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MARBURG

MIT
Marburger Ionenstrahl-
Therapiezentrum

MARBURG ION BEAM THERAPY CENTER

Innovation for better chances

Dear Colleagues,

Particle therapy is a form of radiation therapy that allows precise and targeted treatment of complex tumors. This is made possible by the special dose distribution of the particles, which allows a steep dose fall-off outside the irradiation area. This spares the surrounding healthy tissue as much as possible and minimizes undesired side effects.

The Marburg Ion Beam Therapy Center (MIT) at the University Hospital of Giessen and Marburg is one of only two centers in Germany providing heavy ion radiation with carbon ions beside proton radiation to destroy tumor tissue.

In comparison to photon, but also proton radiation, the special feature of carbon ion therapy is the significantly higher biological effectiveness due to the much more intense energy release to the irradiated tissue (so-called high LET effect). In this way, good treatment results can be achieved even for tumors that are considered as resistant to radiation.

All patients who are referred to the MIT for treatment or combined therapy are presented and discussed in the context of interdisciplinary tumor boards with special focus on particle therapy.

Only if – together with you as treating physicians – an individual treatment benefit may be expected for the patients, we will start planning proton or heavy ion radiation.

Our aim is not only to make this highly innovative therapy accessible but also to further develop it together with you. For this purpose, a relevant number of therapy trials are offered and conducted, in which many of our patients are included.

Since the beginning of irradiation therapy at the MIT at the end of 2015, we have already been able to help more than 2000 patients. With this booklet, we want to provide you with a brief „guide“ to particle therapy in Marburg.

We are looking forward to getting in contact with you.
Of course, we are available for individual consultation.

With best regards

Prof. Dr. med.
Sebastian Adeberg

Director of the Marburg
ion Beam Therapy Center

Professor and Chair of the
Department of Radiotherapy
and Radiation Oncology
University Hospital of
Gießen and Marburg,
Marburg Campus

Dr. med. Sylvia Heinis

Managing Director
of the Marburg Ion Beam
Therapy Center

Sales Manager of the
University Hospital of
Gießen and Marburg,
Marburg Campus

Advantages of particle therapy

At the Marburg Ion Beam Therapy Center (MIT), irradition takes place with protons or carbon ions (^{12}C ions).

Both forms of irradiation cause DNA damage to the tumor cells in the target area. Only if this damage can no longer be repaired by the cells does it lead to cell death and thus to the death of the tumor.

With the special physical properties of particle radiation (so-called Bragg peak), a better sparing of the surrounding tissue can be achieved with the same dose compared to photon irradiation. In some cases, a higher radiation dose may even be achieved.

The extent of DNA damage is largely dependent on the radiation dose.

Since carbon ions cause significantly more severe DNA damage than protons and photons, they are used for particularly radiation-resistant tumor types.

Particle therapy has a particular advantage in children, as long-term side effects such as growth and development deficits can be avoided by sparing the organs at risk. In addition, particle therapy can be used to reduce the radiation dose which may contribute to lowering the rate of secondary malignancies.

Indications for particle therapy

Already today, more than 50% of all patients suffering from cancer may be cured. In this context, radiotherapy plays a major role. In addition to photon therapy, particle therapy allows further radiotherapeutic options with even higher accuracy and effectiveness which is very promising with regard to increased healing rates and reduced side effects.

In particular, radioresistant tumors or tumors in the neighborhood of organ structures that are highly sensitive to radiation exposure seem to qualify for this therapy option.

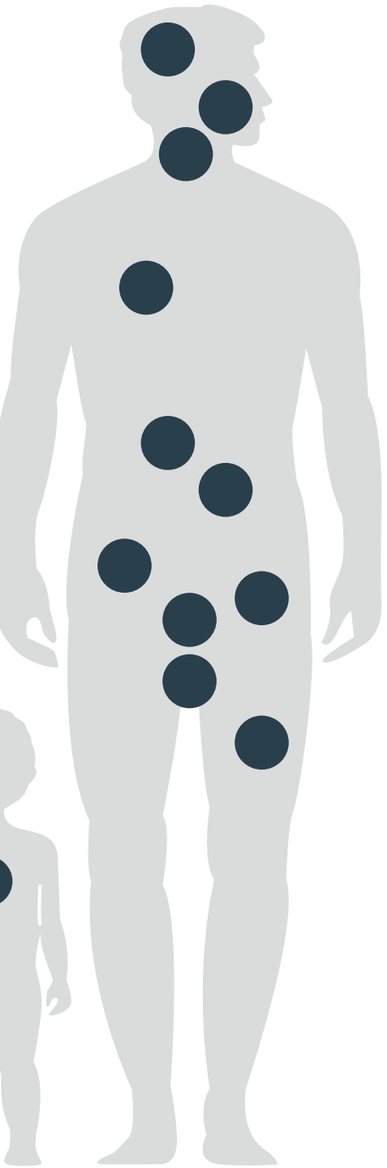
Especially children benefit from the extremely high precision of protons. Most frequently observed pediatric tumors treated at the MIT in the context of GPOH trials (International Society for Pediatric Oncology) are brain tumors, sarcomas, or Hodgkin lymphomas. Infants undergo radiation therapy under general anesthesia.

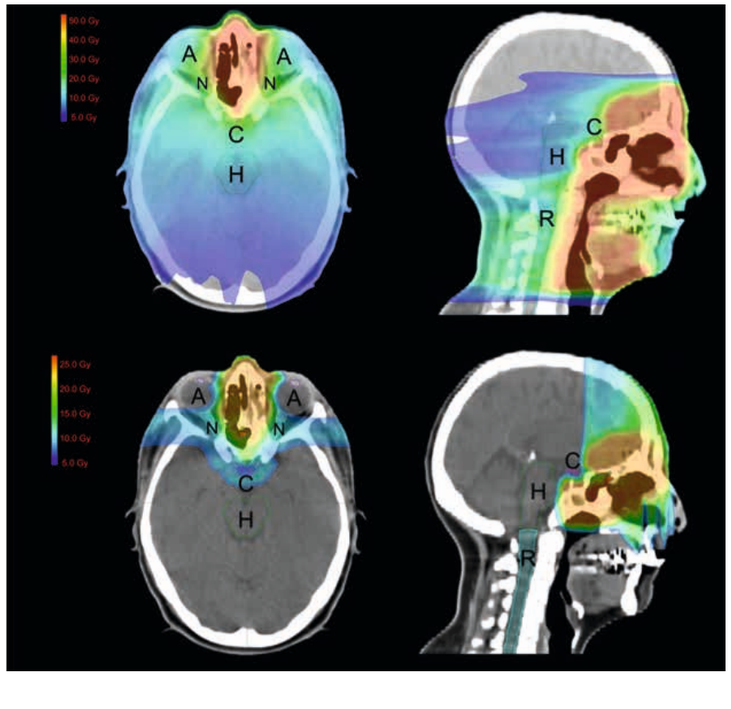
Please find below a list of indications that was published by the joint federal committee:

- **Adenoid cystic carcinomas**
- **Chondrosarcomas**
- **Chordomas**
- **Ependymomas**
- **Hypopharyngeal carcinomas**
- **Pituitary adenomas**
- **Recurrences of head and neck tumors**
- **Craniopharyngiomas**
- **Laryngeal carcinomas**
- **Lymphomas (mediastinal localization up to the age of 30 years)**
- **Medulloblastomas**
- **Meningiomas of the skull base**
- **Meningiomas WHO°2 + °3**
- **Carcinomas of the nasal cavity**
- **Carcinomas of the paranasal sinuses**
- **Nasopharyngeal carcinomas**
- **Pancoast tumors**
- **Prostate carcinomas**
- **Pancreatic carcinomas**
- **Recurrences of rectal carcinomas**
- **Sarcomas**
- **Mucosal melanomas of the nasal cavity and paranasal sinuses**
- **Salivary gland carcinomas**
- **LGG**
- **Recurrences of HGG**

Pediatric tumors
(e.g. ependymomas, medulloblastomas, gliomas, lymphomas, sarcomas, neuroblastomas, germ cell tumors, craniopharyngeomas)

For all other tumor entities, we are also happy to provide individual advice on the advantages of particle therapy and assist with any necessary information.





Dose distribution of the photon plan (see above) as well as carbon ion boost plan (see below) for a locally advanced carcinoma of the paranasal sinuses.

By using carbon ions for dose escalation in the area of the primary tumor, it is possible to preserve organs at risk and at the same time optimize the radiation effect on the tumor.

A – eye
N – optic nerve
R – spinal cord/medulla
C – optic chiasm
H – brainstem

Boost therapy: photons and particle therapy may well complement each other

Besides irradiation alone, which includes particle therapy at the MIT in Marburg, there are several other indications that allow the application of particle therapy as boost therapy in combination with photon therapy.

With boost therapy, treating physicians have the possibility to effectively enhance their therapeutic approach with particle therapy for patients qualifying for this kind of treatment.

In the context of boost therapy, the high-risk region is treated in 5 to 14 fractions with protons or carbon ions at the MIT in Marburg.

Afterwards, photon therapy is performed near the patient's residence in further 25 to 30 sessions of intensity-modulated application, completed by chemotherapy if necessary.

If desired, photon therapy can of course also be performed at UKGM in Marburg.

The costs for particle therapy and photon therapy are charged independently from each other to the statutory and private health insurances.

The following indications qualify for a combined treatment with photons and particle therapy at the MIT in the sense of boost therapy:

- Glioblastomas
- Carcinomas of the nasal cavity and paranasal sinuses
- Mucosal melanomas of the nasal cavity
- Carcinomas of the nasopharynx
- Carcinomas of the salivary glands
- Advanced head and neck tumors
- Adenoid cystic carcinomas

FAQ

How can I know if a patient is qualified for particle therapy?	Please submit your enquiry about particle therapy in Marburg either by e-mail (partikeltherapie@uk-gm.de), by mail (Marburger Ionenstrahl-Therapiezentrum Albrecht Kossel Str. 1, 35043 Marburg, Germany) or by calling us on the phone (+49 (0) 6421 - 58 63 974).
Which documents about the patient are required?	**The following documents (if available) will be required for registration:** Medical report describing the stage, course, and current symptoms Recent diagnostic imaging (digital format, e.g. on CD) with current and previous imaging and findings Histology of the tumor to be treated In cases of previous irradiation: documentation of the radiation exposure (please submit a radiation plan in DICOM format and a printed version of the radiation protocol) Referral letter, health insurance card and, if possible, guarantee of payment
When can a patient present to MIT?	After reception of the required documents and files, the case will be discussed in our local particle therapy tumor board that takes place twice a week. Afterwards, you will receive our feedback and the patient is invited to attend an appointment for information and radiation planning. Depending on the indication, radiation therapy usually starts within one week.
Do statutory and private health insurances cover the costs for particle therapy?	In general, the German statutory and private health insurances cover the expenses of particle therapy. Similar to all therapeutic innovations in the healthcare system, they are not automatically integrated in the standard care catalogue. So it is necessary to previously apply for cost coverage. Meanwhile, we were able to establish specific contracts with many statutory health insurances for the majority of our patients so that cost coverage is usually possible without any problem in the context of the indications mentioned in this brochure. Regarding other statutory or private health insurances in Germany and worldwide, we conclude individual agreements.
Is there a possibility to get an accommodation during therapy?	For all patients, there is the possibility of prescribing medical transportation. The travel costs are almost completely covered by the health insurances. If daily travel is not possible, we support patients in finding suitable accommodation. In many cases, partial cost coverage by the health insurance is possible.
Which trials are conducted or plannned at the MIT?	You can find a list of current trials by visiting **www.mit-marburg.de/studien**

Contact information

Univ.-Prof. Dr. med.
Sebastian Adeberg

Professor and Chair
Department of Radiotherapy and Radiation Oncology University Hospital of Giessen and Marburg, Marburg Campus

+49 (0) 64 21 - 58 66 434
sebastian.adeberg@uk-gm.de

PD Dr. med.
Fabian Eberle

Senior Physician
Head of the Section
of Particle Therapy

+49 (0) 6421 - 58 62 972
fabian.eberle@uk-gm.de

Prof. Dr. med. Dipl. Phys.
Hilke Vorwerk

Senior Physician
Vice Chair

+49 (0) 64 21 - 58 62 958
vorwerk@med.uni-marburg.de

Dr. med.
Markus Schymalla

Senior Physician
Head of the Section
of Neuro-Oncology

+49 (0) 64 21 - 58 68156
markusmichael.schymalla@uk-gm.de

MIT
Marburger Ionenstrahl-Therapiezentrum

Marburger Ionenstrahl-Therapiezentrum (MIT)
Albrecht Kossel Str. 1
35043 Marburg

Information, Enquiries, and Appointments
Tel.: +49 (0) 64 21 - 58 63 974
Fax: +49 (0) 6421 - 58 68 066

You reach us from
Monday to Thursday:
8:00 am to 4:30 pm,
Friday: 8:00 am to 5:00 pm

E-Mail:
partikeltherapie@uk-gm.de
You may retrieve further information by visiting **www.mit-marburg.de**