

Clinical Perspectives of Microbeam radiation therapy (MRT)

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MRT using multiple parallel, planar, micrometres-wide, synchrotron-generated X-ray beams ('microbeams'), can safely deliver radiation doses to contiguous normal animal tissues that are much higher than the maximum doses tolerated by the same normal tissues of animals or patients from any standard millimetres-wide radiosurgical beam. There exists a huge body of knowledge concerning the effects of different configurations of beam spacing, dose, beam orientation, and temporal dose fractionation. In addition, researchers have started to better understand the underlying biology of MRT effects (selective radiotoxicity to blood vessels, bystander effects, gene expression changes, cell-to-cell communication, repair / cell death, etc.) and there has been made enormous progress in technical preparation of clinical trials (treatment planning system, positioning system, dosimetry protocol, experimental dose verification, safety, etc.). Altogether, this has led to the first MRT treatment in a large animal (cat). Treating diffuse intrinsic pontine glioma of childhood - one of the most devastating of pediatric malignancies - is an excellent vision for MRT clinical application. However, one has to carefully discuss epidemiology, rational, ethical considerations including quality of life vs. duration of life, and end point definitions.