

## **Biomarkers for Cerebral Ischaemia**

### **Technology**

Early intervention in ischaemic injury is essential for beneficial outcomes; however, there is no reliable single marker or combination of markers for either perinatal hypoxic-ischaemic encephalopathy (HIE) or transient ischaemic attacks (TIA). It is desirable to have one or a combination of markers which are definitive of ischaemic injury of the brain to allow early clinical intervention e.g. neuroprotective therapies in HIE or surgical intervention following TIA to prevent later stroke.

The inventors have used rat models of neonatal HIE and adult stroke to search for proteins that could be diagnostic and/or prognostic for the human conditions. Cutting edge proteomic techniques have been used to isolate and identify a number of potential serum biomarker proteins for both conditions. The inventors have now moved to the stage of screening blood from neonatal babies for HIE and adult patients with suspected TIAs and stroke. Positive antibody-based blood tests for at least 2 proteins are envisaged for each condition.

The product will be in the form of a suite of protein biomarkers in the blood that diagnose either neonatal HIE or TIA within the first few hours (1-9) of their occurrence. This is likely to be in the form of a protein biochip "point-of-care" device using immobilised antibodies that bind to specific targets.

### **Patent**

Two Australian Provisional Patents, one for each condition, are in preparation.

### **The Market**

Hypoxic ischemic encephalopathy occurs when an infant's brain fails to receive sufficient oxygenation around the time of birth. HIE may occur hours before birth, or, in some cases, during labor and delivery. HIE occurs with an incidence of 2-4 in every 1,000 live births; currently 15-20% of these infants die as neonates and about 25 % have lifelong disabilities. Detection of neurological deficit in the early phase in babies with HIE is the most important step to determine appropriate treatment methods.

Stroke is the third leading cause of death in the USA, UK, Australia and New Zealand. In the US about 700,000 people of all ages suffer a

new or repeat stroke resulting in 275,000 deaths annually. Stroke is also a leading cause of adult disability in western countries. The American Heart Association estimated that in 2005, the direct and indirect costs associated with stroke in the US would exceed \$56 billion.

A transient ischaemic attack (TIA) is a serious condition caused by a temporary reduction in blood and oxygen supply to part of the brain and is sometimes called a mini-stroke as symptoms are similar to stroke. However, severe symptoms normally last up to 30 minutes, and all symptoms disappear within 24 hours. A TIA is a full stroke if symptoms last longer than 24 hours. Without treatment, one in ten people who have had a TIA will have a full stroke within the next year. TIAs occur with an incidence of about 83 - 101 cases per 100,000 in the USA, or an estimated 250,000 cases per year in that country. A TIA is often an antecedent for a major stroke event and therefore early recognition of a TIA and treatment of its primary cause is expected to decrease stroke incidence.

At present there are no products for the early diagnosis of HIE or TIA. It is estimated that point-of-care devices will form an \$11 billion market by 2010-2011.

### **Management and Scientific Team**

The scientific team of Prof Rosemary Martin, Assoc. Prof. Zsuzsoka Kecskes and Assoc. Prof. Christian Lueck have between them, many years of clinical and scientific experience covering neurology, neuroscience and paediatrics. Dr Karen Edwards at the Office of Commercialisation is responsible for managing the commercial aspects of the project.

### **Business Opportunity**

The Office of Commercialisation is seeking a partner with relevant expertise to further validate and develop this technology for diagnostic applications.

### **Further Information**

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