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Current status of MINIBEE: minibeam beamline for preclinical experiments on spatial fractionation in the FLASH regime

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In vivo studies support that the combination of protons and spatial fractionation, the so-called proton minibeam radiotherapy (pMBT), enhances the protection of normal tissue for a given tumor dose. A preclinical pMBT facility for small animal irradiation at the 68 MeV cyclotron of Helmholtz-Zentrum Berlin (HZB) will improve the understanding of this method. A two-step energy-degrading system will first define the maximum energy of the beam and further degrading will occur before the target forming a spread-out Bragg peak (SOBP), if necessary. Beam size and divergence will be adjusted by slit systems before a 90-degree magnet bending the beam into the experimental room. At the current stage, a magnetic quadrupole triplet placed close to the target demagnifies the beam by a factor of ~ 5 . The goal is to generate a magnetically focused minibeam of 50 micrometer sigma. Scanning magnets will enable a raster-scan application in the tumor. Conventional dose rate delivery will be allowed while FLASH applications can be achieved with the possible use of a ridge filter. The results of beamline simulations by TRACE-3D and BDSIM will be presented.

Footnotes

Funding Agency

Paper preparation format

Region represented

Europe

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