

Design of a Dedicated Beamline for Ocular Oncology at the Australian Bragg Centre for Proton Therapy and Research

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Plaque brachytherapy is used to deliver ionising radiation to some melanomas of the eye to achieve local tumour control and preserve the eye-globe. Some tumours of the eye are unsuitable for plaque brachytherapy and enucleation is often the only choice for satisfactory local control. The availability of proton beam therapy (PBT) widens the possibilities for globe and sight-saving treatment in these patients, whilst reducing radiation dose to normal structures such as the brain, optic nerves and pituitary gland [1, 2]. Conventional treatment of the eye with PBT requires the insertion of tantalum clips to locate the tumour in the treatment beam. The Australian Bragg Centre for Proton Therapy and Research is currently being built in Adelaide, South Australia, which provides the opportunity for a beamline to be designed and dedicated to treatment of eye cancers. The design of an ocular oncology beamline will be presented including a discussion of the components that are planned to be used in its assembly. Additionally, the patient imaging and beam targeting systems will be discussed including the embedding of real-time monitoring of tumour target position [3]. This innovation should avoid the use of tantalum clips to locate the tumour in the treatment beam eliminating the need for surgery. Shielding considerations for the beamline are avoided by using a high energy proton therapy bunker where the shielding for that bunker is more than sufficient for the ocular beamline.

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- [2] Damato B, Kacperek A, Errington D, Heimann H. “Proton beam radiotherapy of uveal melanoma.” *Saudi J Ophthalmol.* 2013; **27**(3): 151-7.
- [3] Nguyen DT, O'Brien R, Kim JH, Huang CY, Wilton L, Greer P, Legge K, Booth JT, Poulsen PR, Martin J, Keall PJ. “The first clinical implementation of a realtime six degree of freedom target tracking system during radiation therapy based on Kilovoltage Intrafraction Monitoring (KIM).” *Radiotherapy and Oncology* 2017; **123**(1): 37-42.