Left: CNBP
Senior Investigator
Prof. Robert McLaughlin

Right: CNBP Researcher
Mr. Stefan Musolino

Case Study

Sensors for the Brain

A SMART NEEDLE

Prof. Robert McLaughlin

A new high-tech medical device to make brain surgery safer is being developed by CNBP researchers at the University of Adelaide.

The tiny imaging probe, encased within a brain biopsy needle, lets surgeons 'see' at-risk blood vessels as they insert the needle, allowing them to avoid causing bleeds that can potentially be fatal. The 'smart needle' contains a tiny fibre-optic camera, the size of a human hair, shining infrared light to see the vessels before the needle can damage them.

Utilising optical coherence tomography (OCT) the imaging needle is able to be connected to a range of OCT scanners, with computer software then able to recognise blood vessels and alert the surgeon in real-time as the probe is being used.

The smart needle has already been used in a pilot trial with 12 patients undergoing neurosurgery at Sir Charles Gairdner Hospital in Western Australia. It will soon be ready for formal clinical trials.

The team are in discussions with a number of international medical device manufacturers and are seeking to manufacture the smart needles in Australia.

> The smart needle will soon be ready for formal clinical trials.

BRAIN TEMPERATURE

Mr. Stefan Musolino

The brain is the most temperature sensitive organ in the body—even small deviations in brain temperature, as a result of disease, brain injury or drug use are capable of producing behavioural change and neuronal cell death.

In order to measure and understand these temperature changes and how they are influenced by various biochemical pathways in the brain, a transdisciplinary team at the CNBP has developed an optical fibre-based temperature sensor, capable of pinpoint brain temperature measurement in freely-moving animals.

The sensor tip, minimised to only a few microns, provides for precisely localised temperature monitoring where conventional technology would struggle. Due to the small size of the fibre tip it has the possibility to be combined with existing sensors and implanted with identical methods without inducing additional stress or damage.

A fully developed probe could find potential application in human brain temperature monitoring after traumatic brain injury, stroke, or subarachnoid haemorrhage. It could also be utilised for tracking hypothermia in infants with neonatal encephalopathy to aid in neuroprotective therapy efforts during the first 72 hours after delivery.

> CNBP has developed an optical fibre-based temperature sensor.