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Translational oncology

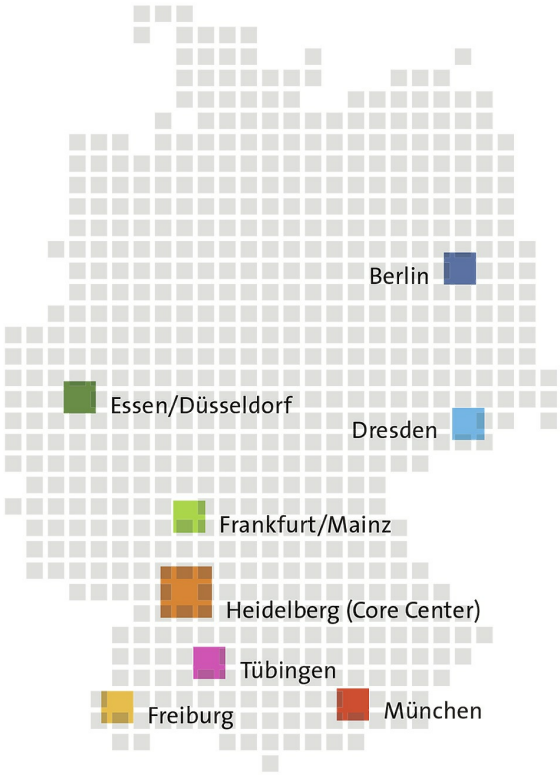
Translation: driver of cancer medicine

The fight against cancer is a pressing issue. Although technological advances in the treatment, prevention and early detection of cancer have improved over the past few decades, the number of people affected is increasing. Cancer medicine now wants to counteract this by joining forces with other players involved in the field.

In Germany alone, around 500,000 people develop cancer each year. The rate of new cases will continue to rise - according to the German Cancer Research Center (DKFZ) new cases will number 600,000 in 2030. One reason for the increase is the ageing population. Genetic predispositions, lifestyles and environmental influences are also part of the widespread risk factors. In early 2019, the German Ministry of Education and Research (BMBF), together with various stakeholders active in the field of cancer research, announced the National Decade Against Cancer. The aim of the joint initiative is to pool knowledge in order to improve options for the treatment, prevention and early detection of cancer.

Finding new therapies is a challenge, because cancer is not just cancer: the molecular profiles of tumours are unique and can change even more in the course of therapy. Not all patients with breast cancer or prostate cancer respond equally well to therapy. Likewise for other types of cancer. For this reason, oncology is now focusing on individualising treatment methods, so that all patients receive the best possible therapy that is tailored to them as individuals.

Developments in the fields of molecular analysis and information technology over the past two decades are hopeful: they have helped make it possible to create molecular profiles of tumours within a very short time. They provide deep insights into the basics of cancer growth and progression. The big task now is to take these research findings into medical care so that both research and patient care benefit as quickly as possible. In medical terms, this transfer of knowledge of research results into clinical practice is called translation.



The eight partner locations of the German Cancer Research Consortium.
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The DKTK: a nationwide network

With the aim of bringing new cancer research findings into clinical development and practice as quickly as possible, the German Ministry of Education and Research (BMBF), together with several federal states and the DKFZ, founded the German Cancer Consortium (DKTK) in October 2012. The DKTK bridges the gap between basic and clinical research. It links designated research institutions through interdisciplinary clinical research projects, the development of clinical data pools with cross-location IT structures and trains experts notably in clinically oriented cancer research. Within the German Cancer Consortium,

over 950 scientists and doctors from more than 20 academic research institutions and university hospitals at seven sites across Germany collaborate with the DKFZ to discover, develop, test and apply new personalised oncology strategies. Three DKTK partner sites are located in Baden-Württemberg, namely in Heidelberg, Freiburg and Tübingen. The DKTK's annual budget has stood at € 27.8 million since 2014. 90 percent of this funding comes from the German federal states and ten percent from the federal government.

Three institutions from Baden-Württemberg involved

- Within the DKTK, Tübingen focuses on cancer immunotherapy. This includes the development of peptide and RNA vaccines as well as therapeutic antibodies that are used in various types of cancer. It also includes virotherapy approaches, i.e. attacking cancer cells with genetically modified viruses.
- Freiburg is a location with huge expertise in epigenetics and targeted therapies, especially related to blood formation disorders. Research into tumorigenesis, i.e. cancer development, is another area of focus.
- The German Cancer Research Center (DKFZ) in Heidelberg is one of the leading cancer research centres in Germany. Within the DKTK, the DKFZ takes on the role of core centre, contributing substantial scientific input, the necessary infrastructure and overall coordination.

Research and patient care under one roof - at the NCT

At the NCT Heidelberg, research and clinical treatment are united under one roof.

The National Center for Tumour Diseases (NCT) Heidelberg is located in the vicinity of the DKFZ. It is a joint facility run by the German Cancer Research Center (DKFZ) and the Heidelberg University Hospital (UKHD) and is an oncology centre of excellence that receives funding from German Cancer Aid.

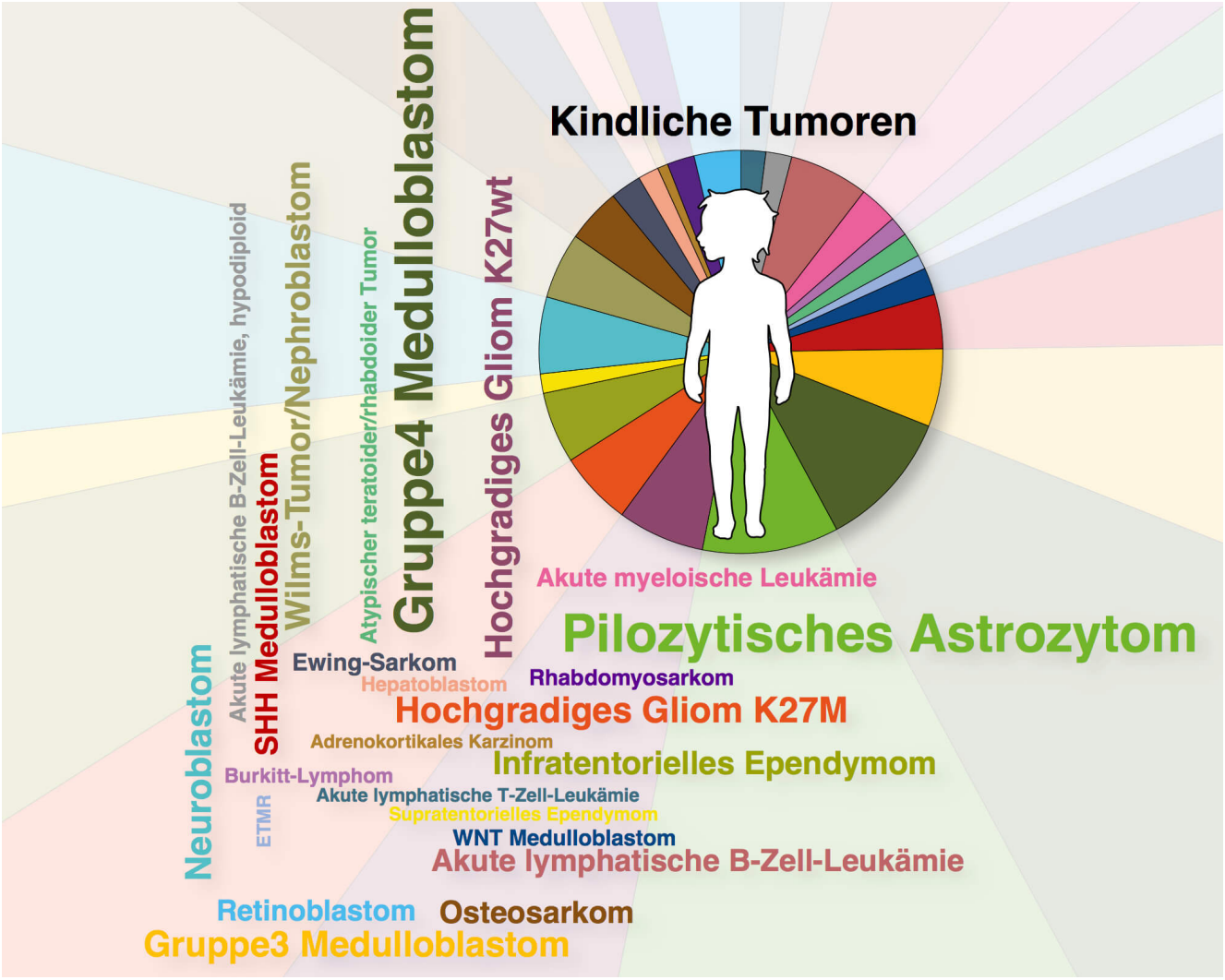
The NCT Heidelberg was established in 2004 with the aim of pooling excellent patient care with innovative cancer research under one roof. In the spirit of translation, the aim is to transfer the latest research results as quickly as possible into better diagnostic, treatment and prevention approaches. The NCT has since been expanded to include a site in Dresden. Four further facilities are planned throughout Germany.

The NCT Heidelberg has close connections with the DKTK, including through the NCT/DKTK-MASTER programme (MASTER = Molecularly Aided Stratification for Tumour Eradication Research). The programme represents a central platform for the multidimensional characterisation of young cancer patients and patients with rare cancers, who are cared for at the NCT Heidelberg, the NCT Dresden or at one of the other DKTK locations. "Since the start of the programme in Heidelberg in 2013 and the expansion to the entire DKTK in March 2016, we have systematically performed cancer genome analyses on over 2,000 patients with advanced or difficult-to-treat tumour diseases and discussed them on a special molecular tumour board," says Prof. Dr. Stefan Fröhling, managing director of the NCT Heidelberg. Fröhling also heads up the Translational Medical Oncology division at the DKFZ. He explains: "With the help of the molecular data obtained, we want to find out how extensive cancer genome analyses and the evaluation of the analyses can be optimised so that they can be used effectively in precision medicine."

Translation in paediatric oncology - the Hopp Children's Tumour Center Heidelberg (KiTZ)

While the NCT in Heidelberg focuses on adult oncology, the Hopp Children's Tumour Center in Heidelberg (KiTZ) specialises in cancer in children. Anti-cancer drugs tailored to children are urgently needed. Although 80 percent of children affected can be treated successfully, the cancer is not suppressed in 20% of cases and the disease progresses or recurs after a while. The chances of recovery are then poor. Due to the relatively low number of cases in paediatric oncology (the rate of new cases in Germany is around 2,000 per year), collaboration across institutions is particularly important here.

"Childhood cancers are often different from adult cancers," says Prof. Dr. Olaf Witt, who heads the translational paedriatic oncology programme at the KiTZ and also works as an oncologist at the UKHD and as a scientist at the DKFZ. "Nevertheless, there are very few clinical studies for children with cancer." Together with partner institutions across Europe, Witt and his colleagues at the KiTZ have set themselves the goal to change this. In 2015, they launched the INFORM programme especially for children whose cancer has returned after treatment: tumour samples from children with cancer are genetically analysed to look for changes (mutations) in the genome that cause the cancer. The data obtained are used to differentiate tumours during



The molecular analysis and classification of childhood cancers (different subgroups of brain tumours are shown here) is one of the most important research areas at the Hopp Children's Cancer Center Heidelberg (KiTZ).

diagnosis and to identify new targets for targeted therapies, which are then tested in clinical trials.

Bringing together research and clinical treatment, uniting forces and benefiting from one another: translation has become an important driver of oncology. Networks such as the DKTK and facilities such as NCT and KiTZ offer a good infrastructure for translational initiatives, enabling new findings from the laboratory to quickly reach the bedside.

Oncology centres of excellence

Because every patient in Germany should have access to the best possible diagnostics and therapy, German Cancer Aid has set up a network of so-called "oncology centres of excellence". They are assessed according to strict quality criteria by an international commission of experts. Translational cancer research is a fundamental part of the oncology centres of excellence.

Article

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Dr. Elke Matuschek

Further information

Dr. Friederike Fellenberg
Leitung Kommunikation und Veranstaltungen
Im Neuenheimer Feld 460

69120 Heidelberg
Phone: +49 (0)6221 56-5930
E-mail: Friederike.fellenberg(at)nct-heidelberg.de

Dr. Alexandra Moosmann
Hopp-Kindertumorzentrum Heidelberg (KiTZ)
Referentin Presse- und Öffentlichkeitsarbeit
Im Neuenheimer Feld 130.3
69120 Heidelberg
Phone: +49 (0)6221 56 36434
E-mail: a.moosmann(at)kitz-heidelberg.de

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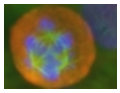

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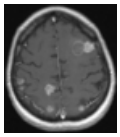

Tumour metastasis

Immunology – at the forefront of medical progress

funding | cancer | network partners | translational research | therapy | research centre | research cooperation | Immuno-oncology