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# ASMIRT POSITION STATEMENT

## PARTICLE THERAPY

The Australian Society of Medical Imaging and Radiation Therapy is the peak body representing medical radiation practitioners in Australia. Our aims are to promote, encourage, cultivate and maintain the highest principles of practice and proficiency of medical radiation science.

ASMIRT are aware of several consortia considering and developing cases for implementing particle therapy (PT) in Australia. ASMIRT maintains that patients in Australia must have access to proton therapy where appropriate. While there is currently limited high level evidence to support the clinical benefits of proton therapy, there are dosimetric advantages for some patients, particularly paediatric patients. Currently, a small number of Australian patients travel overseas to receive PT with (and without) support from the Australian government.

ASMIRT supports the establishment and development of proton facilities in Australia and consider a collaborative, interprofessional approach to the provision of PT is required to ensure safety and quality. ASMIRT acknowledge that preparation is necessary in terms of training and education requirements, provision of leadership, and guidance on quality and safety in the delivery of service. Radiation therapists have an integral role to play, as members of the interprofessional team, in the simulation, planning and treatment of patients receiving PT and as such it is essential that ASMIRT ensures the profession is represented at all forums and participates in the planning for PT in Australia.

To support ongoing development in the area of PT a special interest group (Particle Therapy Group) will be established with members with expertise in PT and leadership.

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### Background

Radiation Therapy is the use of x-rays or charged particles to treat most cancers. Particle therapy (PT) is a type of radiation therapy in which charged particles are used instead of X-rays to treat tumours. The type of particle may be neutral (neutrons) or charged (protons & carbon ions). Due to the nature of these charged particles, and how they deposit dose, the radiation is able to enter the patient's body and stop close to the tumour and spare significant amounts of healthy tissue from excess exposure<sup>1</sup>.

Proton beams and other heavy particles travel through tissue with minimal deposition of dose until the end of their paths, where a peak of energy is deposited, this phenomenon is known as the Bragg peak. Beyond the Bragg peak, the dose for protons falls over an extremely short distance to zero. This means that normal tissues around the target (tumour) receive very little radiation dose<sup>2</sup>. Tumours in proximity to critical structures, such as the spinal cord and brain stem, can be therefore be treated potentially more safely with protons or carbon ions than photons.

Particle therapy is delivered in the same method which is used for conventional photon therapy, with patients routinely being required to receive daily treatment on an outpatient basis, with treatment sessions taking a comparable amount of time.

Potential benefits of particle therapy<sup>3</sup> include:

- Fewer early and late side effects compared to photons.
- Reduction in risk of treatment induced secondary malignancies.
- Reduction in the dose to surrounding normal tissues, which may allow:
  - an adequate dose to a tumour in close proximity to critical structures
  - dose escalation to a tumour to improve disease control
  - Reduction in the number of required treatments

### How Australians access this therapy

Currently to access PT, Australian patients have to travel overseas for the treatment. The Medical Treatment Overseas (MTO) program provides financial assistance for Australians with a life-threatening condition to receive proven lifesaving medical treatment overseas where effective treatment is not available in Australia.

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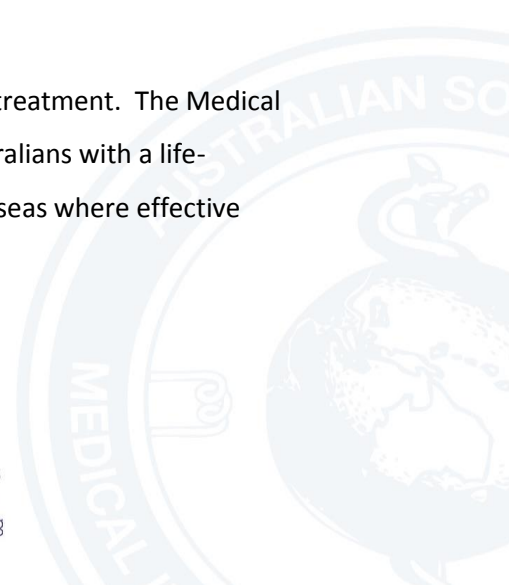
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From 1<sup>st</sup> January 2012 to 31<sup>st</sup> December 2016, the Department of Health provided financial assistance to 20 patients to access PT overseas<sup>a1</sup>. The indications for PT under the MTO Program have included clival chordoma, spinal thoracic chordoma, atypical teratoid rhabdoid tumour, craniopharyngioma, pelvic osteosarcoma, supratentorial anaplastic ependymoma, skull base chondrosarcoma, chondrosarcoma of the cervical spine, perimeningeal rhabdomyosarcoma, adenoid cystic carcinoma on the lacrimal gland, ocular melanoma and choroidal melanoma<sup>b</sup>. Patients who received PBT overseas ranged in age from 17 months to 63 years old.

The total cost of PBT under the MTO program from 2012 to 2016 was approximately \$2.8m including travel reimbursement.

### **Current state of affairs in Australia**

Currently there are no proton facilities in Australia; however, five states including South Australia, New South Wales, Queensland, Western Australia and Victoria are considering investing in proton facilities within the next three to five years. Each of these jurisdictions is at a different point in their planning and application process, with the Australian Government announcing funding support for a Proton Therapy Centre to open in South Australia in 2020.

In 2014, the Royal Adelaide Hospital (RAH) established a working group focusing on proton therapy which consisted of, radiation oncologists, radiation therapists and medical physicists. Initially the focus of the group was to increase skill level and education surrounding proton therapy, a natural extension of the project has been toward providing Australia's proton vs photon comparative planning service, a clinical decision-making tool for clinicians exploring the option of overseas referral. Education has been provided to the group via international training course attendance, vendor specific treatment planning system training and collaboration with international proton centres.

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a Three patients in 2012, six patients in 2013, three patients in 2014, five patients in 2015, and three patients in 2016.

b Ocular melanoma and choroidal melanoma are now successfully treated with stereotactic radiosurgery within Australia and applications are no longer supported under the MTO Program.

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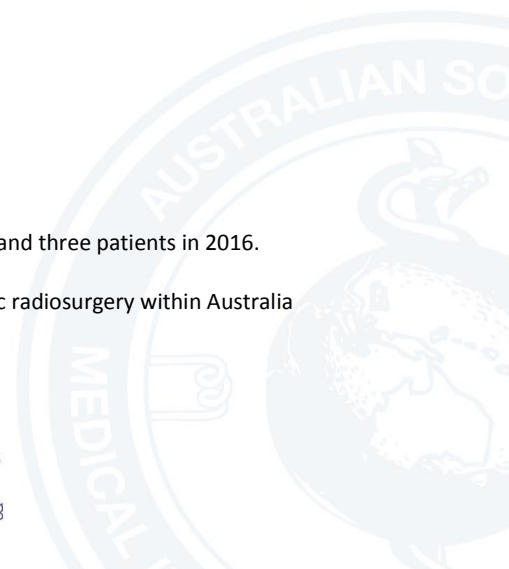
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### Overseas facilities

As of March 2018 there are 78 centres operational, with the majority of these being multi-gantry centres. An additional 45 centres are under construction, and 22 in the planning phase<sup>4</sup>. There is a large uptake of this technology across the United States and Europe.

### Conclusion

It is expected that in the next five years, the number of proton therapy centres in operation internationally will be double those in 2017. This trend is likely to translate into a growing demand for Radiation Oncology staff who have received training, have experience in and/or hold qualifications/credentialing in proton therapy, opportunities for which do not currently exist in Australia. Radiation therapists have an important role to play in the simulation, planning and treatment of patients receiving proton therapy. ASMIRT supports the development of education and training programs for Australian radiation therapists, and credentialing programs and the active involvement of radiation therapists in the planning and implementation of this treatment.

### References

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2. Glimelius B, Isacson U, Blomquist E, Grusell E, Jung B, Montelius A. Potential gains using high-energy protons for therapy of malignant tumours. *Acta Oncol* 1999; 38:137-45.
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