

## Introduction Erasmus MC Research Annual Report 2007

### Mission

The mission of Erasmus University Medical Center, Erasmus MC, is to be an innovative centre for high grade biomedical research, education and patient care with a high impact on the population's health.

Our objectives are:

- to create new knowledge on health and disease by performing outstanding research in each of our three research domains: the biomedical, the clinical, and the health sciences;
- to provide high grade education in the fields of medicine, health care, health policy and research;
- to provide advanced patient care of an exemplary quality;
- to disseminate knowledge by participating in advisory bodies, in the policy debate and by informing the general public;
- to promote the medical application of new discoveries by an explicit valorisation policy.

This report concerns research. It describes research, and gives a tabular survey of input and output of the research of Erasmus MC. A general description of all activities (research, education and patient care) of Erasmus MC can be found in the 'Maatschappelijk verslag 2007' (on the website and only available in Dutch).

### Research organization Erasmus MC and structure of the Research Annual Report

The research organization of Erasmus MC is characterized by a matrix structure. Most departments participate in Research Schools or Institutes. As part of the underlying agreement, departments make a five-year commitment to pool specific researchers and resources in the Research School. The heads of departments thus grant authority over part of their research budget and staff to the Research Schools for a limited period of time. Generally, department heads are also members of the Board of the Research School. Every six years, as part of the accreditation process, the quality of research and of the PhD training of Research Schools is reviewed by the Royal Netherlands Academy of Arts and Sciences (KNAW).

Table 1 shows the Erasmus MC Research Schools. Co-operation between Research Schools is increasing.

Research Schools Erasmus MC	Research themes
Cardiovascular Research School Rotterdam (COEUR)	Cardiac and Vascular Biology and Pharmacology; Vascular Medicine, Atherosclerosis, Heart Failure and Stroke; Cardiovascular Imaging and Diagnostics; Surgical-, Interventional and Device Therapy of Cardiovascular Disease; Congenital Heart Disease; Cardiovascular Clinical Epidemiology
Helmholtz Research School (HRS, Erasmus MC part)	Plasticity and Dynamics of Sensori-motor systems; Visual System, Eye Movement and Visuomotor Activity
Medical Genetics Center (MGC; Erasmus MC part)	Molecular Genetics of Cancer; Molecular Basis of Genetic Disease and Congenital Malformation; Mapping and Cloning of Disease Genes in the Human Genome; Development of Diagnostic Methods and Gene Therapy; Genetic Toxicology of Radiation and Chemicals
Molecular Medicine (MM)	Endocrinology and Ageing; Hematopoiesis and Lymphopoiesis; Solid Tumors; Infections and Host response
Netherlands Institute for Health Sciences (NIHES; Erasmus MC part)	Epidemiology; Health Services Research; Medical Informatics and Medical Imaging; Behavioural Research; Health Policy and Management
Musculoskeletal Science Centre (MUSC, Research Institute)	Fundamental, Patient-related and Public Health Research of Back Pain, Hip- and Knee Disorders, Upper Extremity Disorders

This Erasmus MC Research Annual Report follows the pattern of the research programmes of the research schools and institute as described in the next section. Thus, results cannot be found looking at the level of departments, but only at the level of research schools/-institutes and programmes. A small proportion of research is not part of research schools/-institutes and is shown separately as other research (OR, at the back of the report). Via cross-reference tables at the back of the report, one can trace down the contributions of the individual departments. For example the programme code EMC MM-03-32-04 can be read as follows:

Research school Molecular Medicine (MM), theme three, programme code 32-04 with the title 'Improving accuracy and therapeutic ratio in radiation oncology'. Some themes also contain programmes associated to the research school (indicated with an 'A'). Associated research programmes are scheduled to enter the core of the research school in due time.

#### Input, output and assessment of quality

The total input into Erasmus MC research reaches about 1000 full time equivalents (fte) of scientific personnel. Funding of research personnel takes place via four so-called budget sources.

- *First source.* Erasmus MC appointment and funding.
- *Second source.* Appointment by the Erasmus MC and funding by the Netherlands Organization for Scientific Research (NWO); occasionally appointed by NWO and working place Erasmus MC. Erasmus MC appointment and funding by the Royal Netherlands Academy of Arts and Sciences (KNAW), the European Union or the (USA) National Institutes of Health.

- *Third source.* Erasmus MC appointment through sponsoring by charity funds with an independent scientific research council and working on a national level (e.g. Heart Foundation, Cancer Foundation and so on).
- *Fourth source.* Erasmus MC appointment and direct sponsoring by Industry, Ministries and various foundations.

More than 50% of total fte input is sponsored by national science foundations, charity funds, industry etc.

Quality control is an indispensable tool in improving research. Research Schools are being assessed once every 6 years. The Erasmus MC Research Schools perform on a high quality level as indicated by the accreditation committees of the Academy of Arts and Sciences. Next to the Research School assessment the research programme of Erasmus MC as a whole has been assessed. The Centre for Science and Technology Studies (CWTS) performed a bibliometric analysis of the scientific output of Erasmus MC for the period 1997-2007.

In summary, the first bibliometrical assessment indicated a mean citation score of all Erasmus MC publications of 1.59, which means an Erasmus MC publication is cited 59% more than the average scientific publication in the world. The number of publications in the world wide top 1% most highly cited publications is 2,33 times higher as might be expected on the basis of the total number of publications of Erasmus MC.

### **Research funding**

In 2007 75% of the first budget source has been allocated as a lump sum and 25% according to performance, i.e. number of PhD theses, amount of external funding (second and third budget source) and top-publications in (Social) Science Citation Index journals.

Apart from the structural and the performance based budget, various extra internal Erasmus MC budgets are made available in order to meet the following objectives: innovation and multidisciplinary cooperation. These budgets add up to about 3.5 M€ per year. In particular these budgets are made available for research in the areas translational research, efficiency research and care related research.

### **Innovation of research facilities**

The Board of Erasmus MC values the importance of an innovative, state of the art research infrastructure. In order to maintain such an infrastructure new investments are necessary. Jointly, Board and departments invest in equipment and facilities. Moreover, Erasmus MC is rather successful in external funding from public and private sources.

### **Knowledge transfer and starting life science companies**

Ultimo 2007, the Erasmus MC Holding BV contained 16 companies with a total turnover of EUR 19,1 M€. In 2007 2 new company has been started, 2 are sold and 7 are in formation. The 2008 turnover is expected to grow to EUR 17 M€.

Furthermore, Erasmus MC has established an incubator for start-up companies. The incubator supports researchers starting an innovative company with respect to advice, business planning, housing etc. In 2007 there are 29 participants, 19 of them having started a company within the incubator as yet.

Erasmus MC generates a stream of intellectual property on various aspects of biomedical and clinical research. The financial benefits of intellectual property are being reinvested in research infrastructure and in attracting and retaining of research expertise.

#### **Explanation of abbreviations**

- Fte full time equivalent
- SP1 fte scientific personnel 1<sup>st</sup> budget source
- SP2 fte scientific personnel 2<sup>nd</sup> budget source
- SP3 fte scientific personnel 3<sup>rd</sup> budget source
- SP4 fte scientific personnel 4<sup>th</sup> budget source
- SPtot total fte scientific personnel
- T1 thesis PhD; graduation internal, research internal
- T2 thesis PhD; graduation internal, research external
- T3 thesis PhD, graduation external, research internal
- IS international scientific publications in prominent journals with an impact factor
- FS international scientific publications in journals with expectations of obtaining an impact factor and further scientific publications
- OP other publications
- Ptot total number of publications