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The TOM'5 System for Multibeam Tomotherapy

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Introduction:

The idea of tomotherapy is the most comprehensive IMRT concept for optimization of today tumour therapy with photons. It refers to a radiation treatment with a sequential exposure of body slices. For realization of this concept there are some technical developments to be found. Most of them are based on a multitude of beam angles set in place by a rotating gantry of the treatment device.

Materials and methods:

The apparatus for multibeam tomotherapy uses a ring-like gantry with a distinct set of five stationary treatment heads (Achterberg and Müller 2007). This proposed system patented by the authors is creating arbitrary dose distributions through intensity-modulation of fan beams by a combination of MLC operation and patient table movement.

We have made a simulation to evaluate the performance characteristics of our unit. By the means of the Monte-Carlo-programme BEAM we studied design and treatment geometry. The developed algorithm „Multifocal MLC-Positioning“ for a synchronized driving of multileaf collimation and table movement allows us to perform radiation treatment planning. With BEAM and the treatment planning system Pinnacle3 (Philips Medical Systems) dose distributions have been produced.

Results and discussion:

We present an optimized design of our static tomotherapy device and calculated treatment times and dose distributions of different patient cases. The examination of usual results of classic radiation therapy, conventional IMRT, other tomotherapy devices and the treatment with heavy particles (protons, carbon) shows the potential of the new system.

Achterberg, N. and Müller, R.G., Med. Phys. 34 (2007) 3926-3942.

Please submit a short bio (max 1500 characters)

Born in Berlin in 1969 I grew up at the grey side of the Wall. Through a school project concerning dose calculations during diagnostic X-ray examinations I were attracted by the field of medical physics. After studying physics in Greifswald and Erlangen I worked at the Institute of Medical Physics in Erlangen. The topic of my thesis was "Design and simulation of a treatment unit for multibeam tomotherapy". I am now as a clinical physicist with the Department of Radiooncology at the University Hospital Erlangen (Strahlenklinik-Universitätsklinikum Erlangen). Research interests are new technologies in radiation therapy. My main focus at the moment is my family with two sons. That leaves no spare time for my favourite occupation: sport, in particular triathlon.

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