TECHNOLOGY LICENCING OPPORTUNITY

Portable & Non-Invasive Cerebral Blood Flow Image Mapping System

Technology Details

University of Manitoba researchers have created a novel software program that utilizes a functional near infrared spectroscopy (fNIRS) cerebral physiologic system and a non-invasive arterial blood pressure (ABP) monitoring system to produce an image of the brain. The fNIRS system consists of a OxyMon fNIRS cap wearable cap that has customizable fNIRS channels that connect to a fNIRS system to capture oxy- and deoxy-hemoglobin and tissue saturation values non-invasively from multiple points in the brain in real-time. The data is co-recorded with ABP information with a niABP Finapres Nova system and then processed with our novel software program to facilitate live-time derivation of cerebral autoregulation (CA). To produce an image of the brain, the derived CA measures are projected onto a layout of the brain in a colored coded heat-map format. The device is portable and usable at the bedside in any healthcare environment.

Applications

Human Medicine: This non-invasive method can be used to detect impaired CA blood flow in patients with traumatic brain injury, ischaemic stroke, subarachnoid haemorrhage, intracerebral haemorrhage, and in surgical patients.

Technology Benefits

This system solves the following issues related to existing platforms:

1. Cost – reduces costs by several fold compared to standard imaging.
2. Accessibility – eliminates the need to travel to specialized centers for imaging.
3. Portability – facilitates imaging in clinic or in-patient settings; including bedside cases where patient mobility is a concern (unstable patients).
4. Risk – eliminates the need for contrast or radiopharmaceuticals and concerns related to magnetic field neuroimaging (ie. metal implants).
5. Expertise – the developed platform does not require expert technicians to operate.
6. Data resolution – the system provides live-time updating calculations and images, eliminating reliance on snap-shot out-of-date information that is part of standard neuroimaging.
7. Universality – the software can be used with any commercial or research grade fNIRS system.

Development Stage

Technology Readiness Level: TRL 6

The novel software program (developed using Python) that derives a CA heat map of the brain and is legally and beneficially owned by the University, including copyright and moral rights as they are defined in the Copyright Act (R.S.C., 1985, c. C-42), Canada.

The invention is described in detail in Sainbhi, A.S.; Vakitbilir, N.; Gomez, A.; Stein, K.Y.; Froese, L.; Zeiler, F.A. Non-Invasive Mapping of Cerebral Autoregulation UsingNear-Infrared Spectroscopy: A Study Protocol. Methods Protoc. 2023, 6, 58 (https://doi.org/10.3390/mps6030058).

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