Dokumenttyp: journal article

Autor(en) des Beitrags:
Girst, Stefanie; Greubel, Christoph; Reindl, Judith; Siebenwirth, Christian; Zlobinskaya, Olga; Dollinger, Günther; Schmid, Thomas E

Titel des Beitrags:
The influence of the channel size on the reduction of side effects in microchannel proton therapy.

Abstract:
The potential of proton microchannel radiotherapy to reduce radiation effects in the healthy tissue but to keep tumor control the same as in conventional proton therapy is further elucidated. The microchannels spread on their way to the tumor tissue resulting in different fractions of the healthy tissue covered with doses larger than the tumor dose, while the tumor gets homogeneously irradiated. The aim of this study was to evaluate the effect of increasing channel width on potential side effects in the normal tissue. A rectangular 180 × 180 µm(2) and two Gaussian-type dose distributions of $\sigma = 260$ µm and $\sigma = 520$ µm with an interchannel distance of 1.8 mm have been applied by 20-MeV protons to a 3D human skin model in order to simulate the widened channels and to compare the irradiation effects at different endpoints to those of a homogeneous proton irradiation. The number of protons applied was kept constant at all irradiation modes resulting in the same average dose of 2 Gy. All kinds of proton microchannel irradiation lead to higher cell viability and produce significantly less genetic damage than homogeneous proton irradiation, but the reduction is lower for the wider channel sizes. Our findings point toward the application of microchannel irradiation for clinical proton or heavy ion therapy to further reduce damage of normal tissues while maintaining tumor control via a homogeneous
dose distribution inside the tumor.

Zeitschriftentitel / Abkürzung:
Radiat Environ Biophys

Jahr: 2015
Band: 54
Heft / Issue: 3
Seiten: 335-42
Sprache: eng
Print-ISSN: 0301-634X

TUM Einrichtung:
Klinik und Poliklinik für RadioOnkologie und Strahlentherapie

Occurences:
- Einrichtungen > Fakultäten > Fakultät für Medizin > Kliniken und Institute > Klinik und Poliklinik für RadioOnkologie und Strahlentherapie > 2015

entries: