciences, Lund University and Department of Experimental Medicine, Medical Faculty, Lund University, and outside the university with groups in Gothenburg, Uppsala, Umeå, Kiel, Krakow and Seattle. The research is of good international standard.

INFECTION MEDICINE
The unit has modern research facilities at the BMC and comprises approximately 40 full-time employees working in 6 independent groups. In addition, 8 physicians from the Infection Clinic at Lund University Hospital, currently participate in the various projects. The research has a common theme; studies of host-bacteria interactions – clinical, molecular and cellular aspects. The scientific questions are addressed by researchers with competence in different areas; clinical medicine, microbiology, biochemistry, molecular biology and immunology, and there are many interactions with other units within the Department, but also with other Departments at LU and at other Swedish and international universities. The unit is engaged in graduate and undergraduate education focused on infectious diseases, innate immunity, and cell and molecular biology.

ORTHOPEDICS
The major part of the health care consumption in musculoskeletal disorders is caused by fractures, joint diseases (osteoarthritis and rheumatoid arthritis), back problems, injuries, and tumors. This pattern is reflected in the research activities. Laboratory facilities exist within the unit for the following areas: biomaterial, biomechanics,
RQ-08 Lund University

5(39)
cartilage metabolism, animal experiments, bone transplantation and radiostereometry. In addition to some 30 M.D. clinical investigators, a total of 3 laboratory technicians, 4 engineers/engineering students, 5 statisticians and 6 secretaries are engaged in the research work. Currently, a total of around 15 graduate students are working on their Ph.D. theses. With the opening of the Biomedical Center (BMC), linked to the University Hospital, the collaboration with preclinical research in cell- and molecular biology within connective tissue was enhanced.

RHEUMATOLOGY
The research activities at the Rheumatology unit focus on various aspects of rheumatic conditions and many of the projects are characterised by close collaboration between clinical and basic researchers in a translational fashion. The research on inflammatory arthritis spans from studies of effects of intervention e.g. rehabilitation or biological medication to identifying pathophysiological mechanisms and markers for tissue damage. Another line of research focuses on clinical and experimental studies of SLE making use of our unique well-characterised epidemiological patient cohort. Another group is primarily working with systemic sclerosis where a large cohort of patients are being monitored. A number of integrated projects are also ongoing. Researchers from the Rheumatology unit are involved in many national and international research networks. Educational activities include courses on basic and postgraduate level and editor and authorships of national and international textbooks.

Section IV

CHILD AND ADOLESCENT PSYCHIATRY
The main research profile has been "Children at risk – Child Maltreatment. Other areas: Eating disorders, Children with hearing impairment and children with ADHD.
The unit has been very active in teaching based on the performed research, especially in the following topics: Child sexual abuse, sexual exploitation, child prostitution, child physical abuse, child maltreatment, young sexual offenders, hearing impaired children and abuse, eating disorders.
The unit has a good reputation as one of the leading research centers in the field in the northern part of Europe, both when it comes to child abuse and neglect and eating disorders. Researchers has been very active in the Baltic Sea Regional Study on Adolescent’ Sexuality.

EXPERIMENTAL BRAIN RESEARCH
The LExpBr involves around 15 persons, with an increased proportion of scientists at the ass professor and post doc level during the last five years. The focus is on translational stroke research (animal and human studies) evolving around mechanisms of cell death and tissue plasticity following brain damage. The aim is to find pharmacological targets for stroke therapy. This research includes relevant rodent and in vitro models of brain damage, 2-photon microscopy and live cell imaging as well as gene profiling and proteomics. LExpBr interacts with the neurology, medical physics, neuroradiology units and the Department of experimental medical sciences. With 30 years experience of stroke research LExpBr has a unique international position and participates in one of two stroke consortia funded by the European Union. LExpBr participates in teaching and training of students in Medicine and Biomedicine. 23 thesis originate at LExpBr.

CLINICAL NEUROPHYSIOLOGY
In order to elucidate the pathophysiology of neurological and psychiatric disorders, different parts of the brain, engaged in normal activity, are investigated. The platforms are: A brain dedicated SPECT camera. A laboratory for integrated electrophysiology and neuropsychology...
enabling us to make 3D reconstructions of rapid neurophysiological events during computerised test sessions. A platform for coregistration of SPECT (regional blood flow and other functional modalities), electrophysiology (EEG, event related potentials, and MRT. By collaboration with the Neuroradiology unit to access a new 3.0 Tesla MRI camera for fMRI. Interdisciplinary collaboration with several clinical research groups within and outside the two university hospitals, including neurology, child neurology, radiology (epilepsy research), psychogeriatrics (dementia research), psychiatry (suicide research), neonatal intensive care (research on continuous brain monitoring in NICU), anaesthesiology (research on brain monitoring after cardiac arrest and during hypothermia treatment), psychology (memory research), hand surgery and endocrinology (diabetic neuropathy), orthopaedics (spinal cord monitoring)

Teaching responsibility in basic neuroscience and clinical neurophysiology.

LOGOPEDICS, PHONIATRICS AND AUDIOLOGY
The Logopedics, phoniatrics and audiology unit is responsible for two master programs; speech and language pathology (SLP) and audiology as well as research education in SPL, phoniatrics and audiology. The research is focused on developmental language disorders, cognitive and linguistic development in children with cochlear implants, voice function, and speech motor control. Most of the staff is active in both research and teaching and there is a continuous introduction of scientific advances into the undergraduate and graduate curriculum. Ongoing research collaborators in Lund include Clinical Neurophysiology, Linguistics, Psychology, and Cognitive Science.

NEUROSURGERY
A major resource is the Raising Laboratory for translational neurooncology, now comprising 20 full or part time researchers and about the same number of clinicians involved, divided into a number of subgroups, including e.g. 14 PhD students. The Brain Immuno Gene Tumour Therapy group (BRIGTT) comprises 20 researchers and clinical staff. This group has translated basic research into a treatment model for patients with glioblastoma multiforme. The laboratory is unique in the world and clinical results have been successful with a prolongation of life of about 80%

The Glioma ImmunoTherapy group (GIT) run a series of animal studies to find new and improved techniques to translate to the human situation. Cancer Cell Biology identifies signaling pathways for glioma initiation and progression. Establishes in vitro culture conditions for long-term maintenance of low and high grade glioma cells by simulating the glioma niche conditions. The Stem Cell group study the possibilities to utilize exogenous stem cells as therapy for malignant glioma. Electroporation and -fusion for gene transduction treatment of tumours and neurological diseases is studied in a collaboration between the Raising Laboratory and the dept for Medical Radiation Physics.

The Spinal Cord Injury Group has developed models for spinal cord injury in the rat and experimental therapy with a patented cell line will start during the spring 08. The research activities within the Neurosurgical unit cover most fields of neurosurgery including neurooncology, functional neurosurgery, spinal research, vascular neurosurgery, neurotrauma and intensive care, and pediatric neurosurgery. Neurosurgery has extensive collaboration with anaesthesiology, neurophysiology, neurology, neuropathology, neuroradiology, oncology, clinical genetics, paediatrics, radiophysics, nationally and internationally, and also with other faculties at Lund university. At least 2 textbooks for education have been published during later years. 11 dissertations have been defended within the last 3 years and at present PhD 14 students are under education. The neurooncological research is positioned in the international frontline, especially concerning the clinical application of the immuno gene therapy developed. Also functional neurosurgery in
connection with Parkinson treatment is of very high standard. We have international collaboration with a number of universities (Duke University, Durham, NC and Columbia University, NY, USA; Nagoya University, Japan; Shantou University and Fudan University, China; The University of Melbourne, Victoria, Australia. The University of Perth, Australia. The Panum Institute and Niels Bohr Institute, Copenhagen).

NEUROLOGY
The Neurology unit comprises 6 independent research groups. There is a strong focus on experimental, translational, and clinical research in Parkinson’s disease, stroke, and epilepsy. For several projects, close collaboration between clinical and experimental research has been established. Research on stem cells as stroke therapy is currently at a breaking point when experimental studies are carried into clinical testing, necessitating input from both fields. There are well established collaborations between the clinical stroke research group and sections of neuroimaging, neurosurgery, cardiology, and genetics. Academics involved in research are active at different educational levels. Evidence based medicine, literature search strategies and analyses of scientific papers are integral parts of the curriculum at medical school and other health educations. The unit arranges 2 selectives on acute neurology. Academics have served as editors for textbooks (e.g. Subcortical Stroke, Oxford University Press) and chapter contributors for international textbooks, and for the main Swedish textbooks for graduate education. For about 3 decades, the unit has arranged annual post-graduate courses in cerebrovascular disease. There is strong collaboration with the Department of Clinical Sciences in Malmö, and other experimental groups at the Wallenberg Neuroscience Center and the Stem Cell Institute. The Neurology unit is established, standing as one of the 2 top Swedish neuroscience institutes, with a solid international reputation. We have a long tradition as pioneers in clinical and translational research in several fields. Academics have major international positions as editors, members of editorial boards, executives of scientific societies.

OPHTHALMOLOGY
At the Ophthalmology unit clinical and experimental research regarding retinal degeneration has been pursued since 1985. During recent years the team has expanded and the structure has changed from one large group to four. The experimental and clinical laboratories are sponsored by grants from e.g. the government (Swedish Research Council) and the Medical Faculty at Lund University, as well as from the US (FFB: Foundation Fighting Blindness; Gail and Richard Siegal Foundation) and EU (EVI-GENORET, NEUROTREIN. The applicants sustain active collaborations with various top-level international laboratories. Several of the senior researchers are involved in teaching, at various educational levels, of students as well as medical and laboratory personnel.

GERIATRIC PSYCHIATRY
Four research groups, partly overlapping, emanate from Lund Longitudinal Dementia Study. Approx 6 members/group. Neuropsychological laboratory; unique cognitive test facilities. Research focuses on cognition, dementia and depression. Mapping deficient cognitive functions and studying physiological mechanisms, brain-behavior relationships, biomarkers and genetics to develop detailed diagnosis and intervention programs. Interdisciplinary cooperation; functional and morphological cerebral imaging, genetics, biomarkers and evaluation with neuropathology, shared supervision for PhD students between departments. All members in the research groups are involved in teaching; medical and psychology students, student nurses, interns, and the public incl pharmaceutical industries.
The unit mainly consists of 6 research groups, lead by a professor or associate professors. We have educational matters and administration in common. The areas of interest span from epidemiological (the Lundby Study) to preclinical psychiatric research (Molecular Psychiatry Unit) via clinical research on mood disorders/suicidality, psychotic disorders and alcohol dependence in various settings. Several research aspects are covered. Preclinical- clinical – nursing translational projects are performed and collaboration exist with Scandinavian universities and also e.g. with Oxford, Columbia University, N.Y., University of B.C., and Nanjing University. Projects in Uruguay are pending. Teachers are engaged in basic training of various student categories, and research has a substantial impact on education. One textbook was recently published. Our unit is known nationally and internationally, not at least concerning the Lundby Study and the research on mood disorders/suicidality.

REHABILITATION MEDICINE
The unit was established 2006 and is linked with the clinical rehabilitation medicine clinic, one of the largest in Scandinavia. Research comprises studies of the short- and long-term consequences of trauma and diseases to the nervous system and long-term non-malignant pain, the development and implementation of novel therapeutic rehabilitation interventions and their effects in people with life-long disabilities. Research is conducted in collaboration between rehabilitation medicine physicians and other rehabilitation professionals such as physiotherapists, occupational therapists and psychologists, providing a unique interdisciplinary atmosphere. The unit is part of a large center for studies on ageing and supportive environments (CASE), funded for 10 years by the Swedish Council for Working Life and Social Research.

OTORHINOLARYNGOLOGY, HEAD AND NECK SURGERY
Otorhinolaryngology is a diversified specialty where different techniques are applied and so is the research. It is best described as a combination of basic research, motivated by defined problems and clinical research with development of new treatments and diagnostic methods. The research is organized in 5 major fields i.e. 1. Human balance and inner ear disorders; 2. Allergy in the upper airways and membranous disorders; 3. Squamous cells cancers of the head and neck; 4. Infectious diseases of the ear and throat. 5 Sleep apnoe. We are since about 3 years also forming a group in audiology. The research groups described below are all at a national leading position and well recognized on an international level. For field 1-2, 5 one may consider the groups as among the top leaders in their respective area. Groups 1-3 have larger funds from either the Swedish Research Council or the Cancer Society, with funded positions and group2, 5 external and commercial funding. The unit is a tertiary referral center with nationwide and international referrals for some diagnosis. Therefore we have the opportunity to recruit patients, retrieve measurements and samples and implement results. The different research groups also correspond to main issues in the corresponding clinical field. It has therefore been possible to have teachers with contact with frontlines in research as well as clinical practice also in the basic teaching.

Section V

CANCER EPIDEMIOLOGY
The unit work close together with the Oncological Centre for the south health care region, responsible for the cancer-, quality- and biobank registries. Also disease outcome in a number of large cohorts with extensive exposure information is followed through available population based regional and national registries. Descriptive, analytic and interventional cancer epidemiology is performed at this unit. Examples
of our research are the following: Reasons for difference in survival for breast cancer patients in Skåne and Denmark; the EUROCare project, which collects data from a large number of cancer registries in Europe in order to differentiate the different survival curves in the respective countries; population based studies of genetic and environmental causes of tumour diseases in Sweden; soft-tissue and bone sarcoma study of risk factors and clinical trials in cooperation with the five Nordic countries, Europe and USA; risk factor analysis in malignant lymphoma; late effect studies in paediatric patients with cancer; health economic analysis in cancer patients. Close cooperation between tumour biology researchers, pathologists, radiologists, clinicians (surgeon, oncologist, haematologist) has been established. The cooperation between the five Nordic countries, many European countries and USA is well functioning. The unit is regularly involved in cancer epidemiological education of medical students including prevention and evaluation of cancer incidence, prevalence, mortality, screening and cancer risk factors. The unit is heavily involved in research projects and doctorial theses emanating from other units using information from available registries or consulting the unit about statistical or epidemiological know how. We have a large national and international network in research and the unit is well known in Europe and USA.

CLINICAL PHYSIOLOGY
The unit comprises 3 research groups, the Cardiac MR Group, the EKG group and the Lung Group. During the last 5 years 70 original articles have been published and 9 doctoral theses defended. We have within the unit state-of-the-art magnetic resonance imaging (MRI), single photon emission tomography (SPECT), computed tomography (CT), ultrasound, and positron emission computed tomography combined with CT (PET-CT). A unique set of methods, largely developed by us, allows advanced studies of lung function, e.g. for ventilation/perfusion SPECT imaging, comprehensive lung function tests at rest and exercise, and tests in critically ill patients. The unit is highly active in clinical teaching, e.g. basic and clinical physiology for physicians, physiotherapists, biomedical technicians, graduate engineers. Teaching is closely linked to our research. Collaboration exists with University of California, Duke University, Johns Hopkins, European Association of Nuclear Medicine, EANM, Fudan University, Shanghai. The unit also lead a task group for lung diagnostics within the European Association of Nuclear Medicine (EANM). Each group, Cardiac MR, EKG and Lung is of international standing being frequently invited to give lectures, chair sessions and organize international meetings.

DIAGNOSTIC RADIOLOGY
Advanced MR and CT equipment with extensive research collaboration with manufacturers. Sweden’s only radiology unit with two 3T MRI scanners. Primary research profile is neuroimaging and skeletal radiology, but all aspects of radiology are covered. Diagnostic Radiology actively participates in the broad imaging initiative “Lund Bioimaging Center”. Since 20 years an active cooperation with Medical Radiation Physics, primarily within MRI. Large collaboration with clinical departments regarding neuroscience (e.g. stroke, vascular interventions, dementia, epilepsy). During the last 5-year period also a very broad engagement in international radiology and its development. Lund School of MR, invited lectures, textbooks (e.g. NICER Imaging Encyclopedia, editor H. Pettersson).

ELECTRON MICROSCOPY
The Electron Microscopy unit was formed in the middle of the 1980s as a service facility for electron microscopy, in first hand, within the medical faculty. Other clients from the University or outside are also served if possible and research is also done in collaboration with other groups. The unit is equipped with one Transmission and one Scanning microscope with accessory for elementary analysis with EDS, equipment, ultra microtome, high vacuum evaporators, sputter coater critical point drier and so on, for preparation of samples is obviously also available. The unit is processing a large variety of samples, from molecules, microorganisms, tissue and even some materials.

MEDICAL RADIATION PHYSICS

The unit is organized in four research groups, systemic radiation therapy(nuclear medicine), medical magnetic resonance, radiation therapy and radioecology.

Systemic radiation therapy: In the last five years a research laboratory has been built including SPECT/CT, PET and cyclotron with both preclinical and clinical research. New high resolution imaging detectors are developed. Development of dosimetry method for internal radionuclide therapy including image reconstruction and quantification algorithms, image registration and 3D modeling of radiation transport on macroscopical and small-scale level is undertaken. Medical magnetic resonance has its primary focus on development of new techniques for assessment of microcirculation (perfusion), molecular motion (diffusion) and macrocirculation (flow).

Recent installations of two 3 tesla MRI scanners in Lund provides one of the most modern and well-equipped MRI facilities in Scandinavia. The plan is to create a Medical Bioimaging Center in close collaboration between 18 research groups at 4 faculties.

In radioecology special resources are advanced alpha and gamma spectrometry low-level laboratories, and instrumentation/equipment for field measurements under regular and emergency situations. We also have access to, through collaboration, AMS, Accelerator Mass Spectrometry and ICP-MS, Inductively Coupled Mass Spectrometry.

The research profile focuses on the study of radioactive elements in the environment from different sources and their transport and kinetics in man. Developing analytical methods related to radiochemistry and nuclear measurement techniques is an important part of the research. Investigations of radon exposure in houses plays an important role for the total natural exposure to man in Sweden. Especially methods for retrospective assessment have been developed. The whole activity is multidisciplinary within physics, chemistry, and radioecology.

BIOMEDICAL ENGINEERING

Biomedical Engineering has specific resources including equipment for High Intensity Focused Ultrasound (HIFU), and for analysis of diagnostic ultrasound signals, for tissue analysis. The main research is focused on medical ultrasound. In diagnostics, analysis of the echo signal from different types of tissue is studied. Also studies on tixotropic characteristics in fluids, in combination with induced ultrasound are performed. Furthermore, temperature measurements with ultrasound is studied. In the therapeutic area, High Intensity Focused Ultrasound (HIFU) is studied for tissue destruction, for non-invasive cancer treatment.

The HIFU-project has been carried out in close collaboration with both Diagnostic Radiology and Surgery units.

Education and courses are held on graduate and postgraduate levels and for different types of staff. A textbook on Diagnostic Ultrasound is edited from the unit.

A close collaboration with the Dept. of Electrical Measurements, at Lund Institute of Technology, is carried out within the ultrasound research area.
OBSTETRICS AND GYNECOLOGY
The unit is integrated with the clinical department. Clinical research is performed at the clinical wards, ultrasound unit, laboratory for studies of fetal physiology, the biochemical and molecular biology research at the laboratories within BMC, and the animal experimental work (unique sheep model of transition from intra- to extrauterine life) at the in vivo unit of BMC. The perinatal epidemiological research is done together with the Center of Reprod. Epidemiology. The strongest research profile is within perinatology with 6 research groups (fetal physiology esp. feto-placental circulation, obstetric ultrasound, diagnosis of perinatal hypoxia, animal experimental group, pathophysiology of preeclampsia, perinatal epidemiology). Other research areas: Molecular mechanisms of pericellular proteolysis and cellmigration in tumour biology; Genital infections; Oxytocin and vasopressin in preterm labour and in dysmenorrhea; Population based studies of perimenopausal women (Health of women in Lund area). Close collaboration with the Pediatrics unit within perinatology and with other research groups in BMC.

All perinatological groups cooperate and perform joint studies. All researchers participate in undergraduate teaching. The worldwide prominent standing in the ultrasound research is reflected in organising and participating in national and international postgraduate courses. Two basic obstetric textbooks in Swedish, one in Czech and one in Russian have been edited from the unit.

Follow-up studies are performed of children together with Inst. of psychology; development of ultrasound methods with Inst. electrical measurements, Technical university, and the Tornblad Institute with its world unique register containing deliveries and possible of harm of medication. International frontline of ultrasound research, research on oxytocin receptors, perinatal epidemiology, perimenopausal health -WHO Collaborating center in perinatology, membership (presidency) of several world organizations.

ONCOLOGY
The unit is the largest research unit within the Department with several academic positions. It is part of several networks of excellence at faculty and national levels, most importantly are CREATE Health, SWEGENE, Lund Stem Cell Centre and Lund Laser Centre.
Special resources are the very close connection to the Oncologic Clinic and the Department of Cancer Epidemiology/regional tumour registry; The Kamprad laboratory building; Laboratories at BMC.
Platforms for molecular biology, imaging, animal models, biomedical optics, biobank, regional and national registries, Oncologic clinical research unit (OKFE), radiotherapeutic section.
Research activities include both preclinical and clinical research; from tumour cell biology to psychosocial oncology, with focus on epidemiology, prevention, diagnostics, prognostics, treatment (including -prediction, -targeting, -monitoring), and multicenter studies. Multi- and interdisciplinary activities include CREATE Health; SWEGENE; Lund University Medical Laser Centre (LUMLC); Cancer Stem cell program; Swedish Oncogenetic Group; South Swedish Breast Cancer Study Group; Swedish and Nordic Breast Cancer Groups; Swedish Lymphoma Group; SWENOTECA; The Scandinavian Sarcoma Group (SSG); Cell and Cancer Imaging
The research activities are mostly translational, combining different disciplines and expertise of relevance.
Oncology is responsible for education of medical students in oncology during 4th and 8th semester and supervision of graduate and Ph.D. students (presently >30). Postgraduate education in radiotherapy, and education for oncologic nurses and doctors.
Relation to interactions with other departments within LU: Divisions of Atomic Physics, Theoretical Physics, CREATE Health, Swegene, Lund Stem Cell Centre, Division of Genetics, Mathematic Statistics, Radiation Physics, Cell- and Organism Biology, Malmö Food and
Cancer, Cancer Epidemiology, Occupational and Environment Medicine, with hospital disciplines for cancer diseases (surgery, radiology, pathology, genetic clinic etc)

The unit has a large national and international network in research with large national and international grants emanating into more than 100 publications per year and is internationally well known.

PATHOLOGY
Two separate research groups, one working with neuropathology, one working with cellular imaging in tumor- and inflammatory related projects. The cellular-imaging group has a broad equipment of diverse modern microscopes and microscopy tools, forming a core facility for other research groups within LU, which utilize the equipment and personnel expertise.

Interdisciplinary activities is basic for the research activities of the two groups, as well within and between institutions and faculties of LU, as well activities within Sweden and other countries. Personnel in the groups take very active parts in basic and graduate education. The cellular-imaging group give advanced course for research students.

PEDIATRICS
The unit has broad activities with major research fields being are neonatology, pediatric nephrology, and pediatric cardiology, as expected from the organisation. Other important clinical research areas are oncology, habilitation and early orthopedic surgery for CP, epilepsy diagnostics and treatment, endocrinology and pediatric surgery.

Multi- and interdisciplinary research is illistrated by e.g. the “Blood and Defence Network” at LU with several national and international collaborators and joint positions between Lund and the University of Helsinki (neonatology). The researchers in neonatology have a fruitful collaboration with obstetrics, neurosciences, and immunology at LU, as well as with neonatologists in other countries (eg. within EU-funded FP6-project). Continuous collaboration between HU, CU, and LU occurs in pediatric cardiology. A long-lasting collaboration continues between Nordic countries in pediatric oncology, and with other countries. Pediatric endocrinologists have research collaboration with those in Malmö.

Teaching is performed on several levels and is an active part of the activities in the unit.

The unit is on high national as well international level in at least four major areas: pediatric nephrology, cardiology, oncology, and neonatology.

UROLOGY
Lower urinary tract dysfunction affects several hundred millions of sufferers in Western countries. The three major patient groups are those with urinary incontinence, bladder outlet obstruction and neurogenic disorders. The underlying pathophysiology of the involved lower urinary tract organs in incontinence is poorly understood and therefore hampers diagnosis, prevention and optimal treatment. In female incontinence we study the bladder outlet, the urethra and the pelvic floor with EMG, pressure mesurements, biofeedback, transcutaneous electric nerve stimulation, three-dimensional ultrasound, urodynamic investigations including urethral and bladder measurements. We are challenging traditional transurethral surgery (TURP) for benign prostatic hyperplasia (BPH) with an outpatient method based on microwave thermotherapy. Measurement of the intraprostatic temperature during treatment allows individualized therapy. Urinary and fecal incontinence in elderly is investigated including an interventional study in elderly dependent people.

SURGERY
Surgery has had a high research activity with up to 20 registered PhD students and in average 4-5 doctoral theses presented annually.

Facilities for translational research bridging clinic and pre-clinic together are good. Overall, the research contains both “guts and glands”. By tradition, research on visceral surgery and associated
items has been a focus area in Lund with high activity, especially within the field of upper gastrointestinal surgery including esophagus, stomach, hepato-pancreato-biliary, malignant and benign both together. The endocrine surgical section within the unit has a strong position nationally and internationally with a continuous good flow of high quality papers and PhD’s, not at least within the field of hyperparathyroidism. The section for mammary surgery has also an intense collaboration and research with the oncology unit.

Teaching at undergraduate and postgraduate level involves all physicians and not only academic teachers. A number of textbooks for medical education has been edited from the unit.

The unit has collaboration with several pre-clinical and clinical research groups and units and other departments within Lund University.

The unit has a firm platform and good reputation nationally, in many areas ranked at least at the second concerning activity. The national and international collaboration is well developed with networks both in Scandinavia and Europe including both pre-clinical and clinical studies as well prospective randomized trials. Recently we also have a collaboration Zhongshan Hospital, Fudan University, Shanghai, with an exchange of visiting professors both in Shanghai and Lund, the latter financed by the Swedish Research Council.

The allowed length (excluding the above headings) of this description incl. spaces is given in the Appendix to this Form 2

2.2 Strengths - Weaknesses - Opportunities - Threats with regard to the research of the department

Instructions: Give a short SWOT analysis of the department especially with regard to the research efforts.

Text:

**Strengths**: The well defined organization paralleling the clinical departments is a major advantage, providing opportunities for gathering samples and patient materials, recruitment of researchers, implementation and clinical development. A close co-operation and the vicinity to the Biomedical Center and the technical and science faculties, promote translational research and development of new techniques. Local collaboration with Medicon Valley, the pharmaceutical industry and national and international networks.

**Weaknesses**: The retirement and severe cut-backs of academic staff decrease academic leaders, resulting in decreased research and educational activities. Focus on production of health care and economic cut-backs rivals research and academic activities. The relative lack of ways to implement clinical research findings to clinical use or potential commercial development is a weakness.

**Opportunities**: Increased co-operation with experimental departments, other faculties, including technology and the pharmaceutical industry in translational research and education. Lund has one of the largest training facilities for clinical skills (Practicum). Possibilities of formation of multicenter clinical research centers. Development of a scientific interface and nationally and internationally improved collaboration with the pharmaceutical industry and venture capitalists, emphasizing implementation of clinical research findings and entrepreneurship.

**Threats**: Reduction of academic staff (research and education) as a result of retirements. Cutbacks in health care and focus on pure economy may lead to a decrease also in academic staff, thereby limiting possibilities for e.g. time for clinical research, less incitament for doing research and an academic career, and for these reasons an impaired environment for academic activities.
2.3 Description of the most successful research areas with strong national or international impact.

Instructions: Describe the particularly strong and successful research areas. The following headings can be used as a guide for the presentation: Title, Background, Project description, Achievements, National and international standing (substantiate your claims for the position), Specific actions / precautions needed to ensure a successful development.

Text:

**EMERGENCY MEDICINE**

Regulation of receptor expression in peripheral and cerebral circulation: How do the receptors function in cardiovascular disease? We have observed as the very first that some G-protein coupled receptors change their expression in disease. Risk factors for cardiovascular disease are involved in this process.

Studies of human peripheral circulation in hypertension: Previous studies have revealed enhanced levels of circulating messenger molecules in hypertension, but we have now found altered contractile responses in hypertension associated with increased expression of receptors on the vascular smooth muscle cells. We examine the hypothesis that the increased blood pressure leads to alteration in shear stress and in turn in the expression of receptors.

Studies of the trigeminovascular system in migraine pathophysiology: We have observed that the sensory neuropeptide CGRP (calcitonin gene-related peptide) is released in parallel with the headache and correlates with the degree of pain. In collaboration with the pharmaceutical industry a new medication has come forward which specifically blocks this receptor.

Role of natriuretic peptide in congestive heart failure: The inflammation processes in congestive heart failure and the use of “brain natriuretic peptide” as an early and strong marker for disease is studied, as is the use of cutaneous microcirculation as a surrogate marker for cardiovascular disease.

Effects of nitroglycerine treatment on CHF: Continued studies on circulatory responses in CHF patients.

Enhanced expression of Angiotensin II and endothelin receptors in coronary syndromes: Initial basal studies revealed that angiotensin II and endothelin-1 receptors are upregulated in various models of ischemia. This project is designed to evaluate if there are similar alterations in the expression in man. It is possible that the cutaneous circulation can serve as a surrogate marker for general cardiovascular disease.

Methods for enhanced diagnostics of ACS: Can the diagnosis of ACS be enhanced in the emergency setting? A prospective myocardial scintigraphic study is under way to evaluate the criteria for ischemic heart disease and to compare with other clinical parameters.

**ANAESTHESIA AND INTENSIVE CARE**

1) Development of techniques for noninvasive ICP measurement and a new therapy of severe head injury denoted “the Lund Concept”. This therapy is based on the physiological principles for brain volume and cerebral perfusion regulation and is used worldwide. Outcome studies with this therapy have shown a marked reduction in mortality compared to conventional therapies. 2) Based on the protective effects of cooling, body temperature in patients suffering acute cardiac arrest is reduced actively for brain protection. Preliminary data indicates favorable outcome. A network for these patients has been created including also other hospitals for a more comprehensive analysis of the effect of the therapy. 3) Research regarding antimicrobial peptides is a field with great potentials to create future therapies of sepsis and severe infections. 4)
Research on protection of lung function in prematures has resulted in new important principles for oxygen therapy. 5) Research in the field of malignant hyperthermia.

CARDIOLOGY
We are leading in several areas nationally and internationally: Delineation of details of the inflammatory mechanisms in acute coronary syndromes. Transcriptional profiling of platelets revealing novel receptors that are possible targets for drug development. Development of cell therapy for the heart: The techniques of advanced cell sorting and isolation cardiac progenitors and to develop cell therapeutic strategies for the heart. Cardioprotection using hypothermia. Percutaneous device development. Development of ECG-based non-invasive diagnostic modalities for assessment of cardiac arrhythmias. PSA-ECG and FAF-ECG techniques have been developed in Lund. Delineation of atrial conduction during AF for identification of persistent focal sources that drive the arrhythmia and that could become a target for catheter ablation. Novel mechanisms of infarction development found by genetic analysis.

RESPIRATORY MEDICINE AND ALLERGOLOGY
In the COPD field we have evaluated the early inflammatory changes in the airways of smokers related to early COPD. We have also shown that the protein pattern in broncho-alveolar lavage from smokers(using proteomic methods) shows specific markers before patients develop disease. Our further studies will concentrate on the relation of exacerbations and bacterial colonisation related to changes of inflammatory parameters in tissue samples from these patients. Another important finding is that COPD also has a probable systemic autoimmune component. We have found common patterns with arteriosclerotic disease, inflammatory bowel disease and multiple sclerosis. In asthma a very important finding is that fibroblasts from samples taken in early asthma show an intense activity, indicating that matrix remodeling is very important, especially in the peripheral part of the airways. We think this is an important way to further characterize and phenotype different forms of asthma. Our results clarify that fibrocytes, a progenitor cell, has an important role in this remodeling. We have been able to study lung tissue and the matrix formation in patients with scleroderma, where the lung complications is of uttermost importance in the prognosis. We have developed a centre of excellence for clinical trials.

MEDICINE
Insulin Secretion and Type 2 Diabetes. This project uses an interdisciplinary approach to examine the mechanisms and impact of islet dysfunction in type 2 diabetes in order to develop novel strategies for improved therapy. Subjects with type 2 diabetes and healthy volunteers, experimental animals, isolated islets and cultured insulin producing cells are examined to:
- establish mechanisms of the islet compensation to insulin resistance and the failure of these mechanisms as the basis for type 2 diabetes
- identify the role of neuropeptides, gliouconcretin peptide hormones, adipocyte-derived peptide hormones and islet peptides for regulation of islet function, for contributing to diabetes pathophysiology and as basis of novel strategies for treatment.

Major recent achievements: A major involvement of the autonomic nerves for the control of islet function has been established, mainly to control cephalic phase of insulin secretion and the glucagon response to hypoglycaemia. These effects are partially achieved by neuropeptides, such as galanin and pituitary adenylate cyclise activating polypeptide (PACAP). Furthermore, the novel approach for treatment of type 2 diabetes, which is based on the gut hormone glucagon-like peptide (GLP-1), has been established, with special focus on inhibition of the GLP-1 inactivating enzyme dipeptidyl peptidase-4 (DPP-4).

Lipid signalling in the gut – clinical and biological implications. Sphingolipids are key constituents of cell membranes and are also present in the diet. Metabolites formed during their metabolism are important messengers that regulate numerous cellular functions including cell differentiation, apoptosis and inflammation. The project is focused on the enzymes that regulate
formation of sphingolipid metabolites in the gut, and their potential anticarcinogenic and anti-inflammatory properties, particularly with regard to colorectal cancer and inflammatory bowel disease and liver disease.

Major recent achievements: The group discovered and more recently purified, and cloned intestinal alkaline sphingomyelinase. This enzyme has anticarcinogenic and anti-inflammatory functions and was found to exhibit inactivating mutations in some colon and liver cancers. Neutral ceramidase was purified and characterized. Clinical studies showed for the first time effect of TNFalpha blockade in ulcerative colitis.

MEDICAL ETHICS

Europriorites: Research Allocation in Health Care. A BioMed underd project on health care. A comparative study of priority setting in health care in five European contries. The project is funded by the European Commission. EuroStemCell: A project focusing on ethical aspects of stem cell research, funded by the European Commission. ESTOLS: A project funded by the European Commission focusing on “philosophical pluralism in European decisions regarding Bio-ethics”. The international standing is high. CPR. Several hospitals, both nationally and internationally, have guidelines for CPR. The project aims to survey patients’ and physicians’ attitudes by interviews and questionnaires. One dissertation and one guideline for Lund University Hospital have been achieved. National impact.

End-of-life decisions: Such decisions are often made at the hospitals internationally, not at least when changing from curative treatment to palliative care. The project involves Australia, Belgium, Denmark, Italy, the Netherlands, Sweden and Switzerland using questionnaires and registered data. More than 15 papers have been published in international journals (incl the Lancet). The project mapped existence of euthanasia in the participating countries, the second questionnaire emphasized on palliative care. Scientific misconduct: The project hopefully will influence the way by which such conduct is handled. Preliminary results indicate that fabrication, falsification and plagiarism are seldom found in Swedish research, but policies at the department levels are seldom developed and harassments, for instance concerning pregnant woman, are rather common.

NEPHROLOGY

Mechanisms of microalbuminuria: Microalbuminuria is an early indicator of diabetic nephropathy and/or vascular disease. The pathogenesis of microalbuminuria has been very difficult to study in the clinical setting. How much is caused by defective proximal tubular reabsorption of albumin vs. real glomerular permeability changes? The project use very highly sensitive size-exclusion (SEC), gel filtration, chromatographic techniques (HPLC), using Ficoll of high mol. weight (MW) as probes for glomerular transport studies in animals, because Ficoll cannot be used in humans due to toxicity. With the technique used we have for the first time been able to make detailed studies of the various causes of microalbuminuria.

In almost all cases of microalbuminuria there is a decreased size-selectivity of the glomerular filtration barrier to high MW Ficoll, which can be described in terms of an increased number of “large pores” in the filtration barrier, whereas charge selectivity and “small pore” number are only little affected.

Altered neutrophil behaviour and the etiology of vasculitis: The most prominent histological feature of small vessel vasculitis is the accumulation of necrotic neutrophils in the vessel wall. We work with the hypothesis that acquired, age related changes make neutrophils prone to deviate from the normal route to apoptosis and removal without collateral damage. Similarly we believe that such changes predispose for autoantibody formation. We compare in vitro features of neutrophils and monocytes from patients with systemic vasculitis with healthy controls and with relevant disease controls. We study surface expression membrane bound proteins (using FACS),
transcription (using realtime-PCR) and behaviour (spontaneous apoptosis, phagocytosis etc). We have found that neutrophils express increased amounts of PR3 on their surface and that surface expressing of PR3 is linked to the expression of another protein called CD177. Monocytes and to a lesser degree neutrophils overexpress mRNA for PR3. Neutrophils from stable vasculitis patients have a decreased tendency to undergo apoptosis in vitro compared to healthy controls and patients with SLE.

We have put forward a unique hypothesis, which if proven correct, will dramatically change the current view of autoimmune disease and provide new avenues for therapeutic interventions.

**THORACIC SURGERY**

Developed new methods to overcome the shortage of donor lungs. In approx. 75% of organ donors the lungs are rejected due to bad function. We have invented a flush solution for lung preservation: Perfadex, today used in 90% of the transplantations in the world. It prolongs the time between harvest to reperfusion from 6 hours to 24 hours. Developed and clinically implemented a method to recondition rejected donor lungs. Invented Steen Solution, used to recondition the lung function ex-vivo. Discovered important physiological circumstances regarding cardiac arrest. When cardiac arrest occurs the right ventricle quickly will be so distended that defibrillation will fail to establish spontaneous circulation. The importance of giving chest compression before defibrillation is done was first explained by us in an experimental large animal model.

Developed the mechanical chest compression/decompression device LUCAS (Lund University Cardiopulmonary Assist System) which today is in use in Europe, Asia and USA. LUCAS makes it possible to transport cardiac arrest patients with ongoing vital circulation to the hospital for casual treatment, eg. PCI, by-pass surgery.

**Section III**

**DERMATOLOGY**

One promising project is research on innate immunity of skin and blood, with particular focus on taking basic concepts to clinical therapy. We have discovered several novel and evolutionary conserved antimicrobial peptide “systems” in skin and blood, activated during injury and repair. These concepts are in the process of transformation into clinical trials.

In another successful project allergic dermatitis is studied by using novel synthesized hapten-modified peptides, chemically defined complete antigens. Immunization of mice gives specific T-cells, and T-cell hybridomas are produced. Cultured antigen presenting cells, our synthesized complete antigens and the hybridoma cells constitute a completely defined immunological synapse, which is used to investigate allergic eczema and drug hypersensitivity and the cross reaction pattern of these allergies.

**INFECTION MEDICINE**

The projects at Infection Medicine are among the most highly prioritized at the Swedish Research Council and by the local ALF committee, and the Division represents one of the top international laboratories in the area of bacterial pathogenesis (papers published in Nature, Nature Medicine, J. Exp. Med., EMBO J., PNAS, CELL, PLoS etc.).

**ORTHOPEDICS**

Research on joint disease and its consequences spans from basic genetic and biochemical investi-
gations to applied projects which monitor nationwide the outcome of arthroplasty and includes development of methods for diagnosis and monitoring of early-stage osteoarthritis; epidemiology and risk factors for osteoarthritis following joint injuries; improved diagnostic and reconstructive techniques after knee ligament injury; improved techniques for joint replacement in the rheumatoid joint; studies of processes and causes of joint implant loosening in hip and knee.

Fracture research includes a prospective multicenter study investigating the epidemiology and treatment of hip fractures and its effects on health care economy.

Biomaterial and Bone Biology Research includes a study of the process of bone induction and its stimulation by human recombinant growth factors, and synthetic bone substitutes for fracture repair.

Research on lumbar back pain and sciatica aims to optimize patient information, surgical methods, postoperative treatment, and utilization of hospital resources. A new mini-invasive ultrasound technique for treatment of discal hernia is studied.

Research on different methods of treatment for gangrene of the lower extremity caused by diabetes is evaluated with regard to quality of life, cost, etc.

Research on orthopedic oncology evaluates diagnostic procedures, surgical techniques, and prognostic classification of soft tissue tumors. Surgical treatment of skeletal metastases are studied concerning technique and outcome.

Research in hand surgery includes evaluation and treatment of ligament injuries in distal radius fractures in young patients.

Research in pediatric orthopedics targets gait and function analysis in children with cerebral palsy and pathophysiology in Perthes’ disease.

RHEUMATOLOGY

The Section for Rheumatology is particularly strong in the field of matrix biology with an internationally leading position in the development of biomarkers for cartilage and bone turnover in joint and connective tissue diseases. A major achievement is the discovery and characterization of COMP (cartilage oligomeric matrix protein) and the development of a serum assay, which is now commercially available. This protein is currently the most studied and established tissue marker for arthritis worldwide. Another field, which is internationally competitive, is translational research concerning systemic lupus erythematosus where a number of world wide collaborative projects are ongoing. This includes networks where the genetic background to this disease is being characterized.

Section IV

CHILD AND ADOLESCENT PSYCHIATRY

The Baltic Sea Regional Study on Adolescents’ Sexuality. For a number of years child protection professionals and researchers have tried to find ways of addressing phenomena associated with child sexual abuse, child sexual exploitation against children. Within the Council of the Baltic Sea States a regional research network developed a study plan and invited researchers from the member states to participate in the so called Baltic Sea Regional Study on Adolescents’ Sexuality. More than 20 000 students (4 339 from Sweden), 17-19 years of age, participated in the study. By now are 3 papers are accepted, 2 submitted and 4 under preparation. One attachment to a Swedish Governmental Committee SOU 2004:7, an International report and contributions to two books has also been written so far. The project has given new knowledge on several areas concerning commercial child exploitation, children’s disclosures of sexual and young perpetrators of sexual abuse. The study has been much appreciated on the international arena.

EXPERIMENTAL BRAIN RESEARCH
Mechanisms of cell death following brain injury: We have identified the mitochondria as an important target for brain injury therapy. One company has been founded. Mild hypothermia is effective in preventing brain damage. We are identifying critical mechanisms of this protection. One company has been founded. Clinical trials are in progress.

**CLINICAL NEUROPHYSIOLOGY**
Continuous brain monitoring in the sick neonate. An Atlas on the subject has been published and a second edition is in press during spring of 2008. The technique was carried to adult patients after cardiac arrest and during hypothermia treatment, and the first results from the group was recently published in Intensive Care Medicine. The group has been invited to participate as investigators in a EU multicenter study.

**LOGOPEDICS, PHONIATRICS AND AUDIOLOGY**
The unit has a long and very productive tradition of research in developmental language disorders. Recently, this program had been extended to cognitive and linguistic functions in children with cochlear implants. Another focus has been on speech motor control. In all these areas, the unit has a very strong international standing.

**NEUROSURGERY**
Neurooncological research, Immunotherapy, focusing on glioblastomas with immunisation with tumour cells, transfected with interferon gamma, demonstrates good experimental results. Within the Raising Laboratory for translational neurooncology, the Brain Immuno Gene Tumour Therapy group (BRIGTT), animal results have been translated into a treatment model for patients with glioblastoma multiforme. With successful results with prolongation of life of about 80% the group also performs differential serum protein profiling of GBM patients immunized with autologous glioma cells transfected with the IFNγ gene, and their controls and compares mRNA and protein expression profiles in glioblastoma multiforme.

In parallel, the Glioma ImmunoTherapy group (GIT) runs a series of animal studies to find new and improved techniques to translate to the human situation. More immunostimulatory cytokines and genes are tested. GM-CSF transfected mouse glioma cells (GL261-GM-CSF) have been established to be used for immunotherapy either alone or in combination with recombinant IFN-γ.

The section for Cancer Cell Biology identifies signaling pathways for glioma initiation and progression.

The Stem Cell group study the possibilities to utilize exogenous stem cells as therapy for malignant glioma.

The translational project BRIGTT is still unique in the world. It is a demanding procedure and before we started as the first center to perform this treatment, an international board of immunologists, pathologists and neurooncologists evaluated our possibilities to drive the project and found that all aspect were covered in our center. Our results are still unique with a prolongation of life with 80% of the patients (all above 50 years of age) and with good QoL.

**NEUROLOGY**
Cell transplantation in Parkinson’s disease: We have pioneered the field of cell replacement for brain disorders. Our studies have demonstrated that grafted dopamine (DA) neurons can survive, reinnervate the striatum, restore DA release, and induce clinical improvement for up to 10 years despite an ongoing disease process, which destroys the patient’s own DA neurons. We are currently trying to generate large numbers of DA neurons from stem cells.

Gene therapy in Parkinson’s disease: We are trying to develop long-term delivery of the neurotrophic factor GDNF using gene therapy as a novel strategy for patients. Human cell lines secreting GDNF are generated and encapsulated in polymer-based hollow fibers. Patients will then be implanted with capsules in the putamen, and assessed clinically and with serial PET.
Cell transplantation and neurogenesis in stroke: Our discovery that the adult brain makes an attempt to repair itself after stroke has triggered studies in many laboratories. We are now studying the mechanisms of neurogenesis to identify clinically applicable strategies to potentiate the degree of functional restoration. We are also generating cortical and striatal neurons from stem cells for transplantation into the stroke-damaged rodent brain.

Clinical stroke research: We have pioneered epidemiological studies, large clinical trials, diagnostics, and pathophysiological and neuroimaging correlative studies across several decades. The Lund Stroke Register, a population based stroke epidemiological study established 2001, is one of only a handful of such registers currently on-going world-wide. Data from the register (currently about 3000 patients and 1000 healthy controls from the general population) have been used for monitoring of incidence trends and long term outcome studies including multidisciplinary approaches (nursing, physiotherapy). More recently, the data base has also been used for studies on stroke genetics.

OPHTHALMOLOGY
Retinal degeneration: Mechanisms and experimental therapy. Pathophysiology in blinding retinal diseases such as Retinitis Pigmentosa and glaucoma, is investigated. The studies utilize various animal disease models, both in vitro (retinal explants) and in vivo, and have recently revealed novel components of the mechanisms behind the irreversible cell loss in inherited retinal degeneration. Based on such findings, experimental therapies are developed, using a range of factors, enzyme inhibitors and other molecules. Knowledge of the degeneration mechanisms and experimental assessment of various treatments are both essential for the advance of efficient protective therapies for these diseases.

Effects of ischemia on the neuroretina. Retinal ischemia ensues when the retinal circulation is insufficient to meet the metabolic demands of the retina. The project aims at identifying the signal transduction pathways that are of importance for the development of retinal ischemic injury and neovascularisation. By pin-pointing the signal transduction pathways involved, we hope to discover a novel therapeutic target for the treatment of retinal ischemia.

Electrophysiology. Further development and introduction of new electrophysiological technique (full-field ERG, mfERG and mfVEP), for investigation of the patophysiology and visual function in retina and the optic pathway. This technique could enhance the understanding of the pathogeneses and the clinical variation in families with hereditary eye disorder and in retinal impairment caused by drug toxicity could be verified. The Swedish RP register including 2600 patients with retinal degeneration and a Biobank counting DNA from 1200 patients is including in this research.

GERIATRIC PSYCHIATRY
Characterize functional brain network in healthy subjects and examine how brain damage in different dementia syndromes affect cognitive functions.
Analyze and link brain cellular/tissue changes (neuropathology) with brain imaging in dementia patients.
Study personality characteristics and affective status in relation to cognitive performance, experience of stress and biological markers of stress in a longitudinal design in patients with memory complaints.

PSYCHIATRY
1.Electroconvulsive seizures. Findings of altered cellular plasticity in our preclinical studies,
elucidate possible mechanisms of action of this important treatment regimen. Internationally recognized. Translational studies into the clinic have been introduced.


3. On the psychobiology of suicidal behaviour. Studies (body fluids, challenges, brain-imaging) on the role of monoamines and the stress system for deliberate self-harm. Known internationally. Several postdocs and PhD students are involved.


REHABILITATION MEDICINE

A well-equipped neuromuscular research laboratory has allowed studies of molecular changes following various rehabilitation interventions, which, combined with evaluations using global outcome measures, provide unique opportunities to assess the effects of rehabilitation from cellular function to social interactions. Qualitative research has expanded our knowledge of the effects of goal-oriented, comprehensive interdisciplinary rehabilitation programs, and this has lead to the development and strengthening of new interventions for people with life-long physical and cognitive disabilities.

OTORHINOLARYNGOLOGY, HEAD AND NECK SURGERY

In studies on allergy there is a close co-operation with dept immune technology at the Technical faculty, which has led to development of new methods as well as registered patents and products being made commercially available. In studies of balance control there is a longstanding co-operation with dept of Control Theory at the technical faculty, which has led to some of the cornerstone publications of human postural control. The work has been reciprocal and human behavior has been inspiring understanding of robotic control and vice versa. The work has resulted in several therapies and diagnostic methods, as the present low dose gentamicin therapy for incapacitating Meniere’s disease, which today is the most spread and used method. Recently, a completely new approach has been introduced, the ‘prehabilitation’ i.e. a pretreatment method to reduce morbidity and avoid permanent invalidity after certain neuro- and skull base surgery.

Most patients with head and neck squamous cell carcinoma in southern Sweden are treated at the department and tumour samples are continuously retrieved for research. For more than 30 years a nude mice model for cultivating cell-lines of tumour cells has been running and their original patient donours have been followed, forming a unique material. The work is done in close co-operation with the oncologists. Otitis media is one of the most common childhood diseases and its course, therapy and prevention are studied both in animal models and in clinical studies, including a vaccination program. Sleep apnoea and related disorders are studied. New concept of diagnosis and treatment has been developed and the group leader has been acknowledged as a member of the International and EU-funded validating board for dept in sleep-disorders.

Section V

CANCER EPIDEMIOLOGY

ICRU (International Commission on Radiation Units and Measurements): Definition of a specific terminology by international working groups. Decisive input from Lund.

Scandinavian Sarcoma Group (SSG): A multinational database exists, which is used for tumour biology, epidemiologic and prognostic studies, contains detailed clinical-pathologic, treatment and follow-up data.

Nordic Childhood Cancer Survivor Cohort: Based on pooled data from all five Nordic cancer registries the risk of SMN in survivors, risk of cancer in first-degree relatives, and causes of late
mortality have been investigated.
Collaborative Group on Hormonal factors and Breast Cancer: Meta analyses have been performed on the risk for oral contraceptives, HRT, alcohol, family history, abortions, pregnancies. Our department is participating both with a case control study and the big MISS cohort.
Collaborative Group on Epidemiological studies of Ovarian Cancer: Meta analyses have been performed on the protective effect for oral contraceptives, and pregnancies. Our department is participating with the big MISS cohort.
GenoMel (Melanoma Genetics): The project, first aimed at study the role of CDKN2A germline mutations, has evolved into finding new melanoma genes through a genome wide search among families with melanoma cases, individuals with multiple melanomas or among individuals with a melanoma diagnosis before age 40.
EUROCARE: Concerted action by at present 67 cancer registries in 21 countries in Europe. Analyses of age-standardised five-year relative survival, special studies on specific tumour groups. BRCA-1 and 2 International Collaboration including work within the Breast Cancer Linkage Consortium and the IBCCS cohort: A high risk registry has been established to facilitate studies of follow-up of high risk patients attending the oncogenetic clinic.
SWENOTECA (Swedish-Norwegian Testicular Cancer Project): Based on pooled data from the SWENOTECA data bank from Sweden and Norway survival data have been investigated.

**CLINICAL PHYSIOLOGY**
The Cardiac MR Group; the group has during a short period reached the international front through studies of basic cardiac physiology and various cardiac diseases using the latest magnetic resonance techniques and in-house developed mathematical post-processing algorithms in collaboration with Dept. of Applied Mathematics. The cardiac pump mechanism is studied at a level which will alter our view on physiology, pathophysiology and diagnosis.
The EKG group. EKG is the leading physiological diagnostic method in a global perspective. EKG analysis has been refined through technical and mathematical developments. Our unit pioneered computerization of EKG at rest, stress and 24-hour recording, and now continues with international collaboration with USA and the technical faculty at Lund University. The main focus is to improve EKG for detection of acute coronary syndrome.
The Lung group follows three lines: The constantly upgraded lung function laboratory is a national resource for advanced lung diagnostics; tomographic lung scintigraphy has reached an internationally leading position in lung diagnostics. Quantification of pulmonary embolism enables home treatment to benefit of patients and at low cost; research in patients with critical lung disease is based upon the world leading Siemens ServoVentilator, originally conceived by Jonson. Methods are developed in animal research and applied in international centres for optimizing ventilator settings to minimize treatment induced lung damage.

**DIAGNOSTIC RADIOLOGY**
The key research area is neurofunctional MRI in a broad sense (combinations of morphology, perfusion, diffusion, fMRI and MR spectroscopy). Here, the department have an over 20 year long tradition in internationally competitive research. In close cooperation with Medical Radiation Physics, the main research areas are:
Microcirculation: Optimal imaging parameters, contrast agents and doses used in dynamic susceptibility* contrast (DSC) MRI for perfusion studies at 3T are determined, and accurate mathematical algorithms for calculation of perfusion parameters are developed. Non-invasive arterial spin labelling (ASL) methods for 3T are developed and compared to the DSC method. Routines for functional cortical activation (fMRI) investigations are optimized at 3T with emphasis on examinations of the whole fMRI data chain. MRS is investigated e.g. for differential diagnosis. Clinical impact is evident e.g. for patients with acute lacunar stroke and brain tumors,
as well as for neurosurgery planning in tumor patients.

**MEDICAL RADIATION PHYSICS**

Systemic Radiation Therapy: Developing quantitative molecular imaging with main focus on therapy applications in oncology for systemic radiation therapy. Disseminated cancer will have good possibilities of being treated with targeted radionuclide therapy (TRT). As radionuclide therapy treatments (RNT) are expanding. Present dosimetry needs to be replaced by better 2D and 3D quantification methods and more realistic geometrical considerations on the tissue and cellular level. To enhance the therapeutic ratio the pharmacokinetics needs to be manipulated to reduce the normal tissue exposure.

MRI: For perfusion, optimal imaging parameters, contrast agents and doses used in dynamic susceptibility contrast (DSC) MRI for perfusion studies at 3T are determined, and accurate mathematical algorithms for calculation of perfusion parameters are developed. Non-invasive arterial spin labelling (ASL) methods for 3T are developed and compared to the DSC method. Routines for functional cortical activation (fMRI) investigations are optimized at 3T with emphasis on examinations of the whole fMRI data chain. Diffusion information about extra- and intracellular water by diffusion measurements is pursued using the high field gradients and SNR available at our 3T systems.

Radioecology: Studies of actinide elements from different sources. Advanced techniques are used, such as alpha spectrometry and Accelerator Mass Spectrometry. Retrospective studies of Rn exposure in houses. A technique has been developed to retrospectively assess the Rn exposure in a house using deposition of Rn-daughters on glass surfaces followed by alpha spectrometry. It has then been possible to evaluate the Rn exposure to people and relate doses to lung-cancer frequency.

**BIOMEDICAL ENGINEERING**

Medical Ultrasound: Since Lund University has a long and successful history in the area of medical ultrasound (pioneering work in echo-chardiography was performed here by Hertz and Edler), this is the most important research area with impact both nationally and internationally. Through close collaboration with research groups at the Dept. of Electrical Measurements, Lund Institute of Technology, where ultrasound is one of the most important research areas, a wide understanding for possibilities and applications is at hand.

**OBSTETRICS AND GYNECOLOGY**

Development and evaluation of new fetal surveillance methods: The perinatological team developed and evaluated several methods that today are used in clinical obstetric practice. Doppler velocimetry of umbilical, fetal and uteroplacental vessels is the most reliable method for surveillance of growth restricted fetuses, is very important in management of complicated pregnancies at very early gestational age. The management protocols are supported by long-term follow-up studies (up to 22 years of age). Fetal ECG is an important addition to the cardiotocography used for fetal surveillance in labour. Estimation of Cystatin C levels in maternal blood is a good indicator of maternal renal function in preeclampsia. In the field of doppler ultrasound in obstetrics, Lund is one of worldwide leaders.

Epidemiological studies of perinatal factors: The results supported the national changes in management of breech pregnancies, initiated several prospective studies on perinatal acid-base balance, ultrasound dating and investigation of fetal growth. Studies of the role of oxytocin and vasopressin in human reproduction give basis to development of oxytocin antagonist atosiban, now commercially available and used worldwide in cases of imminent preterm labour as an efficient tocolytic agent with practically no side effects.
ONCOLOGY
We have strong research in genetic susceptibility for breast cancer and maintains an oncogenetic analysis service in Sweden (BRCA1 BRCA2 mutation screening). This represents an example of a successful clinical implementation of research activities – genetic linkage and BRCA gene analysis in familial breast cancer started as research projects in the early 90ties and grown to national diagnostic service. The group is participating in large international genetics consortia for association studies in breast cancer and malignant melanoma. Another example of clinical implementation is the use of prognostic and treatment predictive factors in the management of breast cancer patients.
Research regarding early diagnostics and photodynamic therapy (PDT) of malignant tumours. PDT has been taken from laboratory work to routine clinical application regarding certain types of skin carcinomas, while interstitial PDT is now being studied for prostate cancer.
Clinical trials in lymphoma – coordinating more trials and recruiting more patients than any other centre in Sweden. Pioneers in radioimmunotherapy for lymphoma – first in Europe. The Swedish-Norwegian testicular cancer project, SWENOTECA is a binational clinical research collaboration which started 1981. Several clinical trials, (SW l-VII) have outlined the treatment of testicular cancer in the two countries. The impact of SWENOTECA is reflected in repeated Eurocare surveys of cancer survival in Europe. In focus today is research on late effects of cancer treatment as fertility, hypogonadism and cognitive function.
To improve tumour targeting of immunoconjugates, this requires reduction of the fraction of uptake in sensitive vital organs, improving penetration through interstitial tissues, and evaluation of the internalization process in the tumour cells. We have evaluated a specific device to improve tumour-to-normal tissue in these animals and implemented various devices and strategies in clinical phase 1-2 studies ECAT.
Collaborative Groups on Hormonal factors and Breast Cancer, Epidemiological studies of Ovarian Cancer, GenoMEL (melanoma genetics and BRCA-1 and -2 International Collaboration, including work within the Breast Cancer Linkage Consortium and the IBCC cohort. The role of CDKN2A germline mutations has evolved into finding new melanoma genes through a genome wide search among families with melanoma.

PATHOLOGY
Neuropathology group: Analyses of tissues from human GBM and animal models with respect to histopathological parameters and gene expressions.
Cellular imaging group: Determination of antibody internalization in tumor cells by combined flow cytometry, confocal microscopy and electron microscopy.

PEDIATRICS
Pediatric nephrology: The productive research focus on haemolytic uremic syndrome and vasculitis, noticed nationally and internationally.
Pediatric cardiology: With a fruitful research environment, achieving publications in high-ranked journals and also major grants.
Neonatology: Studying questions of early diagnostic methods for perinatal brain damage, both in animal experiments, clinical setting and in basic science. Major fundings and the clinical research, in addition to diagnostics, aim at finding early interventions for improving cognitive function. Furthermore, a laboratory for diagnostics of mitochondrial disorders is under development (not only GRACILE sdr), but more general possibility to assess respiratory chain deficits.
Child oncology: Collaboration with the Stem Cell Center has been fruitful. Furthermore, collaboration between Lund and the Netherlands has been established. Long-term follow-up of leukaemia patients is ongoing.
SURGERY
Pancreatology: Pancreatological research involving both pancreatic cancer and acute pancreatitis, ranging from in vitro, in vivo, and clinical studies, involving molecular mechanisms, clinical trials, and novel intervention. The acute pancreatitis research is well established, involving cellular mechanisms, effects on the pancreas and concomitant systemic inflammatory response and potential development of multiple organ dysfunction. Studies have also included clinical outcome and randomized trials on nutrition. The Lund group has national and international frontline standing with networks in Scandinavia, Europe and Asia.
Endocrine surgery: Has a good academic tradition in Lund, one of the leading groups in Sweden, not at least the research associated with hyperparathyroidism. The research has resulted in development of novel and less invasive modes of endocrine surgery like unilateral exploration in hyperparathyroidism.
Upper GI surgery: Surgical technique development, quality control and improvements in management of patients with gastroesophageal reflux disease are areas where Lund stand among the top three departments in Sweden. This concerns not at least the clinical esophageal cancer studies continuously ongoing in Lund.
Abdominal adhesions: Abdominal adhesions and operation due to intestinal obstruction is a substantial resource-requiring part of general surgery. A specific concept has been developed including differently charged polypeptides which repeatedly have been demonstrated better than all existing alternatives, and developed to a very active research field. The concept still requires additional research, toxicology studies etc, but is well on its way to potential clinical use.

- The allowed length of this description incl. spaces is given in the Appendix to this Form 2

2.4 Description of most promising research areas or research directions in the department, incl. areas you would like to see develop in the next 5-10 years and actions you consider necessary to allow this development

Instructions: Key words in the description should be Strategic planning, Visions, Possibilities, Obstacles. Also describe actions already taken to allow this development (recruitments, re-organization etc)Sections I-II
EMERGENCY MEDICINE
Important projects: a) Risk factors for cardiovascular disease are known, such as high LDL, hypertension and smoking, but how do they at the molecular level modify receptor regulation. b) Stroke induces upregulation of contractile receptors in the ischemic region. By blocking the transcription/translation of these receptors we have found that the neuronal death is reduced and the infarct volume smaller. This will be taken into the clinic within a short time. c) Primary headache disorders. The neuronal messenger CGRP was discovered in the Perivascular nerve network and this has now resulted in a new medication which is tried in Phase III trials. d) Cardiovascular disease. We have as first in the world demonstrated that G-protein coupled receptors upregulate (increase in number) in coronary ischemic disorders. By controlling this process we believe that this will result in novel therapy.

ANAESTHESIA AND INTENSIVE CARE
Research on effects of cooling after acute cardiac arrest. Research to find neuroprotective substances after neurotrauma, to clarify mechanisms behind brain edema development and to improve general outcome for these patients. Research to use antimicrobial peptides for clinical use. Research to improve outcome in septic patients by stabilization of general hemodynamics. Research in the unusual and genetic disease malignant hyperthermia.

CARDIOLOGY

RESPIRATORY MEDICINE AND ALLERGOLOGY
In the asthma field there is an increasing need to develop new insight in the inflammatory events, especially in the peripheral lung tissue, as still about 50% of asthmatics don’t reach good control of their disease with current treatment. To combine invasive and non-invasive measurement to study disease mechanisms will give new knowledge for phenotyping the patients. In COPD we focus on further characterize the disease also with focus on peripheral airways, to hopefully find new targets for intervention. The knowledge about autoimmune mechanism and continuing inflammation after smoking cessation will make these efforts more important.

MEDICINE
Clinical connections and patient studies can be improved by new and improved patient registers, hopefully common for Lund and Malmö. International collaboration in particular within EU projects and networks should be more emphasized. Collaboration with China is already ongoing and is expanded.

MEDICAL ETHICS
Ethics and risk will be in focus the next 5-10 years. An example is nano-medicine (or nano
technology). There are a number of interesting risk questions that have to be discussed and these questions all have interesting ethical connotations. Another area is medical decision making, risk taking and ethics.

NEPHROLOGY
Integrative physiologic research - Translational research on microalbuminuria. Recruitment of new collaborators is crucial. The development of a technique based on tracer doses of FITC-Ficoll for measuring glomerular permeability in humans will be critical. Effect of ACTH on glomerular protein leakage in membranous nephropathy - It would be of great interest to extend the human studies performed to animal models of membranous nephropathy. Vasculitis research - We plan to address our hypothesis about the etiology of small vessel vasculitis more directly. Present studies aim at identifying clones of neutrophils, monocytes or precursors to such cells, with changed structure and function. When sufficient amounts of cells from such clones can be separated, that will allow comparison of global mRNA expression by gene arrays or global protein expression by proteomics.

THORACIC SURGERY
Due to insufficient techniques and inferior preservation solutions, the time from harvesting of a human heart to transplantation today is 4-5 hours. This short time frame puts sharp limits on the accessibility of donated human hearts. New techniques and preservation solutions for prolonged heart preservation for more than 24 hours have been developed in a pig model and will be introduced in the clinic within short. Our research also gives new insights in the management of brain death. Revolutionary techniques are under development for optimizing donor hearts that today are rejected or not considered as suitable for transplantation.

Section III

DERMATOLOGY
We are organizing a Skin Health and Research Center (SHRC) combining innovative research at BMC with clinical research at the University Hospital. Existing collaborations with other research laboratories and the pharmacological industry in Europe and US will be extended and broadened. Development of new therapies for infectious, inflammatory and allergic skin diseases based on development of new molecules related to modified endogenous compounds.

INFECTION MEDICINE
The unravelling of molecular mechanisms behind vascular leakage in severe infectious diseases, the identification of novel innate immune mechanisms, and the recent discovery of bacterial enzymes that inactivate disease-inducing antibodies, all represent major scientific break throughs with considerable future potential.

RHEUMATOLOGY
The vision is to extend the translational approach with extensive interactions between clinical and basic research activities. The possibilities for extended international collaborations are great. The obstacles include difficulties in recruiting young rheumatologists particularly those that are
willing to devote themselves to basic research work combined with clinical training. Recruitment efforts include early contact with graduate students and creation of attractive post doc positions, and positions for visiting scientists.

Section IV

CHILD AND ADOLESCENT PSYCHIATRY
The unit ought to plan for a research centre in the region. The center should both perform research of international high standard but also support the development of different clinical project within child and adolescent psychiatry and social work in the southern region. Initial contacts with the county council members of Region Skåne have been taken.

EXPERIMENTAL BRAIN RESEARCH
Studies on recovery of brain function following brain injury will provide the next generation of stroke therapeutics. This involves studies of recovery of function of surviving neurons and of scar formation where a strong development can be expected within the next 10 years. By massive gene profiling we have identified three processes involved in the recovery process that could be developed into new interesting research areas. We envisage an industrial development within this field.

LOGOPEDICS, PHONIATRICS AND AUDIOLOGY
The research programs on developmental language disorders and on children with cochlear implants will continue to be strong. A concentrated effort is required to provide a better coupling between teaching and research in audiology by hiring staff members with stronger background in research. Research on voice disorders has recently received external funding and will form another focus area in the division.

NEUROSURGERY
The neurooncological research area will probably continue to be the strongest, with large resources both concerning economy and staff. The poor diagnosis of malignant glioma motivates concentration of resources to a limited number of centres with researchers including both basic sciences and clinical activities, thereby allowing novel ideas and potential therapies. Not until recently, therapeutic results have appeared that imply that finally therapy makes a difference. We now start to feel a reasonable hope that by intensified efforts, the improved therapy will turn into cure within a not too remote future.

NEUROLOGY
Development of stem cell-based approaches for Parkinson’s disease patients - We will generate large numbers of DA neurons in standardized preparations suitable for transplantation, test them in animal models, and apply them clinically.
Development of stem cell-based therapeutic approaches for stroke patients - We will generate neurons and glia in culture and clarify mechanisms of neurogenesis from endogenous stem cells, optimize the magnitude of behavioural recovery after cell therapy in animals, and then start clinical trials.
Development of gene therapeutic approaches for epilepsy patients - We will deliver neuropeptides using viral vectors and encapsulated cells with the aim to dampen epilepsy, first in animal models and then in patients.
Stroke genetics - Lund Stroke Register is a founding member of the International Stroke Genetics Consortium (ISGC; http://strokegenetics.org) established 2007. ISGC is led by the
BROAD Institute of MIT and Harvard with 19 contributing centers from USA, UK, Poland, Germany, China and Sweden. The main aim is to perform the first genome-wide genetic screening in 30,000 patients with stroke and 10,000 controls.

Stroke epidemiology - The Lund and Malmö registers cover a population of about half a million people, i.e. several-fold the population of most other ongoing epidemiological registers. Swedish health care registers have the advantages of large patient groups, comprehensive data collection, and possibility of cross-lining with several other official registers (population register, Statistics Sweden, hospital registry, pharmacy register).

Acute stroke therapies - Lund has, as the only hospital in the region, the full facilities of a comprehensive acute stroke centre with the potential to play a leading role in development of advanced acute stroke therapies.

Cognitive effects of neurological diseases - Development of closer links between the dementia research groups at the Divisions of Geriatric Psychiatry and Neurology would give unique opportunities to high quality research in this field.

GERIATRIC PSYCHIATRY
To identify specific CSF biomarkers for identification of the more unusual dementias. To use multiple MR imaging methods; DTI, DTT, volumetry, MR spectroscopy to characterize metabolic and regional neurodegenerative changes. To identify unknown genes with relevance to dementia and to describe the molecular mechanisms involving these genes.

PSYCHIATRY
Not at least the shirt of generation emphasizes the need of more academic positions to improve psychiatric research. This includes positions as professors in neuropsychology and general psychiatry. The situation for the Lundby study is precarious, as an expert leader is needed. Concerning mood disorder research, innovative studies will continue by several researchers. Studies on psychotic disorders will move into the field of forensic psychiatry, which is expected to expand.

REHABILITATION MEDICINE
One of the most promising research areas is of the effects of various rehabilitation interventions, pharmacological as well as non-pharmacological, that may influence cellular (brain, spinal cord and muscle) plasticity and improve functioning and reduce disability. The other is on the effects of rehabilitation on behavior, cognition and emotions in people with life-long disabilities, factors that are closely linked to the successful outcome in the form of enhanced societal participation and life satisfaction.

SECTION V

CANCER EPIDEMIOLOGY
Collaborative research between cancer registry, quality registries and biobank registries in a population based setting for optimization of cancer care. Further development of population based cohort studies such as the MISS study to allow complete life time follow-up for different exposures. Improved utilization of cancer registry data matching inpatient and outpatient registries, insurance registries etc in order to better quantify cancer care. Using registry data to find new familial cancer clustering for GWS studies.

CLINICAL PHYSIOLOGY
Promising directions for the future are functional and molecular imaging of normal physiologic
and patho-physiologic processes. We work with several imaging modalities both in research and clinic; ultrasound, positron emission tomography (PET) in combination with CT (PET-CT), single photon emission computed tomography (SPECT) and magnetic resonance imaging (MRI). Further development of multimodal Cardiovascular Imaging integrating EKG, MRI, SPECT and PET is promising.

In lung research, our system for tomographic lung scintigraphy is an internationally recognized platform for studies of regional ventilation/perfusion relationships. One goal is to perform international studies aiming at individual treatment of pulmonary embolism on the basis of scintigraphic quantification and follow up. Fenotyping COPD will be essential for understanding of the disease enabling individualised treatment. We will combine CT and SPECT imaging with comprehensive lung function tests at rest and exercise.

Integration between imaging and other functional tests is essential. Continued internationalization is a prerequisite for recruitment of both top level researchers and research students as well as for funding of our activities, as is cooperation with pharmaceutical industry.

MEDICAL RADIATION PHYSICS

During the next 5 years our aim it to pursue ultra-high field MRI and fused imaging techniques, primarily MR/PET. Ultra-high fields (7T and above) for human use shows remarkable potential in the context of morphological/anatomical detail as well as regarding increased contrast in functional MRI. Furthermore, the combination of MRI and PET will combine functional imaging with molecular imaging, utilize new development of nano-particle based contrast agents and be of significant impact e.g. in future individually designed cancer treatment. Both of these aims are covered in our five-year vision, the buildup of Lund Bioimaging Center (LBIC).

Regarding radioecology, the strategic planning is developing sensitive methods for radionuclide analysis with special application mass spectrometry. Apply these methods to environmental studies and kinetics of elements in man using long-lived isotopes as tracers.

BIOMEDICAL ENGINEERING

Tissue analysis by using ultrasound is an important area that will be focused on the next coming years.

Besides the continuation on the Medical Ultrasound area, Patient Security and Safety using Medical Technical Devices are of great importance in the future. Plans for a broad collaboration with a number of actors, from both the University and the University hospital, has been drawn recently. A present closeby project deals with a bew flexible cordless patient alarm system, which will improve the contact ability and surveillance of patients with these special needs. It is to be used both in hospital and residential environment.

OBSTETRICS AND GYNECOLOGY

- Studies of pathophysiology of preeclampsia including genomic and proteomic investigations of the placenta, biobanking of placenta tissue, maternal and umbilical cord blood. Development of new diagnostic and prophylactic strategies.
- Epidemiological studies over several generations in association with biobanks to study the genetic and environmental factors contributing to complications of pregnancy with their consequences for the outcome, both in short and long perspective.
- Technical development of 3-dimensional ultrasound technique for volume estimation of
fetal body for better fetal weight estimation and prediction of growth restriction or macrosomy.

- Development of a better method, possibly based on 3-dimensional Doppler ultrasound, for quantitation of fetal volume blood flow.
- Establishment of new ultrasound methods for studies of pelvic floor and urethra function with aim to improve the repair of obstetric injuries and to limit their long-term consequences.
- Further studies on possible paracrine effects of oxytocin and vasopressin and development of more specific receptor antagonists to be used in the treatment of preterm labour.
- Further studies on pericellular proteolysis as an activator of cell migration, two functions that lead to cell invasion, with aim on developing a marker that could be used for screening for gynecological cancer.

**ONCOLOGY**

- Targeted therapies of cancer - A major goal of cancer research is to improve the specificity of drugs for cancer cells. “Targeted” could have several meanings, e.g. cancer cell-specific delivery of a cytotoxic substance, or non-specific delivery of a substance that targets a pathway that is essential for cancer cell survival while dispensable for normal cells. Ideally, therapeutics of cancer offers a combination of both, which is a major objective of our research. To individualize the use of targeted breast cancer therapy, we will evaluate predictive factors in blood and tissue samples from patients participating in clinical trials in relation to treatment effects.

- Developments of unconjugated and conjugated immunoconjugates for therapy; new radiolabeled tracers for PET-investigations/therapy prediction. To visualize and follow biochemical processes.

- Prediction of early response to therapy making it possible to early change strategy of therapy.

- Carrying out academic clinical trials in cooperation with other departments at Lund University hospital, including research departments for collaboration with translational research. With the start of the phase I unit it will be possible for new treatments developed in conjunction with research departments to be investigated.

- Studies of the joint effects from lifestyle, concomitant medications (including complimentary alternative medicine) and genotypes on 1) response to oral contraceptives and risk for subsequent breast cancer, and 2) response to breast cancer therapy.

- Using registry data to find new familial cancer clustering for GWS studies in order to identify new genes of Importance for cancer predisposition.

- Biomarker studies of blood in breast cancer to identify markers for risk, diagnosis and follow up (such as protein arrays and galectin expression).
  - Developing methods for predictive analysis of targeted therapy in malignant disorders, e.g. breast cancer and lymphoma.
  - Optimizing therapy for testicular cancer – with minimization of long-term adverse effects.

**PATHOLOGY**

Tight localization of spaces and resources of technology and personnel for advanced morphology and histopathology to create an improved scientific milieu. Creation of a core facility for advanced morphology and histopathology would be of an enormous benefit for improved connection of basic and clinical research. Today, advanced morphological skills are under-evaluated by strategic authorities, although there is a very strong need from different groups of excellence for such facilities.

**PEDIATRICS**

Recruitment of young researcher to the most successful groups is of critical value for the further
development within the identified strong fields of pediatric research (nephrology, cardiology, neonatology), and improved collaboration within the university, e.g. neurosciences and stem cell research.

There is a need for new professors of pediatrics, thereby further enforcing research. Collaborative research aiming at developing a diagnostic center for respiratory chain disorders serving the Öresund region has been taken.

SURGERY

Promising research areas for the future are:
Organ dysfunction specifically focusing on the epithelium – Multiple organ dysfunction is frequently a complication in abdominal disorders like acute pancreatitis, intestinal ischemia, or postoperative complications.
Abdominal adhesions – a rapidly developing field of complete novelty value and large potential clinical impact.
Pancreatic cancer - Multiple interventions in order to control proliferation and growth of pancreatic cancer and by increased knowledge also individualize treatment, also in the palliative treatment setting. Cooperation exist with networks nationally, a Scandinavian network (HPB), and also collaboration with Fudan University, Shanghai, improving both experimental and clinical studies.
Technical development in surgery - Development of surgical methodology not at least in upper gastrointestinal surgery, liver surgery, endocrine surgery, recently also involving robotic surgery. Logistics and enhanced recovery after surgery, introduction of a perioperative registry for all surgical patients and enteral administration of multiple compounds prior to surgery in order to downregulate the postoperative inflammatory response, increase gut barrier integrity and motility, and minimize metabolic alterations induced by major abdominal surgery. This will have immediate impact both on clinical research, but also on quality of care, shortening hospital stay and complications.

- The allowed length of this description incl. spaces is given in the Appendix to this Form 2

2.5 List of publications which best represents the research activity.
Instructions: List the key publications that best describe or represents the present research in the department. These may be older than the 5 years primarily covered by RQ-08. For each publication, add three lines of text explaining why this publication is/has been important. If the publications are electronically available, include a link. If they are not available, please be prepared to submit them on demand.

List:

This study shows that outcome after cardiac arrest as analysed under hypothermia can be predicted with high significance from EEG registration.


It is very hard to pick just one reference, but this paper may forever change the view on the transport of macromolecules across microvascular walls. The paper has been selected by Faculty 1000 as one of the most influential in the area at present.


The article describes the first transplantation in the world using a lung from a Non-Heart-Beating Donor (NHBD) after evaluation ex vivo. The reference list contains references on our experimental development of the method.


This study gives a molecular explanation to the excessive vascular leakage seen in severe and life-threatening streptococcal infections. The data have been commented by Nature, Nature Medicine, New England Journal of Medicine, and Science.


This paper represents the long and productive tradition of research on developmental language disorders. In particular, it serves as a landmark, since it is one of the few cross-linguistic studies of language impairment. It shows that research on Swedish children with language impairment is a significant part of international research within the field.


The SALT Collaborative Group. The Swedish aspirin low-dose trial (SALT); A randomized, placebo-controlled study of 75 mg aspirin as secondary prophylaxis after TIA or minor
stroke. Lancet 1991;338:1345-1349. [Corresponding author: Bo Norrving].
The SALT study is the pivotal trial on low dose (75 mg) aspirin in secondary stroke prevention. It is a citation classic, and was included in Vintage Papers from the Lancet publised 2006 by Elsevier, a facsimile edition of the 212 most important publications in the history of The Lancet since its start 1823.

These data provide evidence that grafted neural progenitors can differentiate into morphologically mature pyramidal projection neurons, and become functionally integrated into host cortical circuitry

This study underlines the importance of temperament rather than conventional diagnoses for suicidal behaviour.

Johansson E, Olsson LE, Månsson S, Petersson JS, Golman K, Ståhlberg F, Wirestam R.

The largest randomized clinical trial on fetal surveillance in labour evaluating a new clinical method – automatic analysis of fetal ECG waveform. The results were important for implementation of the method in clinical obstetric praxis.


Ståhl AL, Svensson M, Mörgelin M, Svanborg C, Tarr PI, Johnson R, Karpman D.
Lipopolysaccharide from enterohemorrhagic Escherichia coli binds to platelets via TLR4 and CD62 and is detected on circulating platelets in patients with hemolytic uremic syndrome. Blood 2006;108:167-176

The allowed number of publications is given in the Appendix to this Form 2

2.6 List of publications which best represents renewal of research activities.
Instructions: List the key publications which best describe the recent development and renewal of the research in the department. For each publication, add three lines of text explaining why this publication is/has been important. If the publications are electronically available, include a link. If they are not available, please be prepared to submit them on demand.
List:

Ansar S, Edvinsson L. Subtype activation and interaction of protein kinase C and Mitogen-activated protein kinase controlling receptor expression in cerebral arteries and microvessels after subarachnoid hemorrhage. Stroke 2008;39:00-00.


Rippe C, Rippe A, Torffvit O, Rippe B. Size and charge selectivity of the glomerular filter in early experimental diabetic nephropathy in rats. Am J Physiol 2007;293:F1533-F1538. In this paper high molecular weight Ficolls are used to mirror changes in glomerular permeability with very high accuracy and precision reflecting glomerular protein permselectivity. The strength of our work lies in the in-depth methodological validation of the technique.


Nehéz L, Tingstedt B, Vödrös D, Axelsson J, Lindman B, Andersson R. Novel treatment in peritoneal adhesion prevention: protection by polypeptides. Scand J Gastroenterol 2006;41:1110-1117. A completely new concept with differently charged polypeptides was demonstrated to be extremely effective and significantly better than any other alternative. The finding has lead to a number of concomitant publications in the field and active research around this problem.

- The allowed number of publications is given in the Appendix to this Form 2
2.7 List of publications which cannot be defined as Scientific publications but are still important for understanding the scientific development.

Instructions: For many scientific fields with a strong scientific publication tradition, this section may not be relevant. Then just leave this section empty. Sometimes, non-scientific publications may have a strong influence on the scientific development. List publications which have had a strong influence on the scientific development. If the publications are electronically available, include a link. If they are not available, please be prepared to submit them on demand.

List:


The Swedish National Stroke Guidelines are the first in the world to develop a transparent model for priority settings based on scientific evidence, cost-effectiveness and overall impacts of different management and treatment modalities.


Comorbidity has become identified as a substantial problem in clinical psychiatry.


This review has defined a set of statistical techniques to evaluate the reproducibility of measurements in rehabilitation that are widely used in such studies.


The allowed number of publications is given in the Appendix to this Form 2

2.8 List of important Scientific publications which are not yet included in the Lund University Publications (LUP) database (2003-2007) but which you still regard as essential.

List:


This paper exemplifies the work in the SLE group, which now focuses on detection of genetic linkages to the disease. The epidemiological cohort that has been closely monitored
for many years is a prerequisite for these studies.


Hallström B, Jönsson AC, Nerbrand C, Norrving B, Lindgren. Stroke incidence and survival in the beginning of the 21st century in southern Sweden: comparisons with the late 20th century and projections into the future. Stroke 2008 ;39:10-5. The study shows that the trend of increasing stroke incidence in the young appears to have plateaued, but despite advances in stroke prevention no overall decline is observed.

Jönsson AC, Lindgren I, Norrving B, Lindgren A. Weight Loss After Stroke. A Population-Based Study From the Lund Stroke Register. Stroke 2008 Jan 31; [Epub ahead of print] The study shows that weight loss after stroke is common and that malnutrition appears to be the main cause. The study illustrates the usefulness of a multidisciplinary approach in clinical stroke research in the Lund Stroke Register.


- The allowed number of publications is given in the Appendix to this Form 2

2.9 Additional sources of information

Possible links to Departmental Home pages, etc etc.

http://www.med.lu.se/klinvetlund
http://www.med.lu.se/bmc

Possible links to Strategic plans
Link to Lund University Publications (LUP) - Departmental publication list
Possible links to earlier external evaluations
Form 3. Quantitative summary of research activities and academic reputation.

Department: Clinical Sciences, Lund

Head of Department (submitter): Roland Andersson


<table>
<thead>
<tr>
<th>Activity</th>
<th>Total number</th>
<th>Number of individuals contributing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invitations lectures at international conferences</td>
<td>1231</td>
<td>272</td>
</tr>
<tr>
<td>Plenary or Keynote lectures (subset of above)</td>
<td>413</td>
<td>85</td>
</tr>
<tr>
<td>Invitations to organize and chair sessions at international conferences</td>
<td>477</td>
<td>103</td>
</tr>
<tr>
<td>Assignments to research councils or foundations of national or international significance (assignments &gt;1 yr)</td>
<td>157</td>
<td>67</td>
</tr>
<tr>
<td>Assignments as evaluations for lectureships and professorships</td>
<td>199</td>
<td>100</td>
</tr>
<tr>
<td>Assignment as editor or member of editorial boards of national or international journals</td>
<td>540</td>
<td>68</td>
</tr>
<tr>
<td>Number of elected members of academies and learned societies per 2007</td>
<td>211</td>
<td>88</td>
</tr>
</tbody>
</table>

For some large departments these figures can be hard to confirm. Then give an estimate.

3.2 International Collaboration (2003-2007)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total number of visits, programs or institutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visiting researchers (scholars and doctoral students) staying for at least 3 months</td>
<td>107</td>
</tr>
<tr>
<td>Research visits (scholars and doctoral students) abroad for at least 3 months</td>
<td>48</td>
</tr>
<tr>
<td>Regular guest research programs with identified individuals (e.g. guest professor programs)</td>
<td>21</td>
</tr>
<tr>
<td>Number of collaborating institutes with joint publications</td>
<td>1555</td>
</tr>
</tbody>
</table>
### 3.3 Renewal Indicators (2003-2007)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Total number</th>
</tr>
</thead>
<tbody>
<tr>
<td>External recruitments (for positions as forskarass, lecturer, professor) with a doctoral exam from another university</td>
<td>19</td>
</tr>
<tr>
<td>Internal recruitments (for positions as forskarass, lecturer, professor) with a doctoral exam from Lund University</td>
<td>45</td>
</tr>
<tr>
<td>Number of new projects granted from national or international external funds of significance (not less than 500 kSEK)</td>
<td>229</td>
</tr>
</tbody>
</table>

### 3.4 Interactions with the Society indicating societal relevance of (2003-2007)

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Total number</th>
<th>Number of individuals contributing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governmental / societal assignments of significance (like Governmental Inquiries etc)</td>
<td>123</td>
<td>62</td>
</tr>
<tr>
<td>Text books</td>
<td>173</td>
<td>97</td>
</tr>
<tr>
<td>Popular science papers/books</td>
<td>192</td>
<td>91</td>
</tr>
<tr>
<td>Patents</td>
<td>153</td>
<td>42</td>
</tr>
<tr>
<td>Spin-off companies</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>Adjunct professorships</td>
<td>23</td>
<td>15</td>
</tr>
</tbody>
</table>

*If the Department has a strategy for societal influence and interaction, describe it here*

*The allowed length of this description is max 2,000 characters incl. spaces*

### 3.5 Significant prices, awards etc. (2003-2007)

List name of awarded individual (or group), year, age (for individual) and when rewarded and award name (not research grants etc).

Lars Edvinsson:
- Awarded FAMRI’s first International Distinguished Professor award in the US, may 2007.

Stefan Jovinge:
- Best Basic Science Poser at American Heart Assoc Scientific Sessions in Orlando, Fl USA 2003
- Best Young Scientist award Univ Hosp UMAS 2004
David Erlinge:
- Lars Werkö distinguished research fellowship from the Swedish Heart and Lung Foundation
- Per-Erik and Ulla Schybergs prize
- Jan and Inga Hains Prize

Claes-Göran Löfdahl:
- Jan Rudnik in memoriam Medal for “important contribution to the development of contemporary pulmonary medicine(number 26)"

Thomas Hellmark:
- Konsul Thure Carlssons Minne, 2002

Christer Hansson, 60:
- Ellis and Ivar Janzon’s Prize (Swedish Society of Medicine)

Artur Schmidtchen, 43:
- Younger Scientist’s Award, Medical Faculty, Lund University
- Award from the Schyberg Foundation
- Award from the Sandberg Foundation
- Fernström’s Prize for Younger Scientists

Joanna Wallengren, 50:
- Schlasberg’s Prize (Swedish Society of Medicine)

Heiko Herwald , 43 years:
- The Fernström Prize for young and successful scientists awarded by the Medical Faculty, Lund University (2002).

Lars Björck, 58 years:
- The Hilda and Alfred Eriksson Prize awarded by the Royal Swedish Academy of Sciences (2005).
- The Söderberg Prize in Medicine awarded by the Swedish Society of Medicine (2006).

Lars Lidgren:
- The American Academy of Orthopaedic Surgeons. Honorary Member, 2003
- The Royal College of Surgeons of England. Honorary Fellowship, 2004
- The Alpha Omega Alpha, US. Honorary Member, Honor Medical Society, 2006
- La Société Internationale de Chirurgie Orthopédique et de Traumatologie (SICOT)
- Award for important international contributions to the field. Marocco, 2007
- Asian Federation of Sports Medicine (AFSM) and Federation Internationale de Medecine du Sport (F.I.M.S) Thailand, 2007
- Designation of the Department of Orthopaedics, University of Lund, as a Director of a WHO Collaborating Centre for Evidience-Based Health Care in Musculoskeletal Disorders. 2007.

Stefan Lohmander:
- Arthur Steindler International Research Award of the Orthopaedic Research Society (USA) for significant contributions--nationally and internationally--to the understanding of the musculoskeletal system and musculoskeletal diseases and injuries. 2004.
- Marshall Schiff Memorial Lecturer Award of the American College of Rheumatology: “A special lectureship established to address the interface between rheumatology and orthopedics in the area of musculoskeletal medicine”, 2006

Tore Saxne:
- The Wyeth prize for rheumatological research selected by the Swedish Society for Rheumatology, 2006.

Carl-Göran Svedin:
- Awarded the National Pedagogic Price of 2007 from the Crime Victim Compensation and Support Authority.

Olle Lindvall (61):
- Awarded the title “Excellent Researcher” by the Swedish Research Council, 2003
- The Mångberg Prize, Umeå University, Sweden, 2005

Håkan Widner (49):

Bo Norrving (57):
- Honorary Member Hungarian Stroke Society 2007

Malin Malmsjö:
- ARVO /Alco early career clinician- scientists research awards 2007

Måns Magnusson:
- The Mångberg Prize, Umeå University, Sweden, 2004

Håkan Olsson:
- San Antonio Breast Conference prize 2003


Lund University Hospital Award for Clinical Excellence. Cardiac MR Group. 2005


Ronnie Wirestam, Freddy Ståhlberg, Bo-Anders Jönsson, Sven-Erik Strand, Michael Ljungberg, Inger-Lena Lamm; Leonardo daVinci Award 2004 for one of the three best EU project among 4000 projects in the Leonardo daVinci program for Training and E-Learning

Katarina Sjögreen Gleisner, 37, 2003:
- The Journal of Nuclear Medicine Alavi-Mandell Prize, monetary award for the article "An Activity Quantification Method on Registration of CT and Whole-body Scintillation Camera Images".
- Schybergs stiftelse in collaboration with the Faculty of Science and Faculty of Medicine at Lund University, monetary award for the arrangement of a Scientific Symposium. 2007

Mattias Nickel, 29:
- Research network TESLA, F Ståhlberg coordinator, identified at strong research environment by the medical faculty, LU 2006

Sara Brockstedt:
- Per-Eric och Ulla Schybergs Stiftelse, stipend 2007

Karel Marsal, 2003, 60 y:
- Fellow ad eundem, Royal College of Obstetricians and Gynecologists, UK
- Berndt Kjessler Prize, Swedish Society of Obstetricians and Gynecologists
- American Institute of Ultrasound in Medicine (Honorary Fellow Award)
Jana Brodszki, 2004, 34 y:
- Best oral presentation; 14th World Congress on Ultrasound Obstetrics and Gynecology (Stockholm, Sweden)

Stefan Hansson, 41 år:
- Winner of Innovationsbrons Idéstipendium
- Winner of Öhrlings-Pricewaterhousecoopers /LUAB “Innovationspriset 2007”
- Evy and Gunnar Sandberg Young Investigator Award

Med student Farnaz Malekzadeh 2nd prize young publicists, Läkartidningen (Swedish) Supervisor Helena Jernström

Doktorand Erika Bågeman 1000USD as ACR-travel Award Supervisor Helena Jernström

Hedenfalk, 2003:
- Scholarship from the Torsten Gester Foundation
- Swedish Cancer Society (Cancerfondens pris “Årets canceravhandling 2002”)
- Anna-Greta Crafoords award for the best medical doctoral thesis in Lund in 2002
- Astra-Zeneca-AAACR Scholar-in-Training Award (Oncogenomics 2003)

Mattias Belting:
- Hains’ young investigator award, Medical Faculty, Lund University, 2006 and 2007

Katarina Svanberg:
- Fellow, The International Society for Optical Engineering, January 2004
- SKAPA Innovation Prize, Stockholm, October 2004 (jointly with Stefan Andersson-Engels and Sune Svanberg)
- Superinnovator Award, Society for Industrial Development, October 2007.

Thomas Relander and Mats Jerkeman:
- Quality assurance award Lund University Hospital 2004

ISAC XXIII International Congress 24th May 2006, Quebec City, Canada. Ph.D. Student Amir Feredani, Handledare: Bo Baldetorp

Åke Borg, Carsten Rose San Antonio Breast Cancer Symposium, 2003, Award

Håkan Olsson:
San Antonio Brest Cancer Symposium, Award 2003

Åke Borg, Håkan Olsson and Carsten Rose belong to the 100 most cited and published breast cancer scientists during 20th century.

Elisabet Englund:
- Ulla Carin Lindqvists stipend for ALS, 2006

Diana Karpman:
- Inga och John Hains Prize for medical research 2003, 2004
- Royal Swedish Academy part-time Experimental Research Fellowship 2006-2011
Lund University Research Quality Evaluation for the Future - RQ08

Panel 8 - Medicine/Clinical
Department of Clinical Sciences, Lund (incl Medical Radiation Physics)
Department of Clinical Sciences, Malmö

Evaluation material for
Department of Clinical Sciences, Malmö
[Faculty of Medicine]

Form 1 Data from common data bases (3 pages)
  1.1 Personnel structure 2003 and 2007
    Numbers of PhD and Lic exams 2007
    Number of PhD students 2007
  1.2 Revenues and total costs
  1.3 Number of publications 2003-2007

Form 2 and 3. Departmental Reports
Form 2 Descriptions of Research Activities and Strategic Research Aspects
  [Basic description, SWOT analysis, Strong research areas, Future plans] (21 pages)
Form 3 Quantitative summary of research activities and academic reputation* (y pages)

Specific comments: Note the all Medical faculty departments show a revenue from the ALF system. This is explained in the basic description from the Faculty of Medicine.

* Renewal Indicators, question 2 was omitted due to definition problems
### Personnel Structure in March 2003 and March 2007

Abbreviations used: Full time eq = Full time equivalents, NP=not permanently employed

<table>
<thead>
<tr>
<th>Department</th>
<th>Staff</th>
<th>Title</th>
<th>2003</th>
<th>2007</th>
<th>% women</th>
<th>% NP</th>
<th>% women</th>
<th>% NP</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Academic staff</td>
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<tr>
<td></td>
<td></td>
<td>Full time eq</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td></td>
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The different personnel categories are explained in the document University_Positions.pdf
All figures are given in kSEK (1 SEK appr. 0.11 Euro, 1 SEK appr. 0.15 USD).

**TOTAL**

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**Revenue Sources Research**

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**Depreciation on equipment financed by research grants**

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### Document Type Definitions

**Journal article**: articles published in scientific science journals  
**Scientific Review**: a journal article, which is a secondary account of a scientific field  
**Conference proceeding/paper**: A paper that is part of a presentation at a conference, workshop etc.  
**Book chapter**: a part of a book  
**Book**: one-time publication that is complete in itself  
**Edited volumes**: a book or a volume from conference, for which a department member was an editor  
**Doctoral thesis**: doctoral dissertations defended at the department, published as monographs (books) or composites (summary+papers)  
**Licentiate thesis**: thesis required to obtain a licentiate degree  
**Working paper**: an “informal”, un-refereed publication with the intention to present a scientific or scholarly idea or problem with the intention to mark priority and invite comments  
**Report**: a publication published in a report, technical report series or as the presentation of results from a commissioned task.  
**Translation**: the translation of an original work.  
**Book review**: an essay or article that gives a critical evaluation of a book (/of books)  
**Popular science publications**: an account in a news paper or other journal that is primarily directed to the general public rather than the scientific community

### Explanation:

To be defined as a Scientific Publication, the publication  
- shall present new knowledge in a form that allows control the results or allows use of the results in new research  
- is written in a language and has a distribution which makes it accessible to all researchers who might have an interest in it  
- ought to be published in a publication channel with routines including some scientific review procedure
Form 2. Descriptions of Research Activities and Strategic Research Aspects

(NB This form is the most important source of information for the evaluators!)

Department: Department of Clinical Sciences, Malmö

Head of Department (submitter): Lennart Råstam

2.1 General description of the department and research activities

Instructions: Describe the department under the following headings:

- Organisation and administration of unit (incl. significant changes the last 5 yrs)
- Special resources (unique equipment etc.)
- General description of total research profile
- Special multi- and interdisciplinary activities
- Interactions within the department
- Relation between research and teaching
  - Research impact on teaching
  - Research based education material (textbooks, courses, graduate education)
- Relation to and interactions with other departments within LU
- Standing of the department in a national / international context

Text:

2.1 General description of the department.

2.1.1 Organization and administration of the department

The Department of Clinical Sciences in Malmö was created in 2005, as four smaller clinical and community medicine departments with somewhat differing orientation were merged into one. This was a development that took place at the same time in the rest of the faculty when 18-20 departments were merged into six. The decision was based upon the evaluation report by a group of international evaluators led by professor John Bell from Oxford. One main reason for this was to establish a big enough base for an efficient and professional department administration. Thus, scientists should be released from a fairly heavy administrative burden. It was stated that the new departments should be purely administrative bodies and research and education should mainly be organized in programs that were bridging over the department borders.

There are at present a total number of 28 full professors (3 of whom are on long term leave), 17 senior lecturers (lektor), one lecturer (adjunkt) and 18 assistant professors (forskare, bitr forskare, laboratorieforskare) and 4 research assistants (forskarassistent). Altogether there are 240 PhD students. They are organized in about 50 research units of varying size.

The department has now been effective for three years and we are able to look back and consider the pros and cons of our version of this reorganization. For our department we decided a very flat structure, with some 50 heads of research units reporting directly to the department head. Initially, these units were grouped into four sections, but these in fact never played any significant role and were closed this year. The pros with the flat organization is that it gives the units equal opportunities to develop their own field and find their position in the department without being stuck in an intermediate division structure. Hypothetically, this would lead to a more open communication within the department. No research collaborations are therefore
organized top down - a strategy that to our experience usually turns out not to be effective but rather restraining. Instead, it would give ideal opportunities for the units to form research collaborations as programs and networks within or outside the department.

The main reason for our decision, however, was related to fiscal matters. As the units are given the basic economic responsibility, every unit head knows that no deficits can be transferred to any other unit or group of units without their consent. At the same time they can be reassured that all resources automatically flow to the unit where they are. This has proven extremely fruitful in taking care of deficits within the units and in the planning for a budget surplus at the basic level to account for situations when there is lack of funding of staff. The fact that the department head has a large number of unit heads to communicate with is to our experience balanced by the fact that he gets a good insight in the research programs and is continuously updated about problems and opportunities of the units.

With a turnover of about 170 Msek the average turnover in each group is about 4 Msek. It is important to understand that there is a large variation, the largest group spending > 22 MSEK a year and the smallest between 1-2 Msek. The general rule is that no new unit can be formed unless there is a stable economic foundation, and a group can not be split into two unless the potential new groups are self supporting.

Thus, a head (prefekt) manages the department. He has delegated the responsibility for all matters related to the department’s involvement in the education programs to two associate heads. One associate head manages all matters related to the PhD programs. All these are full professors. Administrative responsibilities are delegated to one senior administrator. These belong to the department head’s advisory committee, along with the head of research at the university hospital (see below).

The administrative office has six positions, four for economists and two for personnel matters.

2.1.2 Special Resources

The most important resource for the department is obviously Malmö University Hospital, which is run by the County council. Since the reorganization three years ago, the department head has a seat in the hospital director’s advisory committee along with the hospital division heads. Correspondingly, the head of research at the hospital (who is a professor) has a seat in the department head’s advisory committee. This exchange of information and opinions has proven to be extremely important as the two bodies can coordinate efforts and orientations with relevance for research and education.

As stated above the clinical professors and many of the senior lecturers have clinical appointments. This construction is regulated by Swedish law. There are also a number of adjunct professors. While the university appoints them, they keep their regular employment although part of their work hours can be used for research. The hospital supports a number of such adjunct positions.

Finally, the county council has agreed to finance a number of clinical research positions in our department. These are either full professors (n=10) or senior lecturers (n=2) with clinical appointments and full freedom to do research within their university employment (normally more than 70 per cent). Tree of these are presently open for applications (cardiology, hand surgery and dermatology).

One of the positions mentioned above is a full professor of family medicine. This is part of a plan to strengthen primary care research. Thus, the county council and the faculty have decided to jointly support the formation of a new Center for primary care research. This is a spin off from the Bell report that pointed to a couple of weak research areas that need to be strengthened. In
addition to one existing professorship in family medicine now two new positions are released, one financed by the faculty and the other by the county council. It remains to be what resources will be given to this.

One major step forward for our department was taken with the building of a new Clinical Research Centre (CRC) at Malmö University Hospital. It is a joint venture between the medical faculty and the county council. The CRC was designed to create an open resource for students, teachers, scientists, hospital physicians & staff, and the public. It was inaugurated in 2006 and has given us generous space for both experimental, clinical and community oriented research. In addition to a facility for experimental research it holds offices for “dry science”, seminar rooms, scientific library, computer facilities (servers etc) and an outpatient clinic for patient and population based research projects.

The CRC lab building was a necessity as the 12 years old Wallenberg laboratory was outgrown and other experimental research was spread over the hospital in smaller units. The CRC lab building comprises three floors in an open design. There is also an animal facility (small animals) with a barrier section. Just 1.5 years after the inauguration, this resource is full, partly because some groups have (endocrinology, pathology, angiology) have been able to merge their work together in one space. Some of those have moved from the BMC in Lund, some have moved from the Wallenberg Lab.

Epidemiologic research is a characteristic for Malmö since several decades, today with major focus on genetic epidemiology. One important resource in our department is the major biobanks that are linked to large epidemiologic databases with detailed pheno-typing. Examples are The Malmö Preventive Project, The Malmö Diet and Cancer study, The Botnia Project, the Teddy Study and The Skaraborg Project as well as other large patient materials e.g. in the area of osteoporosis and forensic psychiatry. Since a number of years, made possible by a Wallenberg Foundation grant (the Swegene effort in functional genomics), we have excellent availability to automated methods for DNA preparation and high-throughput SNP and micro satellite genotyping and sequencing. The fact that some groups have left the Wallenberg lab for the CRC gave us the opportunity to reorganize and merge together these resources and to reorganize the bio banking in a standardized form (RSKC2) in one location. This has been possible through a joint effort between the department and the county council. The research groups will be able to use this resource by paying fee for service. The county council provides the grants for administration and coordination.

The new diagnostic center (DC) at the Malmö University Hospital provides access to all diagnostic modalities (digital radiology, CT, MR, gamma cameras, SPECT/CT, PET/CT) as well as to linear accelerators and dose planning systems and conventional and CT treatment simulators for radiation therapy. The Medical Radiation Physics Unit also runs one of the few low background whole body counters in Sweden and has own equipment for advanced gamma and x-ray spectrometry, thermo-luminescence and optically stimulated luminescence radiation dosimetry, laboratories for dosimetry, water calorimeter for absolute absorbed dose measurements (the only one in Sweden) and sample preparation facilities for low-level ¹⁴C-measurements. There are plans for acquiring an accelerator to support PET/CT.

2.1.3 General description of the research profile

An attempt to group the research units around their general clinical orientations is given below. However, it is necessary to consider that this grouping is arbitrary, and that some groups direct their research into several fields.

In parentheses are given: 1) Numbers of full professors; 2) Number of senior lecturers; 3) Number of assistant professors; 4) Numbers of adjunct professors. # indicates a decided position.
as professor or senior lecturer to be filled. Groups marked by* are led by a physician with a hospital position. Some groups where the activity is low (due to deaths or retirement) are omitted. A majority of the full professors and senior lecturers have a joint appointment as a physician in the hospital. Many units have hospital physicians with own grants associated to their research programs.

**Anesthesiology & Intensive Care**

*(Jonas Åkesson) (0,1,0,0)*
The group is mainly motivated by education needs.

**Angiology, Cardiology & Medicine**

*Experimental CVD Research (Jan Nilsson) (1,0,1,0)*
Focus on the role of the immune system in cardiovascular disease and development of vaccines. Development of therapeutic vaccines that modulate oxidized LDL autoimmunity and inhibit the development of atherosclerosis

*Vascular ET-coupling (Maria Gomez) (0,0,1,0)*
Excitation-transcription coupling in the vascular wall, with focus on microvascular complications in diabetes.

*Angiology (Bengt Lindblad) (0,1,0,0)*
Focus on aspects on peripheral artery disease. The group is multidisciplinary with input from internal medicine, surgery and interventional radiology

*Hypertension & CVD (Olle Melander)*
Modern techniques (genome wide association studies) applied in order to identify genetic markers that improve prediction of cardiovascular disease and hypertension and to indentify novel CVD pathophysiological mechanisms.

*Medicine (Göran Berglund) (1,1,0,1)*
The group has developed two large data bases and biobanks – The Malmö Preventive Project and The Malmö Diet and Cancer study. The major focus of research is to use the large prospective data bases and biobanks for gene-environmental interaction studies (cardiovascular disease and cancer), where the group has important international collaborations with the large diet and cancer project at IARC and the Broad Institute, Boston.

*Chronic Inflammatory Disease (Sabina Janciauskiene)(0,0,1,0)*
Biological role of native and modified molecular forms of serpins, such as alpha1-antitrypsin and alpha1antichymotrypsin (e.g. in fibrinolysis, complement activation, angiogenesis, apoptosis and inflammation)

*Gastroenterology (Stefan Lindgren)(1,1,0,0)*
Focus on the etiology and treatment of hepatic disorders.

**Dermatology**

*General Dermatology (Bo Ljunggren) (1,0,0,0)*
The group is mainly motivated by education needs.

*Occupational & Environmental Dermatology (Magnus Bruze) (#,0,0,1)*
Focus on contact allergy and allergic contact dermatitis. Methods including epidemiological techniques, clinical and experimental testing in humans, chemical investigations and sensitization studies in animals.

**Endocrinology**
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<th>Research Group</th>
<th>Leadership</th>
<th>Description</th>
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<td>Diabetes &amp; Endocrinology (Leif Groop)</td>
<td>1,0,1,1</td>
<td>The Diabetes &amp; Endocrinology Unit constitutes the largest research group within the Lund University Diabetes Centre (LUDC). It is also the coordinator and core player of this center where the majority of the units below are participating. The research focus of the group is to identify genetic factors contributing to these conditions but also to dissect the interaction between genes and environment.</td>
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<tr>
<td>Vascular Diabetes Complications (Carl-David Agardh)</td>
<td>0,1,0,0</td>
<td>Identification and functional characterization of factors and mechanisms that influence development of microvascular complications, i.e., autoimmune and genetic factors, oxidative stress, glycation, and inflammation.</td>
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<tr>
<td>Diabetes &amp; Celiac Disease (Åke Lernmark)</td>
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<td>The overall research profile is the genetic and pathogenic dissection of type 1 diabetes including analysis of environmental factors including virus infections. Analysis of the pathogenesis by both cellular and humoral immune pathogenesis to determine triggers of islet autoimmunity as well as triggers of hyperglycemia i.e. onset of type 1 diabetes. The unit is the coordinator of the NIH supported TEDDY-Study (se below).</td>
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<tr>
<td>Islet Cell Exocytosis (Lena Eliasson)</td>
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<td>Investigations of the processes underlying the release of insulin and glucagon on single normal cells as well as cells expressing mutants of important proteins.</td>
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<td>Medical Genetics (Holger Luthman)</td>
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<td>Studies of the genetics of type 2 diabetes in advanced animal models.</td>
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<tr>
<td>Molecular Metabolism (Hindrik Mulder)</td>
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<td>Identification of metabolic processes and metabolites in beta-cells that exert control over insulin secretion, and whether they are perturbed in Type 2 Diabetes. This is done by manipulating fuel metabolism in clonal insulin-producing cells and in animal models.</td>
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<tr>
<td>Islet Cell Physiology (Albert Salehi)</td>
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<td>Clarification of the pathophysiology of islet production of NO (impairing beta•cell function) and CO (stimulating and defending beta•cell function) in glucose•stimulated insulin release.</td>
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<tr>
<td>Islet Cell Patophysiology (Erik Renström)</td>
<td>0,0,1,0</td>
<td>Focus on identifying the defects in the the pancreatic beta-cell that associate with type 2-diabetes mellitus. Special attention to the mechanisms involved in the shift from biphasic to monophasic insulin secretion that predict outbreak of the disease (electrical activity, calcium signalling, intracellular transport of insulin granules and exocytosis).</td>
</tr>
<tr>
<td>GABA physiology (Bryndis Birnir)</td>
<td>0,0,1,0</td>
<td>Focus on the study of GABA channels that are important for neuronal regeneration, neurogenesis, axonal guidance, some form of cancers and immunosuppression. The results may have important implications for designs of drugs.</td>
</tr>
<tr>
<td>Clinical Obesity Research (Martin Ridderstråle)</td>
<td></td>
<td>Clinical care and therapy of &quot;diabetes&quot; (obesity and T2DM), as well as probing of underlying genetic mechanisms.</td>
</tr>
<tr>
<td>Epidemiology</td>
<td></td>
<td>CVD Epidemiology (Bo Hedblad) 0,1,0,1 Determinants for incidence and clinical course of stroke and myocardial infarction over time, between groups and geographical areas in an urban population with outcomes related to socioeconomic and psychosocial factors, compliance with preventive measures, and inflammatory</td>
</tr>
</tbody>
</table>
markers.

*Nutrition Epidemiology (Elisabet Wirfält) (0,2,0,0)*
Projects are based on data from the Malmo Diet and Cancer with dietary data of very high relative validity, an extensive database, and a well maintained bio bank. The number of incident cases is currently large enough for meaningful analysis of breast and prostate cancer.

**Family & Community Medicine**

*Family Medicine (Anders Håkansson) (1##, 3, 0, 0)*
Focus on research and PhD projects in primary care. One semester courses in research method have been attended by every fifth family physician in the Southern Region of Sweden. Research on quality aspects of medical education at different level of the physician career.

*Community Medicine (Lennart Råstam) (1,0,0,0)*
Genetic epidemiologic studies of type 2 diabetes and obesity using a large and phenotypically well characterized sample of primary care patients and population (the Skaraborg Project)

*Social Epidemiology & Health Economics (Juan Merlo) (2,1,0,0)*
Theoretical development and empirical analysis of contextual effects on CVD, using a combination of advanced statistical and epidemiologic modelling, social science theory and health economic models

*Social Medicine & Global Health (P-O Östergren) (1,0,2,0)*
Determinants for recent trends in population health - development of theory and method for socioepidemiological surveillance and analysis for support of health promotion. A special focus is set on the concept of social capital as a tentative determinant of health.

**Hand Surgery**

*Hand Surgery (Göran Lundborg/Lars Dahlin)(#,0,0,1)*
Research on hand injuries with two main interests: 1) Injuries to the nervous system with focus on complete peripheral nerve injuries, brachial plexus injuries as well as consequences of such injuries for the functional organisation of the brain. New strategies are developed to improve reconstruction techniques of such injuries. 2) Nerve compression injuries, not least as related to diabetes mellitus, where diabetic neuropathy is a prominent feature.

**Imaging & Radiation Physics**

*Medical Radiology (Olle Ekberg) (1,1,0,0)*
This group has a methodological role in several other units along with their own specific research orientation (gastro-radiology). In addition, there is a classic line of research around the development of contrast media, nowadays for MR. There is also a continuation of a large controlled trial on the effectiveness of mammographic breast cancer screening

*Clinical Physiology & Nuclear Medicine (Per Wollmer) (1,0,0,0)*
(The professor is on long term leave)

*Medical Radiation Physics (Sören Mattsson) (1,0,1,0)*
Research is concentrated on studies and development of new applications of ionising and non-ionising radiation as well as radioactive trace substances for best possible use in medicine and medical research. Focus on new methods for diagnostics and treatment with radiation and on clinical applications of these methods using x-rays, CT, nuclear medicine, and magnetic resonance imaging and spectroscopy. Measurement technique and dosimetry are central fields of research.
Infectious Diseases

*Inga Odenholt (1,0,0,0)*
National and international collaboration on community-oriented programs to limit the use of antibiotics in order to reduce the risk of bacterial resistance to treatment.

ObGyn & Reproduction

*Gynecologic & Prenatal Ultrasound Diagnostics (1,0,0,0)*
The aim is to develop and refine abdominal and vaginal gray scale and Doppler ultrasound imaging including three dimensional (3D) ultrasound, to use it to elucidate physiological and patho-physiological changes in the blood circulation of female genital organs, and to test the clinical value of two-dimensional (2D) and 3D gray scale and Doppler ultrasound examination with and without the added use of ultrasound contrast.

*Uro-gynecology Martin Stjernquist (0,1,0,1)*
The group is mainly motivated by education needs

Molecular Reproduction Research (0,0,1,1)
Focus is on gene-environment-life style-interaction in relation to the male and female reproductive system. Our research (experimental and epidemiologic) is based on a translational approach including clinic (a high competence center in the Scania Region). Goal is to understand cellular responses under physiological conditions as well as in disease.

Ophthalmology

*Glaucoma research (Anders Heijl) (1,1,1,0)*
In a pivotal trial the group was the first not only to show but also to quantify the results of intraocular pressure reduction on open angle glaucoma (primary open angle glaucoma, normal tension glaucoma and pseudoexfoliation glaucoma). Positive effects of treatment are seen even when lowering eyes with normal intraocular pressures. Risk factors for progression and natural history have also been clarified. The group is world leading in developing methods for visual field testing (perimetry) and interpretation of perimetric test results. A recent commercialized method allows measurement of glaucoma rate of progression even when field test results are disturbed by cataract or cataract surgery.

*Retina Research (Elisabeth Agardh) (1,0,0,0)*
The role of inflammation in retinal ischemic damage and development and progression of diabetic retinopathy. Inflammatory cascades in vitreous, aqueous humor and serum samples are analyzed in diabetic subjects, and in the retina of diabetic animal models.

Pediatrics

*Pediatric Immunology & Autoimmune Disease (Sten Ivarsson) (0,0,1,0)*
Pediatric endocrinology including monogenic pediatric diseases and in particular all organ-specific autoimmune diseases affecting children younger than 18 years of age.

*Pediatric hematology (Rolf Ljung) (0,0,0,1)*
The group aims at identifying genetic and acquired thrombophilic factors in children with thrombosis and to study thrombosis in a few specific pediatric conditions

*Cellular Auto-immunity (Corrado Cilio) (0,0,1,0)*
Investigation of the phenotype and regulation of autoreactive T cells in autoimmune diseases.

Orthopedics

*Joint & Soft Tissue Research (Leif Dahlberg)(0,1,0,0)*
Joint cartilage monitoring in health and disease. Development of methods that identify early and reversible pathologic structural alterations in the cartilage matrix, as well as the molecular mechanisms behind these changes. A unique MR-method to monitor cartilage quality is used.

**Clinical & Molecular Osteoporosis Research (Kristina Åkesson)**(3,0,0,0)

Our research focus is aimed at identifying personal, environmental and genetic risk factors for osteoporosis and fracture. Beyond that we are evaluating new interventions for both osteoporosis and fracture.

**Psychiatry**

**Forensic Psychiatry (Henrik Ankarsäter)** (0,0,1,0)

Studies on psychiatric susceptibility factors to destructive behaviours using molecular genetic, neurochemical, neuroimaging, neurocognitive, clinical and epistemological methods, aiming at providing a scientific contribution to ethics, legislation and corrective care.

**Surgery**

**Lower Abdomen (Bengt Jeppsson)**(1,0,0,0)

Studies on the composition and interaction of mucosal microbes in different disease states and interaction of microbes and epithelial cells and mechanisms of passage across the GI barrier. The mucosal microecology is carefully characterized in human intestine by culture techniques and new genetic techniques. Reactions to administration of probiotic lb. is tested

**Transplant Surgery (Henrik Ekberg)**(0,0,0,1)

Focus of clinical research is to establish the combination of available immunosuppressive drugs that has the best balance of efficacy and toxicity. In experimental research new immunosuppressive agents are being developed to improve efficacy, induce tolerance and reduce toxicity.

**Plastic Surgery Henry Svensson**(0,0,0,1)

Focus on skin microcirculation, wound repair and tissue regeneration using laser doppler perfusion monitoring and imaging. Some focus on diabetics (growth factors and gene manipulation). Pathophysiology and treatment of postoperative lymphedema.

**Urology**

**Urologic cancer (P-A Abrahamsson/Anders Bjartell)**(2,0,0,0)

One long term goals is to understand the molecular mechanism of NE differentiation in prostate carcinoma and its biologic significance in the disease progression, especially the androgen independent state. Another focus is development and evaluation of novel biomarkers to predict outcome in prostate cancer and investigation of the underlying tumor biology. A large bio bank has been created for this purpose.

It is easy to see from this listing that the department’s research has all the common characteristics of a clinical university department – a variation of orientations, however coupled with a few areas of very high activity and very high rank internationally. These will be described in more detail below.

At the University Hospital, there are also a number of closely linked research groups, with their own research programs and/or strong intellectual and practical support to the university based research. E.g. there are a multitude of clinical trials that are in general organized in the hospital setting and handled by hospital staff and with the economic aspects handled by the hospital. One
example of the latter is a hospital based group in neuropsychiatry.

2.1.4 Special multi- and interdisciplinary activities

Interdisciplinary research is more of a rule than an exception in this department. Most significantly, we have been able to create a mix of pre-clinical and clinical research in the laboratories. While other departments struggle for a new organization to overcome this barrier, this has come naturally with the establishment of the CRC and the introduction of the research programs and net-works in the faculty. The most well developed of the clinical/preclinical interactions is to be found in the endocrinology where the orientation around diabetes mellitus and the subsequent award of the major Linnaeus grant from the research council provided a framework to attract both clinical and pre-clinical scientists to collaborate within the Lund University Diabetes Center (LUDC). Researchers from our and two other departments are involved in this but it is fair to say that the hub is in Malmö, where it is also coordinated.

2.1.5 Interactions within the department

Also between units interactions are more rule than exception. One core unit is that of professor Sören Mattsson that is pivotal e.g. for the Hand surgery and the Joint & Soft Tissue Research units. The collaboration around the major bio banks probably involves around half of departments research units.

2.1.6 Relation between research and teaching

Most senior teachers are involve in the medical education or the masters program in public health. The general principle for a full professor is that 15% of the salary shall come from teaching. Most are also involved as tutors in the advances level theses that every student shall complete.

2.1.7 Relation to and interactions with other departments within LU

As a consequence of the Bell report, formation of faculty-wide research networks and programs were supported. A diabetes program was one of the first to be formed and it involved units from three of the six departments and was chaired by Leif Groops group. The initiatives by the SSF and the Swedish Research Council has further promoted this. The Linnaeus grant is a consequence of this. One other example is the collaboration by Merlo’s unit in the Linnaeus grant headed by professor Tommy Bengtsson at the School of Economics.

2.1.8 Standing of the department in a national/international context.

National and international recognition is of course not linked to the department per se but to the researchers and the research networks of the department. Researchers at the department has been able to attract some of the major grants and awards nationally and internationally. It is no doubt that the diabetes research program led by professor Leif Groop is one of the leading in the world (contributing to most important scientific breakthrough in the world 2007 according to Science mag).

This and other highly visible groups will be presented below (2.3)

It is important to understand that the department needs to live up to the role as part of a medical faculty with responsibility for education with scientific basis (i.e. taught by teachers at least with some, but not always not heavy involvement in research). Thus research of the highest international impact can and will not be the only focus. The balance between these two orientations is often difficult and legitimates that some of the research units to a lesser degree will be able to hunt for the major research grants.
2.2 Strengths - Weaknesses - Opportunities - Threats with regard to the research of the department

Instructions: Give a short SWOT analysis of the department especially with regard to the research efforts.

Text:

2.2 SWOT

Strengths. The most obvious strength is the close links between preclinical, clinical and population based research and the multidisciplinary research environment spanning from animal models to social epidemiology. In short time this has created collaboration over the disciplines. The open intellectual architecture of the CRC is a core factor in this development. There is access to some of the best-characterized population and patient data bases in the world including large bio banks and significant infrastructure. Close and respectful collaboration with the University Hospital is pivotal and of great economic importance. Many unit heads state the importance of the creative atmosphere. There are also a relatively large number of successful young investigators.

Weaknesses. There is a continuing problem in attracting physicians to a research career. There are also severe problems in the financial structure as grants are small and faculty funding is decreasing. Many young senior investigators have to live in a constant fear of being laid off because of economic constraints. Lack of long term financing of projects. Increasing problems for clinicians to participate in research.

Opportunities. Strong national and international contacts and net-works creates opportunities for fast re-orientation of projects.

Threats. One unit head states the common trend of the faculty to build wind shelters instead of wind mills, i.e. putting the money on safe cards instead of young potentially brilliant investigators. Decisions about the reorganization of health care may not take aspects of research into full consideration. In some of the units that are headed by elderly researchers, there is a potential risk of discontinuation either because candidates are not available or because the faculty is not willing to support a re-appointment. A new legislation on expanded possibilities for automatic promotion may clog up the system. There is risk of alienation between the Malmö and Lund campuses.

- The allowed length of this analysis is 2,000 characters incl. spaces

2.3 Description of the most successful research areas with strong national or international impact.

Instructions: Describe the particularly strong and successful research areas. The following headings can be used as a guide for the presentation: Title, Background, Project description, Achievements, National and international standing (substantiate your claims for the position), Specific actions / precautions needed to certain a successful development.
2.3 Description of the most successful research areas with strong national or international impact

A comprehensive overview of the department has been given above, and this section will be used to summarize and specify some of the areas where collaboration and scientific environment has contributed to specifically fruitful results. As a background, we first give a description of the major epidemiologic data bases and bio banks that are used by many of the research groups. We then present the research areas in alphabetical order.

Until the early 1990s Malmö had the highest autopsy rate in the world. A number of population samples were drawn and the high quality cause of death registration lay the foundation for prospective follow-up. The first modern epidemiologic cohort was “Men Born -14”. A 50% random sample of all men born in 1914 and residing in Malmö were invited for a comprehensive survey in 1969-70, including e.g. ankle plethysmography and registration of several possible risk factors for CVD. The cohort has later been reexamined a number of times. His study is still used by several research groups. With a very few exceptions the men are all dead today. PI for this cohort today is Bo Hedblad (Unit of Cardiovascular Epidemiology)

During the last 35 years, two major surveys have been conducted in the Malmö population. They are the basis for a development from traditional epidemiology on risk and risk factors for disease to modern epidemiology with focus on the interaction between environmental factors including life-styles and genetics. The Medicine unit (Prof Berglund) has been the driving force behind this since the late 80s.

The first of these surveys was the Malmö Preventive Medicine Study. Between 1974 and 1992 a total of 22000 men and 11000 were invited for a screening for high risk for cardiovascular disease, diabetes mellitus and alcohol dependency. Apart from an extensive questionnaire, blood was drawn and serum and plasma stored frozen (later DNA extraction has been possible from these samples). A spirometry was made and in many cases also an oral glucose tolerance test. The database has been linked to local and national disease and death registers. Research has been directes towards risk of cardiovascular disease, chronic obstructive lung disease, cancer and alcohol related disease.

In 2002-2006 those 18200 subjects from the initial cohort who were still alive were reinvited for a follow-up survey (70% participation). On this occasion blood for DNA extraction was drawn. This cohort is part of the European EPIC Collaboration where data from several diet cancer cohorts are merged.

The Malmö Diet and Cancer enrolled 28000 middle-aged men and women between 1992-1996. The survey included a 7-days diet survey including interviews with a dietician. Blood was drawn for bio bank and physiologic measure were registered. In a sub-group of 6000, focus was given cardiovascular disease as e.g. intima-media thickness was registered with ultrasound technique.

The Skaraborg Project includes patient (diabetes, hypertension) and population data from Skaraborg County, Sweden (1993-2003). A biobank of 5000 individuals is linked to survey data on socioeconomic characteristics and life-styles. Physiologic data and cardiovascular patophysiology are registered. Arterial stiffness (n=3000) and ultrasound cardiography (n=1100). PI for this project is Prof Råstam.

Other cohorts/biobanks (e.g. ANDIS, TEDDY, prostate cancer will be described below)

Atherosclerosis
The presence of large amounts of oxidized LDL autoantibodies in plasma along with a frequent expression of oxidized LDL-specific T cells in atherosclerotic plaques suggest that atherosclerosis in part may be an autoimmune disease against endogenous modified lipoproteins. However, studies by prof Nilsson and others unexpectedly revealed that immunization of experimental animals with oxidized LDL activates a protection against atherosclerosis. These observations suggest that adaptive immune response may be shifted towards protection as well as the fascinating possibility that it may become possible to develop a vaccine against atherosclerosis. His group has characterized the major peptide antigens in oxidized LDL that are recognized by antibodies in human plasma. These are aldehyde-modified breakdown fragments of the only protein present in LDL, apo B-100. The majority of antibodies in human plasma against these fragments are IgM and correlate with disease severity. Interestingly, immunization of experimental animals with aldehyde-modified apo B-100 fragments results in a shift towards IgG expression and inhibition of atherosclerosis. Based on these observations they have now developed therapeutic vaccines that modulate oxidized LDL autoimmunity and inhibit the development of atherosclerosis with up to 70% in hypercholesterolemic animals. The first clinical studies of this atherosclerosis vaccine are planned for 2009. They also have developed recombinant human antibodies specific for these oxidized LDL antigens that similarly inhibit atherosclerosis. These antibodies have even been shown to induce regression of pre-existing atherosclerotic plaque. The availability of recombinant anti-oxidized LDL IgG has also helped to unravel the mechanisms involved in atheroprotective immunity. Recent findings by the group suggest that these include increased clearance of oxidized LDL from the circulation, facilitation of reversed cholesterol transport by stimulating macrophage expression of ABCA-1 and down-regulation of macrophage chemokine release. The first studies of the effect of recombinant anti-oxidized LDL IgG in humans are ongoing. Vaccines and antibodies represent a new generation of cardiovascular biological treatments that are likely to expand rapidly during the next 10-20 years. The project has generated several patents that have been licensed to industrial collaborative partners such as Bioinvent, Cardiovax, Lab21, and Genentech. The investment made by Genentech in Bioinvent to collaborate in the development of these antibodies as a novel cardiovascular therapy was rated by Invest in Sweden Agency as the most important foreign investment made in Sweden during 2007.

Cancer

Nutrition and cancer

Research on the relations between diet habits and cancer has a strong basis on the Malmö Diet and Cancer Cohort is linked to an important international collaborations with the large diet and cancer project, the EPIC study at IARC. A range of nutrition issues have been examined in relation to breast cancer: Total fat, types of fat, specific fatty acids, alcohol, dietary fiber, phytosterogens (enterolactone) and folic acid; and if the diet and cancer associations depend on different genetic traits or on tumor biology. Food patterns: The utility of cluster analysis in describing patterns of dietary habits in the relation to disease. The risk factors of prostate cancer are largely unknown. Current projects examine the influence of different types of dietary fat, stature, obesity, body fat distribution, and physical activity and socioeconomic factors on the incidence of total and advanced prostate cancer. Using dietary intake data together with biological markers of genetic traits (i.e., specific to key pathways involving specific nutrients) to overcome the problems of confounding, measurement errors and reverse causation in epidemiological studies, and to further elucidate the role of diet in processes leading to health or disease. An important task is to further develop the use of food pattern methodologies to assess associations between combinations of dietary factors with disease outcomes (esp. cancer).

Prostate cancer

The clinical features of neuroendocrine (NE) differentiation in prostate cancer have been
thoroughly reviewed by Prof Abrahamssons group. There are indications that NE-cells stimulate proliferation of neighbouring cells, and that NE cells probably are terminally differentiated, although one can not exclude the possibility that these cells might dedifferentiate and lose their NE features when dividing. The exact role of NE tumour cells, their neuropeptides and biogenic amines in disease progression is the future focus of his group. Which specific NE-product that should be monitored is uncertain, or how we best should define the NE-phenotype, or potential to respond to NE differentiation. Novel approaches are desperately needed to prognose PC, and to eventually treat the hormone refractory stage, but refinement of the NE-concept may provide new opportunities in these fields. Bjartell has created an interdisciplinary group in prostate cancer research for innovative work to investigate how promising molecular markers in blood, urine, and tissue samples can be integrated in clinical models (nomograms) to predict outcome after treatment for prostate cancer. They assess the value of technological improvements (in particular fluorescent nanoparticles), in a clinical setting with well-defined population-based cohorts of prostate cancer patients with long follow-up time. Biomarkers proven useful to predict outcome in prostate cancer patients are brought back to the “bench” for a thorough investigation of the underlying molecular mechanisms. They investigate a new treatment modality in hormone-refractory prostate cancer, STAT-3 inhibition, by developing in vitro and in vivo models to study the effect of STAT-3 inhibitory proteins.

Diabetes mellitus

Research on diabetes mellitus and related metabolic disorders has during the last 10-15 years grown to become the area with highest scientific visibility within the department. A significant step forward was taken when the Swedish research council awarded the largest Linnaeus grant to Lund university to form the Lund University Diabetes Center (10 MSEK/year for 10 years). While the Center involves researchers from two other departments, it is affiliated to and coordinated from our department. In our department, Leif Groop’s unit along with Agardh’s, Nilsson’s, Lernmark’s, Cilio’s, Renström’s, Birni’s, Eliasson’s, Mulders and Salehi’s units, are active in the center.

The Center has formed visions and goals as follows: “We test the overall hypothesis that different mechanisms, controlled by sets of not yet discovered genes and environmental factors, lead to hyperglycemia – the hallmark of diabetes. These include inflammatory reactions and metabolic disturbances leading to impaired insulin secretion and action. The ultimate goal is to use this new information to develop new treatment strategies for prevention and diabetes.” Our department is involved in a number of projects with defined goals.

1. Genomics in diabetes

In order to create a gene atlas for type 2 diabetes (T2D) a collaboration with the Wellcome trust and NIH a whole genome scan in 1464 patients and 1467 controls has provided replicated evidence for associations between SNPs in 10 genes and T2D. (www.endo.mas.lu.se/endo/highlights.html) In addition they searched for association with 18 quantitative traits including measures of insulin secretion and action, lipids, etc. They found significant association between SNPs in the glucokinase regulatory protein (GCKR) and elevated triglyceride levels but lower fasting glucose. In a follow-up meta-analysis they provided a list of 6 additional novel T2D genes. They also identified 6 novel loci associated with lipid levels and demonstrated that a genetic risk score based upon 9 SNPs in 9 lipid-associated genes, predicts cardiovascular outcome and could replace measurements of lipids in risk prediction. They have replicated and explored mechanisms of effects by variants in the GCKR and identified HMGA2 and 18 additional loci being associated with height and This progress in the field of whole genome association studies was by Science named “Breakthrough of the Year”.

2. Genetic sub-groups of diabetes
One other important development is strong evidence that LADA (Latent Autoimmune Diabetes in Adults) is a genetic admixture of T1D and T2D. This age related categorization is addressed two national studies exploring the spectrum of diabetic subgroups, BDD (aged 0-18 yrs) and DISS (ages 15-34 yrs) and in a new study in Scania, ANDIS (All New Diabetics in Scania, all age groups during a 5-year period). ANDIS is also linked to the National Diabetes Registry (NDR), which will provide us with follow-up and outcome data on the patients. Collectively, these studies will put us in a strong position to describe the spectrum of diabetic subgroups.

3. Genetic interaction between inflammation and metabolism
A specific aim is to identify gene regions/genes controlling both inflammation and metabolic traits using both mouse congenic strains and heterogeneous stock (HS). They study a large number of inflammatory and metabolic traits in mice, cell immune phenotypes, various autoantibodies, BMI, HbA1c, glucose, leptin, osteoporosis and many more. DNA is prepared for genotyping and gene expression analyses. Two animal models for LADA have been generated. The immunoprotective role of the neurotransmitter GABA (γ-aminobutyric acid) has been investigated with regard to pancreatic β-cells and neurons. Data indicate that GABA indeed can decrease proliferation of EAE-type T cell lymphocytes.

4. Methylation of mitochondrial genes
They have demonstrated that DNA methylation of a promoter SNP in the gene encoding NDUFB6 in the first respiratory complex results in impaired gene expression in skeletal muscle with aging. In human islets, PGC1α is methylated and downregulated in a genotype-specific manner, which could contribute to impaired insulin secretion over time. Cell and animal models have e.g. shown that increased mitochondrial mass and metabolism in β-cells account for adaptation to insulin resistance in high fat diet. Techniques to study mitochondrial function in single cells are developed. The GK rat, an animal model of T2D, has distinct mitochondrial dysfunction. A mouse MODY3 model also exhibits impaired β-cell glucose sensing due to mitochondrial dysfunction.

4. Islet dysfunction
The most important T2D gene to date, TCF7L, is 5-fold upregulated in diabetic human islets, especially in carriers of risk genotypes. Similar results are observed in the GK rat. They now use human islets to test the hypothesis that risk genotype influences splicing pattern and transcriptional activity. Knock-down of glutaredoxin (GRX) and thioredoxin (TRX) does not affect cell viability, but suppresses exocytosis and insulin secretion. Focus is now on unravelling the effects of the TRX-interacting protein TXNIP, which is upregulated by VitD3. Effects on exocytosis by the vitamin and in β-cell-specific TXNIP KO mice are investigated A novel project deals with the role of micro RNAs in islets, starting targets for the islet-specific miRNA mir375. A broader approach is taken in investigating all miRNAs, and their targets, that affect β-cell function. Other examples of progress in this area are the role of islet lipolysis and the free fatty acid receptor GPR40 in islet function.

4. Micro and macro vascular complications
A number of vascular effects of hyperglycemia have been identified E.g., it exacerbates atherosclerotic plaque inflammation in large vessels by TNF-independent mechanisms. Activation of the transcription factor NFAT in retinal vessels via increased P2Y receptor signalling and intracellular Ca2+ levels, leading to activation of calcineurin, and activation of the NFATc3 isoform in mouse cerebral arteries upon in vivo intraperitoneal glucose tolerance test, resulting in increased expression of osteopontin that is important for development of vascular disease.

The TEDDY Study
The feasibility of HLA-DQ typing at birth and the availability of the standardized assays for
GAD65, IA-2 and insulin autoantibodies and a major long-term commitment from NIH has launched the TEDDY study. The TEDDY (The Environmental Determinants of Diabetes in the Young) study is a major commitment from the National Institutes of Health to identify triggers of islet cell autoantibodies and of hyperglycemia in autoantibody-positive children. More than 300,000 children (50,000 in Skåne) are currently screened for HLA risk at birth until 2009 and 7,800 (2,240 in Skåne) high-risk children will be followed for 15 years in intense follow-up. The TEDDY study represents the fruition of years of research to translate HLA-DQ typing for genetic risk and standardized islet autoantibodies tests to be used as a primary end-point in this mega-trial. The DiPiS and similar trials as well as the TEDDY study have already demonstrated that it is possible to diagnose hyperglycemia and begin insulin therapy before most beta cells have been lost. CiPiS is similarly based on HLA screening and long-term follow-up. A strength to CiPiS is that the study PI, Daniel Agardh is the head of Pediatric Gastroenterology of the University Hospital MAS in Malmö. He is also carrying out the celiac disease study in TEDDY. The first clinical trials in humans was spearheaded in Malmö with promising results. The concept of specific immune tolerance induction with GAD65 is novel, shown to be safe and will be tested in Phase III clinical trials and later as a possible means by which to prevent type 1 diabetes.

**Glaucoma**

Professor Heijl’s unit has performed the probably most important clinical glaucoma trial ever (Early Manifest Glaucoma Trial), supported by the NIH. This trial that included an untreated control group and was first not only to prove but also to quantify the effectiveness of glaucoma treatment, and clarified risk factors for disease progression. They have demonstrated how visual field defects reflect the degree of ischemic diabetic retinopathy enabling identification of functional loss long before visual acuity is affected. Their currently most important research areas are long-term results of the trial which will show the importance or lack of importance of early treatment and clarify risk for serious outcomes plus. Newer projects on population screening, evaluation of and development of good methods for such screening. The third area is studies on serious clinical outcomes and typical results of clinical glaucoma management. The group is also internationally renowned for their development of methods and standards for computer-aided visual field assessment. The methods developed for glaucoma are now taken to visual function testing for diabetic retinopathy follow-up.

**Hand surgery**

Research in the Lundborg/Dahlin unit deals with hand injuries with two main interests: 1) Injuries to the nervous system with focus on complete peripheral nerve injuries, brachial plexus injuries as well as consequences of such injuries for the functional organisation of the brain. New strategies are developed to improve reconstruction techniques of such injuries. 2) Nerve compression injuries, not least as related to diabetes mellitus, where diabetic neuropathy is a prominent feature. Subprojects address epidemiology, health economics and treatment, including coping strategies, of severe hand injuries in adults and in children. fMRI techniques is also used to study cortical reorganisations as related to amputation/replantation and anaesthesia, especially possibilities to enhance hand sensibility by anaesthetising the skin of the forearm. Another subproject is development of the optimal artificial hand with several degrees of freedom and conscious sensory functions.

*Enhancing sensory functions in hand and foot*

They have found that selective de-afferentiation (cutaneous anaesthesia of the forearm or lower leg) results in significant improvement of sensation in hand and foot respectively. The reason is the functional reorganisation which takes place in brain cortex, allowing expansion of the hand and foot projections respectively. They foresee a very significant potential clinical importance of...
these findings, especially with regard to the lower extremity and the neuropathy in the foot seen among diabetics. An easy way to improve sensation in foot, by repeated cutaneous anaesthesia (for instance EMLA® cream) may help to prevent development of foot ulcers and may hereby have an enormous importance for the individuals as well as for the society.

Artificial hand
Development of artificial hands may result in a break through in these areas, with development of new type of thought-controlled artificial hand with conscious sensibility within the nearest years. Sensor in the fingers of the artificial hand will transfer pressure and vibratory stimuli to a tactile display on the forearm, hereby providing the brain with adequate signals to create a through feeling of body ownership of the artificial hand. For the first time we use fMRI technique to map the artificial hand in brain cortex. The vision is that tomorrow’s artificial hand will provide an alternative to transplanted hands or today’s myoelectric prosthesis, providing only a minimal function.

Neurobiology and nerve injury
Definition of signal transduction steps in neurons and Schwann cells, including time aspects, are important to understand the healing process and create new pharmacological tools to improve regeneration. Knowledge of neurobiological mechanisms can directly be applied in nerve reconstruction.

Diabetic neuropathy
With collaboration with diabetologists, well defined patient populations with diabetes and appropriate control subjects are investigated with respect to neuropathy, including definition of involved factors.

Medical radiation physics
Optimisation of diagnostic radiology and nuclear medicine
Focus on how the quality of clinical x-ray and nuclear medicine images is influenced by the choice of exposure parameters. The goal is to reduce the exposure of the patients and/or increase the diagnostic quality. Methods for the evaluation of image quality in clinical x-ray beams are developed and applied at bone investigations, lung studies and mammography.

They have shown that the quantum noise in the image often has a limited influence on the detection of pathologies. This means that 3D imaging is superior to 2D imaging as the effect of superimposed structures can be reduced. A software which effectively rationalises our experiments and the evaluation of the radiologists from ca 25 images per hour to 200 images per hour has been developed. The research has been carried out within projects supported by EU’s 3rd, 4th and 5th framework program in cooperation with research groups in UK, Germany, Sweden and Switzerland. Currently they have just started a 7th framework collaboration within PET/CT and SPECT/CT investigations and technology.

Development of new radiation dose meters and treatment verification methods
The scanning beam technique, which is planned to be used for the clinical proton beams, calls for special demands on the basic dosimetry. The momentary dose rate to be measured is very high, generating ion recombination and other non-linear phenomena in most conventional dosimetry systems. LET-effects add additional problems for protons and especially for light ions. Therefore, before any clinical application can be introduced, careful basic dosimetric evaluations and intercomparisons are mandatory. By the use of gel dosimetry together with other available detector systems, this project aims to improve the present 3D patient dosimetry. Our department has for 20 years been in the international forefront developing 3D dosimeters based on various radiation sensitive gels. The project has recently been extended to include independent dose calculations and risk analysis and this is an important part to validate the individual patient...
Radioanalytical methods for studies in vivo

The group has developed original X-ray fluorescence (XRF) techniques for in vivo determinations of the toxic metals lead, cadmium and mercury and have extensively applied them in studies of occupationally exposed subjects. Techniques for lead and cadmium are now also ready for measurements in the general population. So far, in vivo studies have supplied us with data on element concentrations and kinetics. XRF can be utilised to determine bone lead in relation to more traditional indices of lead exposure, e.g. lead in blood and urine. For mercury the high MDC is difficult but hopefully the technique may be improved by changes in the set-up; a process guided by Monte Carlo simulation. Novel methods to study iodine and platinum (from cis-platin) have also been presented. A recent editorial states "Over the years, this group produced the first in vivo measurement of lead, the first and only reliable use thus far of in vivo x-ray fluorescence of mercury in kidney and the first in vivo x-ray fluorescence (as opposed to neutron activation) of cadmium in kidney. These techniques have been extensively applied, particularly lead measurements amongst occupationally exposed subjects, and they refer briefly to measurements of platinum and other elements. In vivo x-ray fluorescence of lead, begun by Mattsson and his co-workers in the early 1970s, has been the most extensively applied x-ray spectrometry technique for in vivo studies, although the majority of the studies have used γ-rays from 109Cd to excite the lead K series x-rays, rather than the somewhat higher energy γ-rays from 57Co, as used in the original and still existing Swedish system." Chettle D, X-Ray Spectrom. 2008; 37: 1–2.

Osteoporosis and fragility fractures

Projects involve both large population-based cohorts/biobanks of women and men of all ages (n=5 000) and case-based studies (variable size). Extensive evaluation of bone mineral density, physical performance, biophysical and biochemical testing, validated fractures and life style and health factors. Focus on epidemiology, genetics, risk factors and interventions, with specific orientation towards prediction of fracture risk using bone markers, the effect of physical activity on bone health, risk factors for fracture in women and men, genetics of osteoporosis, and evaluation of novel interventions for fracture treatment and osteoporosis.

Findings include: effects on physical activity during long-term follow-up in athletes and normal persons, effects of training in children, the ability to predict fracture in women by both very simple estimates of biological age to sophisticated biological markers, clearly findings with clinical implications and variation in common genes that are predictive of bone mass and fracture. The studies also involve large scale estimates of risk and economic implications. The group is involved in development of recommendation from WHO (Technical Reports) and EU. They have just received a 7 Msek grant from FAS for research on gender aspects on osteoporosis.
2.4 Most promising research areas or research directions in the department, incl areas you would like to develop in the next 5-10 years and actions you consider necessary to allow this development.

The research areas listed under p 2.3 are in fact the ones that we see as the most promising in the coming years and in that sense the presentation speaks for itself. They share the general characteristic of orientation towards common diseases and they all are important in the development of public health. They all have a great potential for improvement and development into clinically important solutions that would benefit many patients and the population at large.

This said, there are certainly some lacking areas that would have the potential to improve our research. First, Malmö is a multi-ethic city, more than every third citizen is of foreign origin. It is necessary in the future to take this fact into account, whether it is epidemiologic cohorts or clinical studies that are performed. Many of the programs described above are deeply related to matters of life styles and cultural norms. In research on diabetes, obesity, atherosclerosis, we need to understand not only the gene/environment interaction that is valid for the subject of genuine Swedish origin, but need to disentangle the variation between all the ethic groups that form our population today.

Secondly, research also needs to be genuinely translational in the sense that the expression “bench to bed side” also should involve a third step - “to population”. We need to find measures to go further and readily apply our findings on these common diseases in structured intervention programs for more effective treatment and prevention programs. It is, however, obvious that such interventions are costly and needs cooperation with and recourses from the health care organization.

There are some important starting points for this. Primary care is one major resource for data both data collection and intervention and it has been exploited to a very small extent so far. It has a close connection to the underserved populations of immigrants and can act as a door opener for both research programs an intervention. The county council and the faculty of medicine have agreed to organize a Center for Primary Care Research. If this can take on a role of collaboration with the research programs described above we have the opportunity to take a big step forward towards higher societal relevance of the department’s research.

There is also an important research orientation in social epidemiology and global health. Also this area is under strong development and some reconstruction. A couple of very strong units are finding ways to merge their interests. One of them (Merlo’s unit) is involved in the Linnaeus grant of professor Tommy Bengtsson (economic history). It also involves strong components of health economics with orientation towards socioeconomic aspects of health and disease. The other unit (Östergren) has a very strong international orientation with collaboration with several universities in the developing world. For the future, is necessary to have all forces in this area merge to form a critical mass.

One other lacking component in Malmö is clinical oncologic research. Cancer research in Malmö is strong in all three common variants of cancer. Translational research on breast and colon cancer are core areas in the lab medicine department in Malmö, while prostate cancer is strong in our department. New and more effective diagnostic procedures for cancer screening are developed in the medical radiation physics unit. It is however a flaw that there are no academic positions in the oncology department. This is needed to coordinate translational research from the clinical oncology perspective. Surgical research has suffered from the death of one of the
professors. The faculty is presently deciding whether to reinstate that position. A discussion is ongoing on how to give the surgery clinic at the hospital region wide responsibility for lower abdomen disease (e.g. colon cancer). This is again an important connection with clinical research to develop the translations aspects of cancer research.

These aspects are equally important for clinical cardiology, as it is strongly related to experimental and epidemiologic research on atherosclerosis. There, however, a tenure track position as senior lecturer is under way, with economic support from the university hospital.

Finally, there is an urgent need for faculty funding to secure long term employment of the large number of young scientists that form the critical mass of our units. During the next 5-10 years we face a turnover of the faculty as many of the senior scientists will be retiring. Funding for internal and external funding to replace them is essential to develop research in our faculty.

- The allowed length of this description incl. spaces is given in the Appendix to this Form 2

2.5 List of publications which best represents the research activity.
Instructions: List the key publications that best describe or represents the present research in the department. These may be older than the 5 years primarily covered by RQ-08. For each publication, add three lines of text explaining why this publication is/has been important. If the publications are electronically available, include a link. If they are not available, please be prepared to submit them on demand.

List:


Kathiresan S et al. Six new loci associated with blood low-density lipoprotein cholesterol, high density
<table>
<thead>
<tr>
<th>Publication</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heijl A, Leske C Bengtsson B, Hyman L, Bengtsson Boel, Hussein M. Reduction of intraocular pressure and glaucoma progression. Results from the Early Manifest Glaucoma Trial. Arch Ophthalmol 2002;120:1268-79.</td>
<td><strong>The first paper ever demonstrating and quantifying the effects of reduction of intraocular pressure in open angle glaucoma (primary open angle glaucoma, normal tension glaucoma and pseudoexfoliation glaucoma)</strong></td>
</tr>
</tbody>
</table>

- The allowed number of publications is given in the Appendix to this Form 2

### 2.6 List of publications which best represents renewal of research activities.

**Instructions:** List the key publications which best describe the recent development and renewal of the research in the department. For each publication, add three lines of text explaining why this publication is/has been important. If the publications are electronically available, include a link. If they are not available, please be prepared to submit them on demand.

List:

<table>
<thead>
<tr>
<th>Publication</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scherman P, Kanje M, Dahlin LB. Sutures as longitudinal guides for the repair of nerve defects – influence of suture numbers and reconstruction of nerve bifurcations. Restorative Neurology and Neuroscience 2005;23(2):79-85.</td>
<td><strong>A completely new principle to bridge defects in injured nerves using sutures as guides. An example of translational research where the principle has been tested</strong></td>
</tr>
</tbody>
</table>


- The allowed number of publications is given in the Appendix to this Form 2

2.7 List of publications which cannot be defined as Scientific publications but are still important for understanding the scientific development.
Instructions: For many scientific fields with a strong scientific publication tradition, this section may not be relevant. Then just leave this section empty. - Sometimes, non-scientific publications may have a strong influence on the scientific development. List publications which have had a strong influence on the scientific development. If the publications are electronically available, include a link. If they are not available, please be prepared to submit them on demand.

List:

- The allowed number of publications is given in the Appendix to this Form 2

2.8 List of important Scientific publications which are not yet included in the Lund University Publications (LUP) database (2003-2007) but which you still regard as essential.

List:

Important publications in press.

- The allowed number of publications is given in the Appendix to this Form 2

2.9 Additional sources of information
Links to Departmental Home page
http://www.med.lu.se/klinvetmalmo

LUDC
http://www.med.lu.se/ludc/diabetesportalen

The Teddy project
http://www.med.lu.se/teddy

DiPiS
http://www.med.lu.se/dipis
Form 3. Quantitative summary of research activities and academic reputation.

Department:

Head of Department (submitter):


<table>
<thead>
<tr>
<th>Invitations lectures at international conferences</th>
<th>Total number</th>
<th>Number of individuals contributing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plenary or Keynote lectures (subset of above)</td>
<td>690</td>
<td>59</td>
</tr>
<tr>
<td>Invitations to organize and chair sessions at international conferences</td>
<td>151</td>
<td>28</td>
</tr>
<tr>
<td>Assignments to research councils or foundations of national or international significance (assignments &gt;1 yr)</td>
<td>253</td>
<td>50</td>
</tr>
<tr>
<td>Assignments as evaluations for lectureships and professorships</td>
<td>69</td>
<td>36</td>
</tr>
<tr>
<td>Assignment as editor or member of editorial boards of national or international journals</td>
<td>113</td>
<td>31</td>
</tr>
<tr>
<td>Number of elected members of academies and learned societies per 2007</td>
<td>79</td>
<td>32</td>
</tr>
</tbody>
</table>

For some large departments these figures can be hard to confirm. Then give an estimate.

3.2 International Collaboration (2003-2007)

<table>
<thead>
<tr>
<th>Visiting researchers (scholars and doctoral students) staying for at least 3 months</th>
<th>Total number of visits, programs or institutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research visits (scholars and doctoral students) abroad for at least 3 months</td>
<td>67</td>
</tr>
<tr>
<td>Regular guest research programs with identified individuals (e.g. guest professor programs)</td>
<td>22</td>
</tr>
<tr>
<td>Number of collaborating institutes with joint publications</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>370</td>
</tr>
</tbody>
</table>
3.3 Renewal Indicators (2003-2007)

<table>
<thead>
<tr>
<th>Description</th>
<th>Total number</th>
<th>Number of new projects granted from national or international external funds of significance (not less than 500 kSEK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>External recruitments (for positions as forskarass, lecturer, professor) with a doctoral exam from another university</td>
<td>10</td>
<td>Not to be included</td>
</tr>
<tr>
<td>Internal recruitments (for positions as forskarass, lecturer, professor) with a doctoral exam from Lund University</td>
<td>23</td>
<td></td>
</tr>
</tbody>
</table>

3.4 Interactions with the Society indicating societal relevance of (2003-2007)

<table>
<thead>
<tr>
<th>Interaction Type</th>
<th>Total number</th>
<th>Number of individuals contributing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governmental / societal assignments of significance (like Governmental Inquiries etc)</td>
<td>102</td>
<td>41</td>
</tr>
<tr>
<td>Text books</td>
<td>98</td>
<td>37</td>
</tr>
<tr>
<td>Popular science papers/books</td>
<td>134</td>
<td>26</td>
</tr>
<tr>
<td>Patents</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Spin-off companies</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Adjunct professorships</td>
<td>14</td>
<td>11</td>
</tr>
</tbody>
</table>

If the Department has a strategy for societal influence and interaction, describe it here

Text:

The department follows the strategic plan of the faculty of medicine

The allowed length of this description is max 2,000 characters incl. spaces

3.5 Significant prices, awards etc. (2003-2007)

Elisabet Agardh, 58, 2006: The award of the Swedish Foundation for Ophthalmological Research
Henrik Ahlborg, 38, 2004: Young investigator award. American Society for Bone and Mineral Research (Åkesson’s Group)
Henrik Ankarsäter, 2007: Annual price to best junior scientist, Malmö University Hospital
Anders Bjartell, 36, 1996: Young Scientist Award, Nordic Association for Andrology
Anders Bjartell, 40, 1999: (EAU-AUA) International Academic Exchange Program.
Anders Bjartell, 40, 1999: Abbott’s Award for Urological Research, 40 years.
Anders Bjartell, 40, 1999: European Association for Urology – American Urological Association
Anders Bjartell, 45, 2005: NCI-UICC Translational Cancer Research Fellowship (TCRF)
Maria Gomez, 38, 2003: Wenner-Gren Foundation award for inviting a guest post-doc student (180 000 SEK).
Maria Gomez, 38, 2005: Carl Tesdorpf’s stipend (170 000 SEK)
Nilsson J et al, ATVB 2006 (100 000 SEK).
Maria Gomez, 38, 2008: Tegger’s Prize for Young Investigator
Anders Heijl, 58, 2003: The Bjerrum lecture of the Danish Ophthalmological Society
Anders Heijl, 60, 2005: Axel Hirsch’s prize of the Karolinska Institute for the paper “Reduction of intraocular pressure and glaucoma progression. Results from the Early Manifest Glaucoma Trial”
Anders Heijl, 60, 2005: The Award of the Danish Synoptikfonden
Anders Heijl, 60, 2005: The Hjalmar Schiøtz medal of the Norwegian Ophthalmological Society
Anders Heijl, 61, 2006: The Award of the Swedish Association of the Visually Impaired
Anders Heijl, 63, 2008: The Trantas Medal of the Greek Glaucoma Society
Anna Holmberg, 40, 2006: Young investigator award. International Osteoporosis Foundation (Åkesson’s Group)
Anders Håkansson, 53, 2003: Nordic award for important contribution to general practice research; København
Anders Håkansson, 54, 2004: Swedish Society for General Practice award
Sten A Ivarsson, 62, 2005 Alvarenga’s Prize
Kaisa Ivaska, 32, 2007: Young investigator award. European Calcified Tissue Society (Åkesson’s Group)
Helena Larsson, 37, 2005, Alvarenga’s Prize (Ivarsson’s group)
Åke Lernmark, 61, 2006: The 7th Annual Langerhans-Virchow Lecture, Pacific Northwest Research Institute, Seattle, WA
Åke Lernmark, 62 2007: Hillblom Visiting Professor, UCLA, Los Angeles, CA
Åke Lernmark, 62, 2007: Enz Visiting Professor, University of Kansas, Lawrence, KS.
Rolf Ljung, 54, 2004: Nillo Hallman Annual Lecture No.15, Helsinki and Åbo, Finland
Göran Lundborg, 56, 1999: Laurea Honoris Causa, Bologna University
Göran Lundborg, 64, 2007: Hanno Millesi award
Valeriya Lyssenko, 2007, SSSD Young Investigators Award, 2008 (Groop’s group)
Olle Melander, 35, 2005: Best Scientist UMAS (60000 SEK)
Olle Melander, 35, 2006: Lennart Hanssons Minnesfond (130000 SEK)
Henrik Thorlacius 36, 2005: Best researcher of the year, Swedish Association of Surgery (Jeppson’s unit)
Henrik Thorlacius 36, 2005: Rising Star in European Gastroenteology, UEGW (Jeppson’s unit)