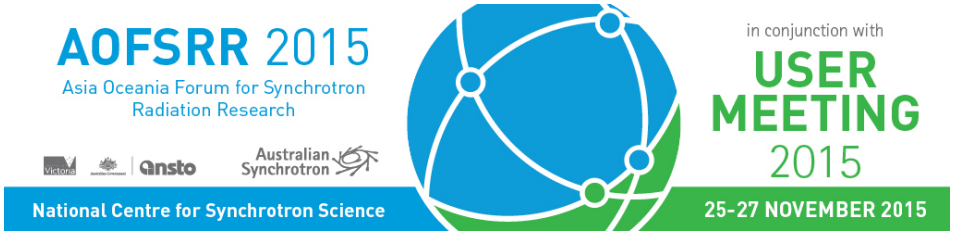

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Development of an image guidance protocol for MRT at IMBL

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Synchrotron microbeam radiation therapy (MRT) is a novel, preclinical form of radiotherapy that shows promise of providing a major advance in cancer control if successfully translated to clinical practice. To generate MRT, the synchrotron beam is segmented by a collimator into a lattice of microbeams, usually 25-50 μm wide. The beams have minimal divergence and are spaced at regular intervals of 200-400 μm. Typical radiation doses are 300-1000 Gy in the peaks, and 5-20 Gy in the valleys. This dose is delivered in milliseconds. We describe the developments in image guidance for the MRT station for preclinical small animal trials at the Imaging and Medical Beamline (IMBL). Image guidance is required to guarantee precise control of the radiation field to accurately deliver the prescribed dose to the target and not to surrounding structures. A valid protocol must be able to generate live images of the patient and register these with existing treatment plan.

The double Laue monochromator at IMBL allows for a 20 mm displacement between the monochromatic beam and the pink beam. Either beam can be selected by moving a slit. In-vacuo filtering is chosen to select the treatment beam with mean energy of 95 keV. The monochromator is aligned to select an imaging energy of 50 keV. After imaging the sample and the relevant beam line components are translated into the treatment beam without changing the beam filtration or the monochromator settings.

Experimental results of such an image guidance procedure will be presented.

Keywords

Microbeam radiation therapy, image guidance

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