Blood Exosome Signature Predicts Patient Outcomes in Non-Small Cell Lung Cancer

Tumour profiling

Lung cancer is the leading cause of cancer death and the fifth most common cancer diagnosed in Australia. It is responsible for almost one in five cancer deaths in Australia, leading to an estimated 8,500 deaths annually. Non-small cell lung cancer (NSCLC) is the most common type of lung cancer, accounting for 80% to 85% of all lung cancer diagnoses. Pathological information derived from biopsies is used to stage NSCLC patients.

Currently, stage 1A NSCLC patients, who have a 5-year survival rate of up to 75%, do not receive adjuvant therapies due to severe side effects. Similarly, for stage 1B patients, whose 5-year survival rates are historically modest (40% to 67%), adjuvant therapy remains controversial due to treatment induced co-morbidities and co-mortalities. For both of these early-stage groups, standard treatment options are limited to surgery and radiation therapy. However, approximately 25% of stage IA and 50% of stage 1B patients can benefit from adjuvant therapy in addition to surgery and radiation therapy.

Curative intended interventions are successful in a proportion of NSCLC patients, with TNM staging providing vital initial information. However, current biopsy-based diagnostic approaches are invasive, prone to sampling limitation, and are generally not repeated after the initial diagnosis. Additionally, no current test is capable of predicting the response of individual patients to different therapy modalities, particularly with regard to the benefits of adjuvant therapy for early-stage NSCLC patients.

Technology and Market

We have developed a world-first, blood-based multi-protein signature capable of accurately predicting clinical outcome in multiple independent NSCLC patient cohorts. This signature is contained in small circulating nano-vesicles termed exosomes. Proteomic assessment of exosome content identified multiple upregulated proteins under the hypoxic conditions known to exist during early tumour development.

This blood test can be used to identify early-stage NSCLC patients (e.g. stage 1A and stage 1B patients) who will benefit from adjuvant therapy as well as prevent over treatment in higher-stage patients, providing a much needed decision tool for oncologists to tailor treatment interventions. Lung cancer is the leading cause of cancer-associated death in the world. Over 200,000 people are newly diagnosed with lung cancer in the USA each year alone. Over 15% are in the ‘early’ stages, with a potential for treatment escalations based on this prognostic test.
The blood-based exosome signature for personalised tumour profiling in NSCLC patients is the subject of an international PCT patent application: PCT/AU2017/051298 Determining a Cancer Prognosis, filed 24 November 2017.

We are seeking licensing or investment partners with experience in cancer diagnostics/prognostics to co-develop and commercialise this technology.

Discovery cohort: 40 Stage 1-3 NSCLC patients sampled at the time of diagnosis

Confirmatory cohort: 21 Stage 1-3 NSCLC patients sampled at the time of diagnosis

Intellectual Property and Partnering Opportunity

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Dr Andreas Möller leads the Tumour Microenvironment Laboratory at QIMR Berghofer, which focuses on advancing our understanding of communication between cancer cells and their environment. Dr Möller’s group are delineating communication pathways between malignant cells and normal, especially immune, cells at metastatic sites. Development of novel therapeutic and diagnostic capacity based on exosomes secreted by cancer cells is also an important priority. Dr Möller is the recipient of funding from the Australian Cancer Research Foundation and Cancer Council Queensland, and has over 25 peer-reviewed publications.

Lead researcher

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With more than 900 scientists, students and support staff, QIMR Berghofer is one of Australia’s largest and most successful independent medical research institutes.

The QIMR Berghofer Business Development Team manages over 160 patent families, offering a wealth of collaborative and commercial opportunities for industry and government. We have a strong track record of partnering with leading pharmaceutical and biotech companies to further develop early-stage technologies, generating over $21 million in annual commercial revenue in the last financial year. In addition to licensing and partnering outcomes, we facilitate contract research and consulting projects for industry clients. Our team includes specialists in commercialisation, IP protection, patent law, clinical trial and project management and industry-backed grant opportunities.

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