

More Options for Cancer Therapy

Tim Schröder

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More Options for Cancer Therapy

The Rhön-Klinikum AG, headquartered in Bad Neustadt on the Saale, Germany, utilizes particle therapy to treat tumors resistant to other forms of therapy. The company is now building such a facility together with Siemens Medical Solutions at their site in Marburg, Germany.

By Tim Schröder

»It is our aim to
remain the
technological leader
in hospital care.«

Gerald Meder, Vice Chairman,
Rhön-Klinikum AG,
Bad Neustadt on the Saale,
Germany

Even today, certain types of tumors barely respond to therapy – this applies in particular to very deep-seated radiation-resistant tumors and tumors that are located too closely to life-supporting organs. In such cases, particle therapy utilizing light ions – like carbon ions or protons – can be effective. With these particles, a higher dose can be applied to the tumor while sparing healthy tissue. Studies have shown that approximately one facility covers the needs of eight to ten million inhabitants. Based on this estimate, approximately 30 facilities would be required for Europe overall.

Particle therapy has been the object of research for decades. Despite this fact, it is an innovative and new form of cancer therapy for the clinical routine. For the Rhön-Klinikum AG (RKA), headquartered in Bad Neustadt on

the Saale, Germany, particle therapy is a highly promising form of treatment. As a result, the corporation decided to install this type of facility together with Siemens Medical Solutions at the Universitätsklinikum Giessen/Marburg GmbH, a subsidiary of RKA. The total costs involved in the project have been estimated at €120 million.

Privately Financed

The objective of the RKA is to ensure cost-effective, all-encompassing care for everybody at a high level of quality. This, however, is only possible with the most modern, high-tech equipment – and that includes particle therapy. The new facility will be the world's third to use both protons and carbon ions. All other facilities work with protons only. In addition, the Marburg particle therapy center



GERALD MEDER, Vice Chairman of Rhön-Klinikum AG, at the headquarters of the company in Bad Neustadt on the Saale, Germany.

will be one of the few projects that are privately financed. Many other facilities were largely funded with research monies. Why did a private enterprise such as the RKA decide on such an expensive leap of faith in medical engineering? "It is our aim to remain the technological leader in hospital care," says RKA's Vice Chairman Gerald Meder. "We want to offer optimal patient care, and to use the best and newest methods in this pursuit."

For this purpose, RKA is looking into new technologies and verifies whether innovations can actually be implemented in clinical practice. RKA plans to treat 2,000 to 3,000 patients per year at the new site. The approach of the clinic is based on general care – for public, as well as for private patients. The elaborate investment would be defrayed through high patient volume rather than through high individual treatment costs. Two important

objectives are pursued with this facility: all-encompassing patient care and clinical research at the university hospital. Meder emphasizes that the particle therapy facility will not compete with conventional radiotherapeutic centers. The RKA is also considering a satellite model as a way towards area-wide care. The particle therapy center will open its doors to oncology clinics in the region for treating their patients. As in the past, each clinic will care for its own patients; however, it is able to offer patients new treatment methods with particle therapy. "We will only be performing the particle therapy

The design for the treatment and radiation center was developed in Erlangen, Germany, together with partners such as GSI (Society for Heavy Ion Research) in Darmstadt, Germany. Image generation, processing, forwarding, and archiving data will be handled by using Siemens technology. The concepts for optimizing the workflow will be developed together by RKA and Siemens. "The close cooperation with RKA for this center was of strategic importance to us," says Johannes Nardi, head of the particle therapy project at Siemens in Erlangen. "It is one of our objectives to further expand the area of oncology. We are happy to have reached an additional milestone in tumor therapy with the Rhön-Klinikum AG."

The scientists of GSI, one of the world's leading institutes, were instrumental in the use of ions for tumor treatment. Their expertise will be applied with the system at Marburg. GSI started with the development of the technology and the construction of a medical radiation room in 1993. For many years it has been instrumental in basic research and in exploring the biological effects of radiation. In 1997, the first patient was treated at GSI. "The knowledge which we have gained over the years is the basis for the new center in Marburg," says Professor Gerhard Kraft of GSI.

It was Kraft who greatly contributed to a tailor-made particle beam for medical application. Since many years he is the head of biophysics at GSI. Starting in October, he will bring his experience from particle therapy and radiation biology into the project as a consultant for RKA.

The GSI scientists working with Kraft developed biological based radiation planning and the treatment of tumors through raster scanning applications. The particle beam is controlled just like the electron beam in a TV tube, so that it is precise to the millimeter, line by line. Since 1999, contact with the Rhön-Klinikum has intensified. Early on, Eugen Münch, Chairman of the RKA's Supervisory Board, realized the potential of heavy ion therapy patient treatment. The idea of building a particle therapy center was taking

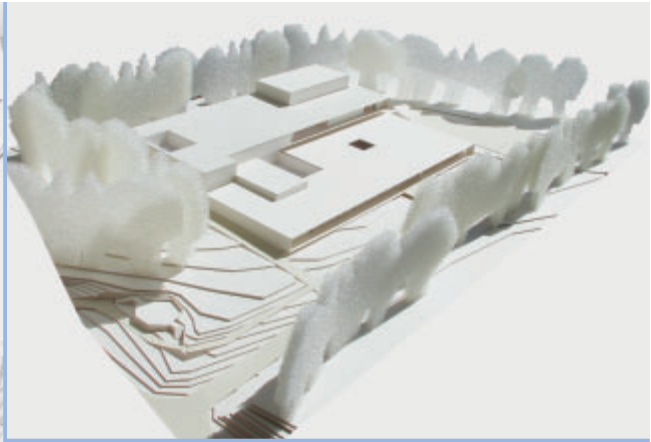
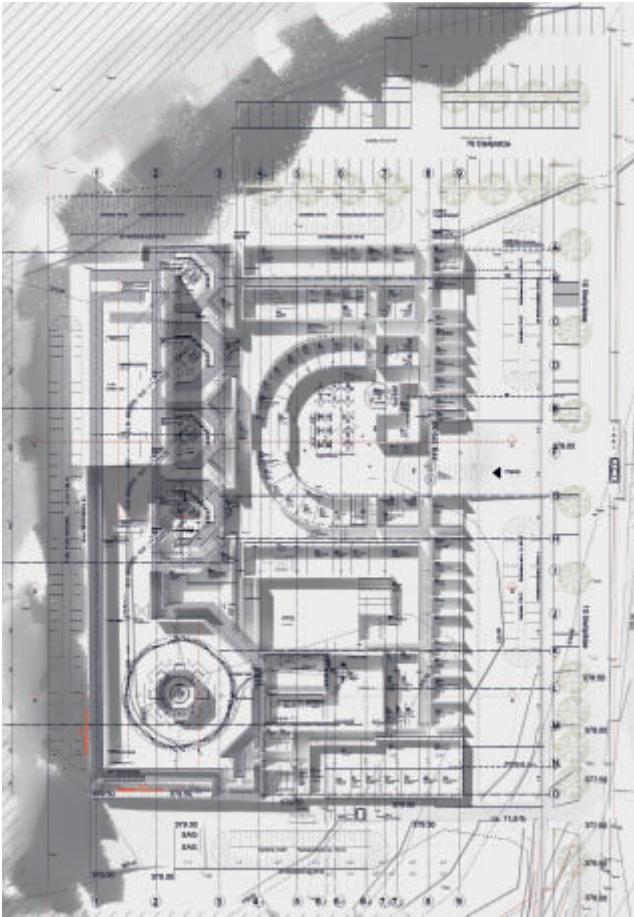
»The new chair will certainly elevate radiation therapy at our institution.«

Rita Engenhardt-Cabillic, MD, Professor for Radiation Therapy, University Hospital Giessen/Marburg, Germany

treatment for the patient," explains Meder. "Diagnosis and therapeutic strategy decisions remain with the partner clinic." This cooperation model will make it possible to provide every patient with the possibility of receiving particle therapy treatment.

Strong Partners

The facility's success is made certain by the strong partnership, emphasizes Meder. "Siemens Medical Solutions is a company that can actually handle such a large project when it comes to logistics, manpower, and medical engineering know-how." Siemens provides the complete technical equipment for patient treatment, as well as the complete equipment for digital data processing. On top of that, the company is the technical operator of the facility and supplies the service team that will ensure the system's functionality and availability.



FLOOR PLAN AND MODEL VIEW of the particle therapy center in Marburg. It is part of Rhön-Klinikum AG, which comprises of 45 hospitals and 14,620 beds. (Courtesy of prime planner Brenner & Partner, Architekten & Ingenieure Hammes Krause, Stuttgart, Germany)

RHÖN-KLINIKUM AG

The Rhön-Klinikum GmbH (Ltd.) was founded in 1973. In 1988, it changed its corporate form to what we know today as Rhön-Klinikum AG (RKA) (Inc.). RKA was also the first German hospital corporation that went public on November 27, 1989.

Currently, RKA counts 45 clinics and 14,620 beds at 34 sites in eight different federal states (Baden-Württemberg, Bavaria, Brandenburg, Hesse, Lower Saxony, North Rhine-Westphalia, Saxony, and Thuringia).

As of March 31, 2006, RKA employs 30,967 people. The company defines itself as a healthcare provider exercising the highest requirements regarding patient care, quality, and value of services rendered. The objectives of the

corporation are the building and operating of hospitals, with emphasis on acute care, at all levels of care. Rhön-Klinikum AG shares the values and objectives of the German social system. RKA aims to guarantee this system in the future with the motto "rationalization before rationing."

RKA has invested heavily in developing and implementing concepts at different showcase sites. One example is the Cardiac Center in Leipzig, Germany's first privately operated university hospital. The center has been patterned and implemented as a model university hospital providing maximum care in the fields of heart surgery, cardiology, and pediatric cardiology.

root. "It was obvious that this could be handled only in connection with a large technical company," says Münch. In response, RKA conducted a feasibility study together with Siemens in 2001 and 2002.

A New Chair

Shortly thereafter, RKA acquired the Universitätsklinikum Giessen/Marburg GmbH, an ideal site for this type of facility. This particular environment provided for an ideal combination of patient treatment and research. Among other things, the effect of the beam on different types of tumors will be examined in the future. For this purpose, RKA plans to finance a new chair for radiation biology. Radiation oncologist Rita Engenhardt-Cabillic will be responsible for establishing this chair. The physician has been working for many years on a special research project for tumor biology funded by the German Research Foundation. "The new chair will certainly elevate radiation therapy at our institution," says the Professor of Radiation Therapy. "It is assigned the important task of examining the clinical effects as well as the effects of the radiation and heavy ions at the molecular level." Engenhardt-Cabillic previously worked at the German Cancer Research Center in Heidelberg. She assumes that 20 to 30 percent of all radiation therapy patients are treated more successfully with the heavy ion method than with conventional approaches. She sees her

role in bringing medical competence to the project, namely clinical workflow. She is not worried about competition with other radiation therapy sites such as Heidelberg, where another particle therapy facility with Siemens technology is being built. "I think that future particle therapy centers will focus on different aspects of tumor pathologies." It is her goal to contribute to a lively exchange, and her wish to collect the research results in a central data pool to make them accessible to others.

Workflows Planned in Detail

The technical aspects of the €120 million facility are coordinated by Ulrich Weber, PhD – a physicist with vast experience in the area of heavy ions. For years, Weber did research at GSI; he was the project manager of the facility in Heidelberg, and is now responsible for project management in Marburg. One of his responsibilities is to work out the technical specifications for this kind of center and to lend his expertise to the creative planning phases of the partnership. "The building infrastructure, radiation protection, structural engineering, and cooperation with architects – all these facets have to be considered when constructing this type of building." Weber has the necessary experience and works together with government agencies that have to approve the system in the end. One of the most important characteristics of the center is its excellent workflow, which



will enable the ambitious patient numbers planned. The concept is based on an optimized workflow between the treatment rooms. The particle beam will be available at one treatment room at a time only. While treatment takes place in one room, the next patients are prepared in the other rooms. A total of four therapy rooms have been planned for Marburg. An efficient workflow saves costs, but the configuration of the facility offers savings potentials as well: "We have realized that the majority of treatments can be handled with a fixed beam in a more economical manner than with a gantry," says Gerald Meder.

Meder sees the particle therapy center as an important step toward patient-friendly medicine that manages the diagnostic as well as the treatment process without operative interventions. "Thanks to MRI and CT, we are able to diagnose many pathologies from the outside," he says. For example, CT and MRI examinations replaced 30 percent of cardiac catheter examinations. Particle therapy is an additional building block – it will make many interventions and surgeries superfluous. Meder is very positive about the partnership between RKA and Siemens with GSI: "We consciously selected partners who are known experts in their field. Workflow expertise, biophysical knowledge, and the size of the company – all that comes together in this project. It can only lead to the optimum."

»The knowledge which we have gained over the years is the basis for the new center in Marburg.«

Professor Gerhard Kraft, GSI, Darmstadt, Germany

Author: *Tim Schröder is a biologist and former editor of the science section of the Berliner Zeitung. He is now a freelance writer in Oldenburg, Germany, and publishes regularly in scientific journals such as Spektrum der Wissenschaft, Max Planck Forschung, and Fraunhofer Magazin.*



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Henkestrasse 127, D-91052 Erlangen, Germany

Responsible for Contents:

Ulrich E. Krips

Publishing Manager:

Silke Schumann

Chief Editor:

Doris Pischitz

Editorial Team:

Timo Schickler, Katja Stöcker, Trey Stuvek

Editorial Assistance:

evolo marketing gmbh

Production:

Norbert Moser

All at: Henkestrasse 127, D-91052 Erlangen, Germany

Phone: +49-9131-84-7529

Fax: +49-9131-84-4411

e-mail: editor.medicalsolutions.med@siemens.com

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