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Heidelberg University Hospital starts up one-of-a-kind gantry at Heidelberg Ion Beam Therapy Center

On October 29, 2012, German Minister of Education and Research Annette Schavan and Baden-Württemberg's Minister of Science, Research, and the Arts Theresia Bauer dedicated the innovative large medical device for tumor irradiation and cancer research.

Heidelberg University Hospital's Heidelberg Ion Beam Therapy Center (HIT) started up its unique beam guide system (gantry), the only one of its kind in the world, at a festive ceremony on October 29, 2012. The 25-meter-long 360° rotating beam guide system can deliver heavy ions or protons to irradiate tumors very precisely and effectively from any angle, even if the tumors are located deep inside the body or at places surrounded by tissue that is highly sensitive to radiation. The first three patients, all of whom have brain tumors, underwent radiation therapy with the gantry on October 19, 2012.

"The Heidelberg Ion Beam Therapy Center (HIT) is one of the world's most innovative research and treatment facilities for cancer," said Prof. Annette Schavan, German Minister of Education and Research, at the dedication ceremony for the start-up of the gantry. "Clinical studies and basic research will deliver important findings about the efficacy of heavy ion and proton irradiation in different tumors in the coming years." The gantry will enhance Germany's leading role here in Heidelberg in providing radiotherapy for cancer patients, Schavan added.

Treatment at HIT is part of the therapy concept of the National Center for Tumor Diseases (NCT), which is jointly operated by Heidelberg University Hospital and the German Cancer Research Center (DKFZ). The concept aims to provide interdisciplinary, individually tailored cancer treatment for every cancer patient. "Our collaboration enables us to translate the results of basic research into new treatment concepts. This also applies to the ongoing advances in radiotherapy at HIT," said Prof. Guido Adler, Chief Medical Director of Heidelberg University Hospital.

Around 1,200 patients treated at HIT to date

HIT was opened in November 2009. Since then, the three radiotherapy rooms and a research irradiation site have gradually been started up. Around 1,200 patients have been treated to date. The facility is the size of half a soccer field and cost around EUR 119 million, with funding provided in equal amounts by Heidelberg University Hospital and the German government.

HIT's pivoting beam guide system was developed by a team from GSI Helmholtz Center for Heavy Ion Research and built by MT Aerospace. "With GSI's support, Heidelberg University Hospital has charted new territory in terms of both technology and science," explained Theresia Bauer, Baden-Württemberg's Minister of Science, Research, and the Arts. Bauer also praised the hospital's entrepreneurial courage and excellent planning, which is based on covering the costs of HIT's clinical operations. "HIT's clinical operations run six days a week. Since an individual patient is irradiated around 20 times on average, we can treat some 750 patients per year in the three treatment rooms," said Irmtraut Gürkan,

Administrative Director of Heidelberg University Hospital. “The calculations for the reimbursement agreements have now been adjusted to reflect this capacity.”

Clinical studies compare the efficacy of the different ion beams

HIT is Europe’s first combined treatment facility where patients can undergo radiation therapy with both protons and with various heavy ions (carbon, helium and oxygen ions). This allows comparative clinical studies to be performed. “For certain tumor diseases in which conventional therapy is not successful, clinical studies will be conducted over the next few years to investigate which type of radiation therapy yields better cure rates, therapy with protons or with heavy ions,” explained Prof. Jürgen Debus, Medical Director of the Department of Radiation Oncology and Radiotherapy at Heidelberg University Hospital and of HIT. The aim is to determine which heavy ions have the best therapeutic effect for the individual tumor diseases.

For some rare tumor diseases that are difficult to treat, carbon ion radiation is already the therapy of choice. These patients come to HIT for treatment from all over Germany and from abroad. “ Ion therapy at HIT is likely to benefit around 15% of the cancer patients whose tumor growth cannot be stopped with conventional therapy,” Debus said.

The gantry: Gigantic high-precision steel construction

The gantry at HIT is a gigantic steel construction 25 meters long, 13 meters in diameter and weighing 670 tons. Yet it is capable of astounding precision. The beam reaches the patients at up to 75% of the speed of light, can penetrate up to 30 centimeters into the tissue and still deviates from the target by no more than one millimeter. “In conventional radiation therapy with photons, mobile radiation sources have already been used very successfully in clinical applications for decades,” stated Prof. Thomas Haberer, Scientific and Technical Director at HIT. While proton gantries are used at other international treatment facilities, especially in the United States, the Heidelberg gantry is now the world’s first facility to begin gathering experience with heavy ions.

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Heidelberg University Hospital and Medical Faculty:
Internationally recognized patient care, research, and teaching
Heidelberg University Hospital is one of the largest and most prestigious medical centers in Germany. The Medical Faculty of Heidelberg University belongs to the internationally most renowned biomedical research institutions in Europe. Both institutions have the common goal of developing new therapies and implementing them rapidly for patients. With about 11,000 employees, training and qualification is an important issue. Every year, around 550,000 patients are treated on an inpatient or outpatient basis in more than 50 clinics and departments with 2,000 beds. Currently, about 3,600 future physicians are studying in Heidelberg; the reform Heidelberg Curriculum Medicinale (HeiCuMed) is one of the top medical training programs in Germany.

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From left to right: Scientific and Medical Director HIT, Prof. Jürgen Debus, Prof. Annette Schavan, German Minister of Education and Research, Theresia Bauer, Baden-Württemberg's Minister of Science, Research, and the Arts, and Scientific and Technical Director HIT, Prof. Thomas Haberer, launch the gantry in the Heidelberg Ion Beam Therapy Center (HIT). Photo: Heidelberg University Hospital

The gantry at the Heidelberg Ion Beam Therapy Center (HIT) is a 360° rotating beam delivery system for heavy ions. The world's only such facility, the gantry is a gigantic steel construction weighing 670 tons. It is 25 meters long, 13 meters in diameter and spans three stories. Photo: Heidelberg University Hospital