Australian MRI-Linac

A unique integration of radiotherapy with real-time MRI-based image guidance that allows cancer and normal tissues to be seen directly during radiotherapy for the first time. Approximately 50% of cancer patients will benefit from such a system that will improve survival, prevent recurrence or relieve the symptoms of their cancer.

More Information

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Competitive advantage

- One of only four engineering approaches in the world to this problem
- The Australian MRI-Linac is a unique ‘in-line’ system with the magnetic field parallel to the radiation beam. This results in different radiation dosimetry properties to perpendicular systems

Impact

- Early international studies suggest the real-time combination of image guidance and radiotherapy results in better survival for poor-outcome cancers
- The physiologic imaging capabilities of the MRI enable a virtual whole-tumour biopsy prior to and during each treatment, enabling real-time adaptive physiological targeting as a unique way to treat cancer

Successful outcomes

- First human images were obtained in March 2017
- First live MRI-Linac treatment in the southern hemisphere was performed using a rat brain tumour model In January 2019
- Planning for human studies underway

Capabilities and facilities

- The prototype magnet is a 1 Tesla split system designed to let the high energy X-ray beam travel through an open bore parallel to the magnetic field
- The research program is embedded into Liverpool Hospital and involves collaboration between numerous universities and scientific organisations
- Team history of scientific and technological advances in MRI and radiotherapy physics and engineering, as well as the clinical practice of MRI-Linac cancer radiotherapy
- Team record of research translation resulting in improvements in hardware, workflow, patient outcomes and policy

Our partners

- The research program is embedded into the Ingham Institute working with Liverpool Hospital and involves collaboration between numerous universities and scientific organisations.