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Recent Developments in MRT at IMBL

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Microbeam radiation therapy (MRT) is a preclinical treatment modality utilising medium energy x-rays from a third generation synchrotron source. The x-rays are collimated into parallel beams which are typically 25-100 μm wide with a pitch of 10-400 μm . Spatial fractionation of the beam allows the delivery of high doses with preferential damage to cancerous tissue and sparing of surrounding radiosensitive normal tissues.

A dedicated MRT system designed for preclinical small animal trials was installed and commissioned in Hutch 2B of the Imaging and Medical Beamline in April 2015. The system consists of a vertical multislit collimator made from tungsten with 50 μm slits and pitch of 400 μm , two thin silicon beam monitors for monitoring dose rate upstream and downstream of the collimator and stage with integrated conformal mask array and visual positioning system.

During commissioning, dosimetry studies were conducted with the aim of developing dosimetry and treatment protocols. Broadbeam dosimetry has been performed on the new system using gafchromic film, various ionisation chambers and diamond detector to compare detector responses in various size and shaped fields. Good agreement was found between detectors for a reference field, and between solid and liquid water phantoms. Microbeam dosimetry has also been performed to characterise the vertical multislit collimator. The thin silicon beam monitors have been characterised and have also been tested with the Patient Safety System which is under development. In this presentation, the updates to MRT on IMBL will be discussed and dosimetry results presented.

Keywords

microbeam radiation therapy, dosimetry

Primary author: Dr LIVINGSTONE, Jayde (Australian Synchrotron)

Co-authors: Dr STEVENSON, Andrew (Australian Synchrotron/ CSIRO); Dr HALL, Chris (Australian Synchrotron); Dr HAUSERMANN, Daniel (Australian Synchrotron); Dr PELLICCIA, Daniele (Australian Synchrotron/RMIT)

Presenter: Dr LIVINGSTONE, Jayde (Australian Synchrotron)

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