German Cancer Research Center
in the Helmholtz Association
Brief History 3
Our Goals – Our Tasks 4
Facts and Figures 6
The Range of Our Research 8

Research Programs
Cell Biology and Tumor Biology 9
Functional and Structural Genomics 9
Cancer Risk Factors and Prevention 10
Tumor Immunology 10
Imaging and Radiooncology 11
Infection and Cancer 12
Translational Cancer Research 13

The National Center for Tumor Diseases Heidelberg 14

Collaborations 16
Support of Young Scientists 18
Technology Transfer 20
The Cancer Information Service (KID) 21
Publisher’s Information 22
Brief History

1964 The German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) was founded. The establishment of a national cancer research center was initiated by Heidelberg surgeon Professor Karl Heinrich Bauer.

1975 The Center became a member of the Association of National Research Centers (AGF).

1977 The Center joined the Deutsche Forschungsgemeinschaft (DFG).

2001 DKFZ joined the Helmholtz Association of National Research Centers (HGF).

2004 The German Cancer Research Center, Heidelberg University Hospitals, the Thorax Clinic Heidelberg and the Deutsche Krebshilfe (German Cancer Aid) jointly set up the National Center for Tumor Diseases (NCT) Heidelberg.

2007 An alliance of the German Cancer Research Center and the Center for Molecular Biology (Zentrum für Molekulare Biologie Heidelberg, ZMBH) of the University of Heidelberg is formed.
**Our Goals – Our Tasks**

In order to develop new strategies in the battle against cancer, we first need to understand the complex biological mechanisms underlying this disease. What induces cells to grow in an uncontrolled manner? What biochemical processes are occurring when this happens? How can we influence these processes?
The German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ), a leading biomedical research institute worldwide, has the task to systematically investigate the mechanisms underlying the development of cancer and to identify cancer risk factors. Based on the results of this basic research we develop new approaches in the prevention, diagnosis, and treatment of cancer.
Staff (as of Dec. 31, 2007)

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total staff</td>
<td>2,128</td>
</tr>
<tr>
<td>Staff scientists (without doctoral students)</td>
<td>619</td>
</tr>
<tr>
<td>Doctoral students</td>
<td>351</td>
</tr>
<tr>
<td>Scientific infrastructure</td>
<td>660</td>
</tr>
<tr>
<td>Management and management support</td>
<td>161</td>
</tr>
<tr>
<td>Basic services</td>
<td>104</td>
</tr>
<tr>
<td>Apprentices</td>
<td>116</td>
</tr>
<tr>
<td>Diploma students</td>
<td>117</td>
</tr>
</tbody>
</table>

In 2007, there were **154 visiting scientists** working at DKFZ.

Collaborations with Industry

Twelve companies providing approx. **170 jobs** today have been founded as spin-offs from the Center.

Technology Transfer

DKFZ has filed about **1,050 German and foreign patents** and has concluded **93 license agreements**.
Expenditure

Personnel expenses
81.2 million EUR

Material expenses
50.3 million EUR

Investment goods
including building investments
27 million EUR

Funding 2007

Program-based funding
90% by the Federal Government,
10% by the State of Baden-Württemberg
110.8 million EUR

Project funding
(External funds)
Federal or State governments,
DFG, EU, German Cancer Aid, etc.
29 million EUR

Own revenues
License revenues,
patient care, donations,
bequests etc.
18.7 million EUR
The Range of Our Research

The 47 scientific departments, 14 junior research groups and nine Clinical Cooperation Units of the German Cancer Research Center are assigned to seven Research Programs, which are assessed by international experts at five-year intervals.
In this Research Program, scientists are investigating the communication between cells and signal transmission within a cell: What signals regulate growth, differentiation and survival of cancer cells?

What errors in basic life processes of the cell lead to cancer? How can medicine specifically intervene in these mechanisms?

Researchers in this Program are studying the genetic basis of cancer by analyzing the complete genome of tumor cells. They investigate genes that are active in cancer cells as well as gene transcripts and proteins that are produced in tumor cells.

High-throughput technologies are being developed for automatic analysis of genes and genomes to identify and verify new target structures for diagnosis and treatment.

Bioinformatics and systems biology use the data obtained in genome research and tumor biology. They help to present the structure of genomes or biological macromolecules on the computer screen. Processes in living cells can also be modeled in this way.
Researchers in this Program are carrying out studies in large population groups in order to uncover causal connections between environmental and nutritional factors as well as genetic predispositions and cancer.

They are searching for substances that can prevent cancer and elucidate the underlying mechanisms.

In addition, new tests and programs for early cancer detection are being developed.

Tumor Immunology

Scientists are investigating the development and growth of immune cells: How are they regulated and activated or forced to commit programmed cell death (apoptosis)?

Research is aimed at understanding the role of the immune system in cancer, AIDS, and autoimmune diseases, in order to make use of the immune system’s potential in fighting cancer and other diseases.
Radiologists and physicists are working to optimize imaging technologies for a precise diagnosis of the size and physiological properties of tumors (magnetic resonance imaging including a 7 Tesla high-field MR system, MR spectroscopy, computer tomography, ultrasound, positron emission tomography).

Scientists are also developing and refining radiation therapy technologies such as intensity modulated radiation therapy (IMRT) and heavy ion therapy. The enhanced treatment methods are designed to better protect healthy tissue, while the tumor can be treated with high precision at the required radiation dose.
A number of viruses and other infectious pathogens can cause cancer. Scientists of this Research Program are investigating the underlying mechanisms. Their research is aimed at developing preventive and therapeutic vaccines against virus-related tumors. The scientific foundation for the first vaccine worldwide against human papillomaviruses to protect women from cervical cancer was laid at DKFZ.

In addition, virologists are developing novel treatment approaches based on viruses that kill cancer cells (oncolytic viruses) and are studying the use of viruses as “gene ferries” for gene therapy.
The aim of this Research Program is to translate innovative approaches in prevention, diagnostics and treatment into clinical application. This includes, for example, treatment methods based on cells, nucleic acids, antibodies or small molecules that specifically block metabolic pathways of tumor cells.

The Research Program comprises those departments that make up DKFZ’s research sections within NCT (see page 14), including the Clinical Cooperation Units of DKFZ.

The NCT’s Clinical Cancer Register, the Tissue Bank and the Clinical Trials Center are important pillars of translational cancer research.
The National Center for Tumor Diseases Heidelberg, a joint project of the German Cancer Research Center, Heidelberg University Hospitals, the Heidelberg Thorax Clinic and the Deutsche Krebshilfe (German Cancer Aid), brings together patient care, cancer research and cancer prevention under one roof. For the German Cancer Research Center, NCT is a crucial platform for the transfer of new research results from the laboratory into clinical application.
The Medical Oncology Department organizes the interdisciplinary Tumor Outpatient Unit, which is the main contact point for all cancer patients. An interdisciplinary Tumor Board recommends treatment for each patient.

With two application-oriented research sections, “Translational Oncology” and “Preventive Oncology”, the German Cancer Research Center is a driving force within NCT. In addition, the nine Clinical Cooperation Units of DKFZ and numerous application-oriented research projects of the Center are integrated into NCT.

The section “Translational Oncology” aims to translate the latest scientific findings into innovative strategies for treating cancer. The section “Preventive Oncology” is concerned primarily with developing strategies to prevent cancer and to detect cancer in early stages.

NCT provides the necessary links between the clinic and research: a clinical cancer register, centralized image and data bases, a tissue bank, and a clinical trials center.

NCT is scheduled to move into its own building on the Neuenheimer Feld campus in winter 2009/2010.

Tumor Outpatient Unit of NCT Heidelberg
Phone: +49 (0) 6221.564801
ambulanz@nct-heidelberg.de
Collaborations: Together We are Stronger

Top quality research relies on cooperation and exchange. DKFZ attaches great importance to this area. Priorities among DKFZ’s international collaborations in the area of cancer research are those with Israel’s Ministry of Science – a collaboration that has been going on for over 30 years now – and with the French Institut National de la Santé et de la Recherche Médical (Inserm).
In 2008, a Sister Institution Relationship Agreement was signed with the MD Anderson Cancer Center in Houston, Texas.

The German Cancer Research Center collaborates closely with Heidelberg hospitals in the framework of NCT. The nine Clinical Cooperation Units of DKFZ are links between research and university hospitals. Another focus are collaboration projects with research facilities located in Heidelberg including the University of Heidelberg, the European Media Laboratory and the European Molecular Biology Laboratory.

In 2007, a new model of collaboration between a university and a Helmholtz Center was launched in the form of a research alliance between DKFZ and the Center for Molecular Biology Heidelberg (ZMBH).

Collaborations with industrial partners have gained increasing importance. Thus, DKFZ entered into a strategic alliance with Siemens in early 2006. Its aim is to further enhance imaging technologies for diagnostic and radiation treatment methods. DKFZ is one of the founders of HI-STEM (Heidelberg Institute of Stem Cell Research and Experimental Medicine), a public-private partnership established to more intensively study and combat tumor stem cells.
Support of Young Scientists

The German Cancer Research Center attaches great importance to the support of young scientists at all stages of their scientific training. Junior research groups have proven as a particularly successful approach. By providing sufficient equipment and independence for young scientists, these groups offer an opportunity for young researchers to distinguish themselves for their scientific career.
As an additional incentive for talented young scientists, these positions are connected with a tenure track option following the American model. After positive evaluation, excellent group leaders may firmly establish their research groups at the Center.

The aim of the new Helmholtz International Graduate School of Cancer Research, which was established in 2008, is to ensure excellent, well-structured and quality-assured training for PhD students. In addition, DKFZ scientists are contributing the “Cancer Biology” major to the new Molecular Biosciences masters course held in English. At the Heidelberg Life Science Lab, DKFZ offers a comprehensive program for high school students.
Since 1997, the Office of Technology Transfer of the DKFZ has made sure that the Center’s intellectual property is protected by the patenting of inventions and, thus, industrial applications become possible. The Technology Transfer Office straddles the gap between research and industry and supports collaborations with industry. The development of new substances and technologies into products relies on support by industrial partners, for example, through collaborations or licenses.

A great responsibility for the staff of the German Cancer Research Center emanates from the fact that their research is financed by public funds. The Center tries to return these investments to society by providing product developments from basic research.
Readily comprehensible, scientifically well-founded and up-to-date information is provided by the Cancer Information Service (Krebsinformationsdienst, KID) free of charge, by telephone and e-mail, to cancer patients, their families, and interested citizens nationwide. For patients of NCT, the Cancer Information Service offers this service also in the form of consultations.

Cancer information has one number: 
0800.4203040
daily from 8 a.m. to 8 p.m.  
(for landline calls within Germany only)

E-mail-service:  
krebsinformation@dkfz.de

Internet: 
www.krebsinformation.de
We are very grateful for the support of our research by donations and bequests. We guarantee that such funds will be used directly for our scientific work without any deductions.
Pictures
Page 4 left, pages 11, 16, 18/19: Yan de Andres;
page 4 right: Martin Kemmet; page 5 left: Johannes
Marburg; page 5 right: Nicole Schuster; page 12:
Klaus Tschira Stiftung gGmbH/Stefan Kresin;
page 14: Media center of Heidelberg University
Hospitals; page 20 and 21: Tobias Schwerdt