781 publications in international journals (2009) 125 patent families 12 spin-offs and joint venture companies with 350 staff members 430 doctoral students, of these 280 employed at Helmholtz Zentrum München 40 trainee positions

compact

top achievements

excellent research

31 institutes and independent research departments more than 400 research cooperation agreements
<table>
<thead>
<tr>
<th>Disease</th>
<th>2004</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection of the lower respiratory tract (e.g. pneumonia)</td>
<td>6.2%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>4.8%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Depression</td>
<td>4.3%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Acute coronary syndrome (e.g. heart attack)</td>
<td>4.1%</td>
<td>5.5%</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>3.8%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Cerebrovascular diseases (e.g. stroke)</td>
<td>3.1%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Premature birth and low birth weight</td>
<td>2.9%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Suffocation and trauma at birth</td>
<td>2.7%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Traffic accidents</td>
<td>2.7%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Infections and other diseases in newborns</td>
<td>2.7%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Chronic obstructive Pulmonary diseases, COPD</td>
<td>2.0%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Vision disorders</td>
<td>1.8%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Hearing loss in adulthood</td>
<td>1.8%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>1.3%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Source: WHO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The pathogenic processes of common diseases such as diabetes mellitus, cardiovascular diseases, cancer, Alzheimer’s disease, depression and lung diseases are still not sufficiently understood. They are influenced by many factors – usually over a long period. They arise from the complex interaction of individual genetic disposition and environmental factors such as nutrition, lifestyle, stress or pollutants. Pre-existing conditions and symptoms of old age often contribute as well.

Helmholtz Zentrum München conducts research on these relationships, focusing particularly on diabetes mellitus and lung diseases. Understanding the complex interaction of different factors is crucial for the development of new therapies, diagnostic methods and prevention strategies. By deciphering biological mechanisms and by means of our technological platforms, we make important contributions to the fight against diseases of the central nervous system, cancer, infectious diseases and cardiovascular diseases.

The basis our work is excellent basic research. It is carried out and ensured by well-managed institutes and research departments, which regularly undergo international peer review. The broad spectrum of our center’s expertise encompasses health, ecosystems and the preservation of the natural foundations of human life. Our research infrastructure includes central, state-of-the-art technological platforms. Through intensive cooperation with clinical partners we ensure that insights from research can be quickly translated into clinical applications to benefit patients. The initial research on the first drug that was developed entirely by the German biotech sector and brought to market was conducted at our center.

A key commitment of our center is the education and training of the young generation of scientists. Here we work closely with Munich’s elite universities. The many joint initiatives and shared facilities with universities as well as the integration of the center into national and international research networks offer the young scientists a stimulating academic environment and optimal career prospects.
As German Research Center for Environmental Health, Helmholtz Zentrum München pursues the goal of developing personalized medical approaches for the prevention and therapy of major common diseases such as diabetes and lung diseases. To achieve this, it investigates the interaction of genetics, environmental factors and lifestyle. The head office of the center is located in Neuherberg to the north of Munich. Helmholtz Zentrum München belongs to the Helmholtz Association, Germany’s largest research organization, a community of 16 scientific-technical and medical-biological research centers with a total of 30,000 staff members.

Use in Society

Common diseases: lung diseases, diabetes, neurodegenerative diseases

New approaches for prevention, diagnosis and therapy

Translational Research, Technology Transfer

Leitmotif Environmental Health

Cooperations

Excellent Research

Excellent Training

Excellent Platforms
1 **Major Common Diseases**
   Such as chronic lung diseases and diabetes mellitus are at the center of Helmholtz Zentrum München’s research activities.

2 **Environmental Health**
   Serves as leitmotif – through the cooperation of various disciplines the center investigates how common diseases develop individually in the context of genetic disposition, environmental factors and living conditions.

3 **Centers of Excellence**
   The scientific expertise is organized in the institutes and research departments, forming the basis for excellent research.

4 **Cutting-Edge Technologies**
   Service platforms offer scientists at the center and external partners access to cutting-edge technologies.

5 **Translational Research and Technology Transfer Strategy**
   To foster efficient further development of basic research into applications, Helmholtz Zentrum München has a successful translational research and technology transfer strategy.

6 **400 Cooperation Agreements**
   Cooperation with the world’s leading scientists is an integral part of the day-to-day research: Helmholtz Zentrum München has more than 400 cooperation Agreements with partners in the Munich region as well as with national and international partners.

7 **Helmholtz Graduate School of Environmental Health**
   The Helmholtz Graduate School of Environmental Health (HELENA) and the educational and training environment of Helmholtz Zentrum München lay the cornerstone for future successful careers in science.

New prevention measures and approaches to diagnosis and therapy against common diseases such as chronic metabolic diseases, respiratory diseases and diseases of the nervous system.
### Research Institutes and Departments

<table>
<thead>
<tr>
<th>Program</th>
<th>Environmental Health</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Epidemiology</em></td>
<td></td>
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<tr>
<td><em>Epidemiology II</em></td>
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<tr>
<td><em>Dept. of Gene Vectors</em></td>
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<tr>
<td><em>Health Economics</em></td>
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<tr>
<td><em>and Health Care Management</em></td>
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<tr>
<td><em>Clinical Molecular Biology and Tumor Genetics</em></td>
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<tr>
<td><em>Lung Biology</em></td>
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<tr>
<td><em>Dept. of Medical Radiation Research and Diagnostics</em></td>
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<tr>
<td><em>Molecular Immunology</em></td>
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<tr>
<td><em>Pathology</em></td>
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<tr>
<td><em>Radiation Biology</em></td>
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<td><em>Radiation Protection</em></td>
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<tr>
<td><em>Dept. of Radiation Cytogenetics</em></td>
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<tr>
<td><em>Toxicology</em></td>
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<td><em>Virology</em></td>
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<table>
<thead>
<tr>
<th>Program</th>
<th>Systemic Analysis of Multifactorial Diseases</th>
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<tbody>
<tr>
<td><em>Bioinformatics</em> and Systems Biology</td>
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<tr>
<td><em>Biological and Medical Imaging</em></td>
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<tr>
<td><em>Biomathematics and Biometry</em></td>
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<tr>
<td><em>Diabetes Research Type 1</em></td>
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<tr>
<td><em>Developmental Genetics</em></td>
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<td><em>Experimental Genetics</em></td>
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<td><em>Human Genetics</em></td>
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<tr>
<td><em>Dept. of Protein Analytics</em></td>
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<tr>
<td><em>Stem Cell Research</em></td>
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<tr>
<td><em>Structural Biology</em></td>
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<tr>
<td><em>Dept. of Comparative Medicine</em></td>
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<td><em>Dept. of Zebrafish Neurogenetics</em></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Program</th>
<th>Terrestrial Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Biochemical</em></td>
<td></td>
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<tr>
<td><em>Plant Pathology</em></td>
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<tr>
<td><em>Soil Ecology</em></td>
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<td><em>Groundwater Ecology</em></td>
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<tr>
<td><em>Dept. of Microbe Plant Interactions</em></td>
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<tr>
<td><em>Ecological Chemistry</em></td>
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</table>

### Service Platforms

Offer researchers inside and outside the Center access to cutting-edge technologies

- German Mouse Clinic
- European Mouse Mutant Archive EMMA
- Animal Keeping
- KORA/Epidemiology
- Genome Analysis Center (genotyping, DNA sequencing, transcriptomics, proteomics, metabolomics)
- Cell Sorting Service
- Production of Monoclonal Antibodies
- Analytics
- Stem Cell Biology
- Structural Biology
- Protein Expression and Purification
- Screening and Assay Development Platform – Systems Biology
- Biological and Medical Imaging
- Immune Monitoring Platform
- Environmental Simulation
Helmholtz Zentrum München
- is the German Research Center for Environmental Health
- investigates the genesis and development of common diseases due to the interaction of genetics, lifestyle and environmental factors. The focus is on lung diseases and diabetes mellitus.
- pursues the development of new approaches to prevention, diagnosis and therapy of these diseases. Another key aim is to develop a personalized medicine. Technology transfer and translational research are purposefully implemented.
- Research activities take place in a network of three strategic programs: Environmental Health, Systemic Analysis of Multifactorial Diseases and Terrestrial Environment – Strategies for a Sustainable Response to Climate and Global Change
- is a member of Germany’s largest scientific organization, the Helmholtz Association. It has 16 legally independent research centers with approximately 30,000 employees and a total annual budget of 3 billion euros

Research units belong to a network of 3 strategic programs
- the Environmental Health Program
  Goal: new effective strategies for the prevention, early detection and therapy of chronic diseases
  Focus: lung diseases, allergies

- the Systemic Analysis of Multifactorial Diseases Program
  Goal: to gain insight into processes in the healthy organism and into the pathogenesis of complex diseases in all organ systems
  Focus: diabetes mellitus, neurodegeneration

- the Terrestrial Environment Program
  Goal: to understand the mechanisms and influential factors in the ecosystems of water, soil, plants
  Focus: soil, plants, water quality

_ Lung diseases: Comprehensive Pneumology Center
_ Diabetes: Partner in the German Center for Diabetes Research; site in Munich is in the start-up phase
_ Service platforms: cutting-edge technologies for excellent research
It Works! – Our Model with Removab as Example

**Benefit to Society:**
2009 Approval of Removab

**Technology Transfer and Value Creation**

1998: Spin-off of Trion, cooperation with Fresenius Biotech
1997: Business plan competition

**Translational Research: Close Contact between Scientists in the Lab and Doctors in the Clinic; Transfer of Research Findings into Clinical Applications**

1994: founding of the clinical cooperation group "Bifunctional Antibodies", New Innovator Award, begin of building a patent portfolio

**Excellent Basic Research**

Since 1992: research work on bifunctional antibodies; Further development of the technology

**Removab**

Removab is the first approved therapeutic antibody that was completely developed in Germany. It is a drug against malignant ascites, a cancer complication. The production method and underlying active principle are based on immunological research work which took place at what is today Helmholtz Zentrum München.
The goal of Helmholtz Zentrum München is successful translational research, that means: to advance knowledge further to achieve medical progress and to benefit society.

- Successful translational research is based on the continual exchange between clinical and basic research.
- Close cooperation with Munich’s university hospitals in the translational centers for lung and allergy research and in 11 clinical cooperation groups.
- Prevention research: establishment of the Helmholtz cohort, the findings of which will be used in the development of new approaches and methods.
- Portfolio management: structured flow of information and knowledge transfer between developmental, preclinical and clinical projects optimizes development processes.

Technology Transfer

- Broad spectrum of new, innovative and competitive technologies in the areas of biotechnology, pharmacology and medical technology, but also in environmental analytic methods.
- Inventions are patented and out-licensed for commercialization: 12 spin-offs and joint venture companies with currently approximately 350 employees.
International Research Cooperation
Helmholtz Zentrum München is connected in networks with leading scientists across the globe and has more than 400 research cooperations.

**Cooperation as Basis for Scientific Excellence:**

- 9 international projects to initiate scientific-technical collaboration
- 23 projects with international partners, including 9 projects with U.S. research institutions
- Coordination of 7 large-scale projects of the European Union
- 3 cooperative projects of the Federal Ministry for Education and Research (BMBF)
- 7 Collaborative Research Centers (SFB) of the German Research Foundation
- 3 Helmholtz Alliances (of these 1 as coordinator)
- Partner in the Munich Excellence Cluster "m4 – Personalized Medicine and Targeted Therapies: A New Dimension in Drug Development"
Research Cooperation in the Munich Region

LMU = Ludwig-Maximilians-Universität Munich
TUM = Technische Universität München
Helmholtz Zentrum München is a key partner in the Munich region. The close cooperation with local partners facilitates rapid translation of research findings into practical applications. Helmholtz Zentrum München has particularly close connections to the two Munich elite universities and clinical institutions in the Munich region. This is reflected in:

- joint appointments with Ludwig-Maximilians-Universität München (LMU) and Technische Universität München (TUM)
- the establishment of joint clinical cooperation groups
- the joint training of doctoral students in graduate schools
- the participation in research schools to promote the young generation of scientists by means of new models of scientific cooperation in translational research centers (Comprehensive Pneumology Center, Munich Allergy Research Center) and joint research centers (focus on diabetes, neurodegenerative diseases, Center for Integrated Protein Research Munich)

Munich is one of the leading biotech locations in Europe. Helmholtz Zentrum München is also a key participant in regional networks.
Distribution of the Staff According to Area

1.) 76% Scientific area
2.) 15% Technical area incl. infrastructure
3.) 9% Administration

Institutional Funding and Third-Party Grants by Source

€114.19 m Total institutional funding
1.) 90% Federal Government
2.) 10% Bavaria

€41.5 m Total third-party funding
3.) €12.8 m Project funding from the Federal Government
4.) €6.8 m European Union
5.) €4.9 m German Research Foundation (DFG) funding
6.) €0.3 m Project funding from state governments
7.) €1.8 m Industry
8.) €7.1 m Other sources
9.) €7.8 m Special task funding
Staff

Total number of employees: 1789
- Scientists and post-docs: 569
- Disciplines of scientists employed at Helmholtz Zentrum München: Biology 40 %, Chemistry/Biochemistry 15 %, Physics/Biophysics 10 % and Medicine 8 %
- Doctoral students: 430 – of these 280 employed at Helmholtz Zentrum München
- Technical staff and other employees: 812
- Trainees: 39
- Work-students, interns, temporary staff: 89
- 31 % of the positions are third-party funded
- 76 % of the staff are employed in the scientific area, 15 % in the technical area, 9 % in the administration (as of January 31, 2010)

Finances

Total budget 2009: € 159.9 m
- Basic financing: € 114.2 m
  (Federal Government and Free State of Bavaria at a ratio of 90:10)
- Third-party/project funding:
  Federal Government: € 12.8 m
  European Union: € 6.8 m
  German Research Foundation (DFG): € 4.9 m
(as of June 10, 2010)
Compact: Helmholtz Zentrum München in numbers Research at Helmholtz Zentrum München: 31 institutes and independent research departments; 15 technology platforms; 2 translational research centers; 11 clinical cooperation groups; 9 junior research groups 1789 staff members: 569 scientists and post-docs; disciplines of the scientists: biology 40 %, chemistry/biochemistry 15 %, physics/biophysics 10 % and medicine 8 %; 430 doctoral students, of these 280 employed at Helmholtz Zentrum München; 811 technical staff and other employees; 39 trainees; 89 work-students, interns, temporary employees; 31 % of positions are financed through third-party funds; 76 % of employees in scientific area, 15 % in the technical area, 9 % in the administration (as of January 31, 2010)

Finances: Total budget 160 million euros: 114 million euros from the Federal Government and the Free State of Bavaria; financing ratio 90:10; over 40 million euros in third-party grants (as of June 10, 2010)