The Netherlands: Investigator-driven medical research

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The Netherlands: medical research output

- 2003-2013: 13,210,643 peer-reviewed international publications in medicine, life and health sciences (WoS)
- World top-12, based on number of publications (2.3% share of the world’s publications)
THE ranking: based on publications and citations only

Top European institutions in clinical medicine
Times Higher Education 21 May 2009
Data provided by Thomson Reuters’ Essential Science Indicators database, 1 January 1998-31 December 2008

<table>
<thead>
<tr>
<th>Rank in Europe</th>
<th>University or Institute</th>
<th>Papers</th>
<th>Citations</th>
<th>Citations/Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Erasmus University Rotterdam</td>
<td>7,108</td>
<td>166,015</td>
<td>23.36</td>
</tr>
<tr>
<td>2</td>
<td>University of Cambridge</td>
<td>4,795</td>
<td>107,088</td>
<td>22.33</td>
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<tr>
<td>3</td>
<td>University of Oxford</td>
<td>6,706</td>
<td>149,545</td>
<td>22.30</td>
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<tr>
<td>4</td>
<td>University of Glasgow</td>
<td>4,908</td>
<td>104,245</td>
<td>21.24</td>
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<tr>
<td>5</td>
<td>University College of London</td>
<td>10,169</td>
<td>206,196</td>
<td>20.28</td>
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<td>6</td>
<td>Imperial College of London</td>
<td>7,550</td>
<td>150,269</td>
<td>19.33</td>
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<tr>
<td>7</td>
<td>University of Amsterdam</td>
<td>8,123</td>
<td>149,851</td>
<td>18.50</td>
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<td>8</td>
<td>Karolinska Institute</td>
<td>12,787</td>
<td>236,174</td>
<td>18.47</td>
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<td>9</td>
<td>Humboldt University of Berlin</td>
<td>6,097</td>
<td>112,420</td>
<td>18.44</td>
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<td>10</td>
<td>Leiden University</td>
<td>8,150</td>
<td>149,851</td>
<td>18.39</td>
</tr>
</tbody>
</table>
Patient care – Euro Health Consumer Index 2013

EHCI 2013 total scores
Factors determining success

Formation University Medical Centers, UMCs (start 2003)

- Merger of university hospitals and faculties of medicine and health sciences
- Dean is (vice) president of the board of directors
- Transfer of the complete budget from university to the UMC
- All personnel in one organization
- Budgets of patient care, research and education still “recognizable”
Factors determining success

Education of physician scientists

- Student selection: Junior Med School/Junior Science School
- Medical curriculum: emphasis on research-focused and evidence-based care
- Top-10% students: honours class → research master program (2 years) for free

- 5 research master programs
  - Medical students interact with Dutch and international students (35%) from various backgrounds
  - ½ year of course work, 1½ years of research

- Erasmus MC medical students
  - 10% physician-scientists via the honours class
  - 30% one scientific publication before graduation
  - 50% has international experience obtained during clerkships, research projects or course work (>2 months)
  - 5% finishes PhD program before MD degree
  - 15% of all medical students enroll in a PhD program
Factors determining success

PhD programs

- 5 different PhD programs
- Over 1,000 PhD students, 35% international
- 220-250 PhD thesis defenses/year
- Supervision: research group’s university budget depends partially successfully defended PhD projects, not on the number of PhD students

PhD thesis defense - guidelines

- At least 30 ECTS of course work
- 4 first author publications in the top-25% journals of the candidate’s field of research
Factors determining success

- Integration care, research and education in one building complex
- Laboratory facilities for “all
- Top referral care vs. regular care 75% resp. 25%
- New hospital
  - Grouped into 6 multidisciplinary themes, not divided into medical specialty-defined area’s
  - 1,000 single-patient bed rooms
  - Each patient enters into a clinical research program
Factors determining success

- Querido principle: from bench to bedside to population and back
- Combined research infrastructure:
  - Advanced sequencing
  - Bio-informatics, medical informatics..
  - Biomics center
  - Animal facilities, animal imaging center
  - Imaging facilities .. etc.
- Epidemiology: large cohorts:
  - Rotterdam elderly study
  - Generation R
- Jan Tinbergen – econometrics, health economics, health technology assessment and health policy and management
Innovative Life Science & Health in South West Netherlands, within a 15 km range

Turnover cluster > 10 billion € per year
Innovative Life Science & Health in South West Netherlands, within a 15 km range

- Joint research programs
  - but also joint:
    - BA/MA program nanomedicine
    - BA/MA program medical technology
    - Valorization / technology transfer office
Finances & grant support 1

- Patient care 800 million €
- Education & training
  - Medical students 120 million €
  - Medical specialists 60 million €
- Research
  - Central budget 44 million €
  - External funding 104 million €
Finances & grant support 2

- **External funding:**
  - 70% of the research budget is obtained from external sources

- **FP7 funding –**
  - no 3 in FP7-health coordinatorships
  - ERC funding – 18 winners

- **Internal funding**
  - Starting grants for translational research
  - Fellowships for young talent
  - Every 5 years – redistribution of centrally allocated funding:
    - Number of publications
    - Number of successfully defended PhD theses
    - Amount of externally obtained research funds
Factors determining success

Internationalization: (inter)national networks based on publication output

Network based on **25 co-publications** with other institutes over 10 years: short-lived opportunism or long-term partners?

- Erasmus MC (NL)
- Yale University (US)
- Fudan University (CN)
- Universidade de Sao Paolo (BR)

- **Example:** 4 networks at four universities across the world
  - Example shown has as research area: gastroenterology & hepatology
  - Data Web of Science 2003-2013
Internationalization: an output-based strategy

Co-publications with foreign institutes: international output since 2003

**Publications/year**

- **Co-publ Erasmus MC & EU**
  - 2003: 100 publications, 3 citations
  - 2004: 200 publications, 5 citations
  - 2005: 300 publications, 7 citations
  - 2006: 400 publications, 9 citations
  - 2007: 500 publications, 11 citations
  - 2008: 600 publications, 13 citations
  - 2009: 700 publications, 15 citations
  - 2010: 800 publications, 17 citations
  - 2011: 900 publications, 19 citations
  - 2012: 1,000 publications, 21 citations

- **Co-publ EER countries**
  - 2003: 50 publications, 3 citations
  - 2004: 100 publications, 6 citations
  - 2005: 150 publications, 9 citations
  - 2006: 200 publications, 12 citations
  - 2007: 250 publications, 15 citations
  - 2008: 300 publications, 18 citations
  - 2009: 350 publications, 21 citations
  - 2010: 400 publications, 24 citations
  - 2011: 450 publications, 27 citations
  - 2012: 500 publications, 30 citations

- **Co-publ Erasmus MC & USA**
  - 2003: 5 publications, 1 citation
  - 2004: 10 publications, 2 citations
  - 2005: 15 publications, 3 citations
  - 2006: 20 publications, 4 citations
  - 2007: 25 publications, 5 citations
  - 2008: 30 publications, 6 citations
  - 2009: 35 publications, 7 citations
  - 2010: 40 publications, 8 citations
  - 2011: 45 publications, 9 citations
  - 2012: 50 publications, 10 citations

**Citations/year**

- **Co-publ Erasmus MC & EU**
  - 2003: 100 citations
  - 2004: 200 citations
  - 2005: 300 citations
  - 2006: 400 citations
  - 2007: 500 citations
  - 2008: 600 citations
  - 2009: 700 citations
  - 2010: 800 citations
  - 2011: 900 citations
  - 2012: 1,000 citations

- **Co-publ EER countries**
  - 2003: 50 citations
  - 2004: 100 citations
  - 2005: 150 citations
  - 2006: 200 citations
  - 2007: 250 citations
  - 2008: 300 citations
  - 2009: 350 citations
  - 2010: 400 citations
  - 2011: 450 citations
  - 2012: 500 citations

- **Co-publ Erasmus MC & USA**
  - 2003: 5 citations
  - 2004: 10 citations
  - 2005: 15 citations
  - 2006: 20 citations
  - 2007: 25 citations
  - 2008: 30 citations
  - 2009: 35 citations
  - 2010: 40 citations
  - 2011: 45 citations
  - 2012: 50 citations

**Source:** Thomson Reuters (Web Of Science): Essential Science Indicators Database, 1 January 2003 - 31 December 2012
Internationalization: an output-based strategy

Co-publ with US, CAN
3,551 publications
76,161 citations
21.45 cit./publ.

Co-publ with EU
6,048 publications
109,471 citations
18.10 cit./publ.

Co-publ with Far East
788 publications
25,512 citations
32.38 cit./publ.

Co-publ with South America
228 publications
5,207 citations
22.84 cit./publ.

Co-publ with Africa
167 publications
4,932 citations
29.53 cit./publ.

Co-publ with AUS & Nw Z
591 publications
21,551 citations
36.47 cit./publ.

Internationalization: an output-based strategy

Co-publ with Far East

635 publications
19,333 citations
30.45 cit./publ.

Co-publ with China & HK

257 publications
9,736 citations
37.88 cit./publ.

Partnerships –

General partnerships

• Fudan University (2005)
  ✓ Joint Research Institute
• Peking University (2008)
• Shanghai Jiao Tong University (2008)
  ➢ a joint research institute will be founded (2014)
• PUMC & CAMS (2009)
  ➢ Hong Kong University

With a focus on health technology

• Shenzhen Institutes of Advanced Technology & Shenzhen University (2013)
• North Eastern University, Shenyang (2013)
  ➢ Tsinghua University
Investigator-driven medical research

- UMC formation
- Physician scientist
- Infrastructure, combined facilities
- New hospital
  - Each patient will be enrolled in clinical research
  - Multidisciplinary organization
- Research budget allocation: focused on research profile, output-related but flexible
- Internal starter funding for high-risk, high-gain research and for exceptional talent

➢ Policy keeps profile in mind, but quality is leading