Research Grants 2026

Brain tumour | Decoding Dopamine Agonist Resistance in Prolactinomas: A Spatial Multi-Omic Study

Doctor Yeung-Ae Park

The pituitary gland is a pea-sized gland located at the base of the skull, near critical neurovascular structures. It is the key gland regulating the body's hormones and is often called the master gland. Pituitary neuroendocrine tumours are the second most common type of brain tumour, affecting 94/100,000 people. Prolactinomas make up 50% of pituitary neuroendocrine tumours, and are the second most aggressive type, affecting young individuals.

Over 10% of prolactinomas are resistant to medications called dopamine agonists, which act like dopamine and reduce the prolactin hormone production. These tumours are aggressive and challenging to treat, and can progress despite multiple surgeries and radiation therapy. Vision loss and hormone imbalances requiring lifelong hormone replacement impair patients' lives and increase morbidity. Developing new drugs for aggressive prolactinomas could help shrink these tumours, prevent growth, and reduce complications from multiple surgeries and radiotherapy.

Understanding how genes are expressed and how the cellular area around a tumour is organised – the tumour microenvironment – is important for learning more about how tumours behave. This microenvironment is key because it influences how quickly the tumour grows, how it forms new blood vessels, how invasive it is, and can also modulate how tumours respond to treatment. We believe that molecular and tissue microenvironment differences exist between dopamine agonist-responsive and resistant prolactinomas, which may identify new treatment targets.

Fibroblasts are a type of cell that help build and maintain the structure of our tissues, and provide structural support to tumour cells. Their role in the microenvironment has been shown to be important in tumour development across tumour types. Dopamine agonist use has been associated with fibroblasts, yet their impact on tumour biology in prolactinomas and treatment outcomes is unclear. Studies have been limited due to the lack of dopamine agonist naïve tissues for comparison, as traditionally, surgery has been reserved for dopamine agonist resistant prolactinomas.

Our prospective study comparing surgery vs. medications at the Royal Melbourne Hospital provides us with dopamine agonist naïve tissue and thus a novel opportunity to examine dopamine agonist naïve vs. responsive vs. resistant prolactinomas for the first time. Analysing the molecular and microenvironment differences between these tissues may identify the mechanisms underlying dopamine agonist resistance and enable improved management of aggressive prolactinomas.

Grant $30,000

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