

Cancer treatment with ion beams

Prof. Dr. Jürgen Debus

Deutsches Krebsforschungszentrum, Heidelberg

Ion beam therapy has emerged as a highly precise form of radiation treatment, exploiting the physical and biological advantages of protons and heavier ions. Its characteristic Bragg peak enables superior dose conformity compared to conventional photon therapy.

Based on 20 years of fundamental research in radiation biology and physics, heavy ion beam therapy in Europe was pioneered in joint projects of the GSI Helmholtzzentrum, Heidelberg University Hospital and the German Cancer Research Center (DKFZ) in Heidelberg, and the Rossendorf Research Center FZR (today's Helmholtzzentrum Dresden-Rossendorf, HZDR).

The clinical results demonstrated promising outcomes particularly in radio-resistant and geometrically complex tumor and led to the construction of the Heidelberg Ion Beam Therapy Center (HIT), the first center worldwide with a rotating heavy ion gantry.

HIT is also an interdisciplinary research platform with a dedicated research infrastructure, that exploits the unique properties of different ion species for new treatment options. A dynamic research environment integrates medical physics, biophysics, radiobiology, and technology development.

Along with translational and basic research, these advances aim to further optimize ion beam therapy and expand its clinical impact in the coming decade.