

Patient Inspired Innovation

Welcome to issue 8 of the NIHR Brain Injury MedTech Co-operative newsletter.

In this edition, find out more about two studies you can be involved in, our Neurocritical Care Theme Leader, and events you are invited to.

About us

The MIC is one of eleven national Medtech and In vitro diagnostic Co-operatives (MICs) funded by the National Institute for Health Research (NIHR).



The MIC works with patients, carers, academics, clinicians and industry to develop new medical devices, healthcare technologies and technology-dependent interventions to improve treatment and quality of life for patients with brain injuries.

Get Involved!

The MIC has developed a volunteer register for patients, carers and whoever has an interest in the advancement of healthcare technologies. For more information on the Register for Healthcare Involvement and Technology Evaluation (RHITE), please visit our website:
<http://www.brainmic.nihr.ac.uk/rhite>

Important:

To unsubscribe from RHITE and this-newsletter please send an email to: involve@brainmic.org

Two opportunities to take part to Research!

1. Use of AI for concussion in an Emergency Department

Summary: Crowding in emergency departments is a big issue leading to increased morbidity and mortality. Head injuries (also known as concussion) represent one of the most common groups seen in the Emergency Department. This study will try to see if technology could reduce the time spent in the department for these patients helping getting the right patients home, and reducing the pressure on the department for other patients.

Aim: To see if using artificial intelligence to read head CT scans can facilitate fast and safe discharge from an Emergency Department and so reduce crowding.

Eligibility Criteria: Patients who present to an Emergency Department to be assessed for a potential mild traumatic brain injury or concussion.

Questions we would like to comment on:

- Do you think it be acceptable for a computer to read a CT scan?
- Would patients like to be involved in this decision making? If so how?
- Are there other processes that could be made better in the Emergency Department to improve both patient experience and faster discharge?

2. Cambridge App for Mild Traumatic Brain Injury (CAM-TBI)

Summary: After a mild traumatic brain injury up to 30% of patients develop persistent symptoms. However, identifying those at risk is difficult and there is little evidence for how best to manage these patients. This project will develop an app that can be downloaded after an Emergency Department visit.

Aim: In patients with mild traumatic brain injury can a smart phone application be developed that can be used to identify those at risk and with persistent post-concussion symptoms and facilitate longitudinal outcome assessment?

Eligibility Criteria: Patients who present to an Emergency Department to be assessed for a potential mild traumatic brain injury or concussion

Questions we would like to comment on:

- What would make people want to use the app?
- Would you download the app for yourself?
- Would you download the app for a loved one?

Get involved!

If you decide to participate in the study you will be asked to participate in workshops taking place in Cambridge between February and June 2020.

HOW TO GET INVOLVED

If you want to know more about how to get involved in these studies or to participate, please, send an email to

involve@brainmic.org

The Brain Injury MIC presents its Theme Leads:

Prof David Menon, MIC Neurocritical Care Theme Lead

As you may be aware, the work of the NIHR Brain Injury MIC is divided into eleven themes led by internationally renowned experts in their respective field. This month we are delighted to introduce to you our Neurocritical Care Theme Lead: Professor David Menon.



David Menon is Professor and Head of the Division of Anaesthesia, Principal Investigator in the Wolfson Brain Imaging Centre, and Co-Chair of the Acute Brain Injury Programme at the University of Cambridge. In 2013 he was re-appointed as an NIHR Senior Investigator as one of the NIHR's pre-eminent researchers.

He trained in Medicine, Anaesthesia and Intensive Care at the Jawaharlal Institute in India, Leeds General Infirmary, The Royal Free Hospital and Addenbrooke's Hospital, and was an MRC Research Fellow at the Hammersmith Hospital prior to coming to Cambridge.

In 2006 he was appointed to the British Oxygen Professorship at the Royal College of Anaesthetists. He is Co-Chair of the Executive Board of the European Brain Injury Consortium, is a Founding Fellow of the Academy of Medical Sciences, and a Professorial Fellow in the Medical Sciences at Queens' College, Cambridge.

He was the first Director of the Neurosciences Critical Care Unit (NCCU) at Addenbrooke's Hospital, Cambridge, where he established the first recognised training programme for specialist neurocritical care in the UK. Protocols developed in the Addenbrooke's NCCU have been shown to improve clinical outcome in severe head injury and rationalise the management of acute intracranial haemorrhage.

Professor Menon's research interests include neurocritical care, secondary brain injury, neuroinflammation, and metabolic imaging of acute brain injury. He has also published on the physiology of coma and the vegetative state, and on mechanisms of anaesthetic action in the brain. In recent years he has represented the UK intensive care community in discussions regarding the impact of evolving legislative changes on research in critical care and emergency medicine.

...and an award to our Theme Leads!

Cambridge is the leading European Centre for Brain Injury Research with three Clinical School Academics in the top 15 of World Experts

Congratulations to the Cambridge Acute Brain Injury team which has been listed as the leading European Brain Injury Research Centre in Europe based on Expertscape - a website that objectively ranks people and institutions by their expertise.

Well done to our Theme Lead, David Menon (Department of Medicine) who was ranked first of all global experts in brain injury, and also to Marek Czosnyka and Peter Hutchinson (both MIC Theme Leads from the Clinical Neurosciences Department) who were placed in the top 15.

Professor Czosnyka with Dr Peter Smielewski are also ranked respectively first and second for Intracranial Pressure, one of our eleven clinical area of expertise.

Although it is wise to be cautious about interpreting precise ranking in league tables, the strong representation from Cambridge is hugely gratifying.

This reflects the work of all the researchers in the Acute Brain Injury Group at Cambridge (co-Chaired by David Menon and Peter Hutchinson), and the contributions of the Brain MIC Honorary Director John Pickard (Emeritus Professor of Neurosurgery, and past co-Chair of the group) who helped lay foundations for this success.

This recognition is based on the rich collaborations and productivity of University of Cambridge brain physics, brain chemistry, neuroimaging, and clinical trials groups.



**Prof David Menon, Prof Marek Czosnyka
and Prof Peter Hutchinson**

...upcoming events in the new year:

Cambridge Science Festival in March 2020!

Featuring events ranging from astronomy to zoology, the 2020 Cambridge Science Festival will welcome again everyone to explore, discuss and discover science through talks, hands-on activities, performance, films and exhibitions. The Brain Injury MIC will be present with a hands-on-activities event and a talk at [CAST, the Cambridge Academy of Science and Technology, at Biomedical Campus.](#)

Hands-on activities event: **Technologies to Challenge Your Brain (11am - 3pm)**
Talk: **Concussion in Sport: What You Need To Know (3pm -4pm)**

Bookings will be opened on 10 February 2020.

09 - 22 March 2020
<https://www.sciencefestival.cam.ac.uk/>

...upcoming events in the new year:

BITT Tank 2020: Artificial Intelligence and Robotics

On 20th April, in the scenic venue of Madingley Hall, we are holding another of our BITT Tank events focusing this year on Artificial Intelligence and Robotics in Neurocritical Care and Neurosurgery.

Registrations are open at the link below:

<https://www.cambridgewireless.co.uk/events/ai-robotics-neurocritical-care-neurosurgery/>

We welcome participation from patients, carers and whoever has an interest in brain injury. This will be an opportunity for networking and learning about how to get involved in research and in our Patient Advisory Group.

For queries, please, write to Francesca Piffer at fp350@cam.ac.uk

20 April 2020
Free-to-attend event!

...and finally the last news from our funding scheme!

Seedcorn Funding Competition Awards 2019 for improving patients' life

Also this year, the Brain Injury MIC has awarded novel ideas and technologies that can improve the life of those affected by brain injury through Seedcorn Funding Competition.

This competition has been established to support early development of novel technology-based solutions applicable to the brain injury pathway, from prevention of the initial acute event through to longer-term rehabilitation. The Seedcorn awards of up to £10,000 aim to support proposals that are led by Academic Institutions, NHS Trusts, Third Sector Organisations and Small and Medium Sized Enterprise (SMEs).

In addition, it fosters collaborative projects that have a near term clinical impact or the potential to secure further substantial funding after proof of principle has been established. Here below, you can read about the winners of the Seedcorn Funding Competition 2019 and their projects.



BISP (Brain Injury Sensory Prosthetic) Investigating usability of a wearable

Mr Szczepan Orlowski, Animorph Co-operative

A stroke can damage the brain, so that it no longer receives information about one side of the body. If this happens, people may not be aware of anything on one side, usually the same side they also lost their movement (the most affected side). This severe disorder affects a third of stroke survivors, slows down recovery and creates a higher dependence on caregivers.

There still is no recommended effective treatment for the condition. Smooth pursuit eye movement training is one of a very few promising treatments for spatial neglect. The therapy encouraging people to move their eyes to follow objects towards the impaired side. Smooth pursuit eye movement training requires a therapist to constantly encourage and monitor the patient to ensure they are moving their eyes while keeping their head still. Moreover, the patient is required to do the training for 1 hour a day which is quite intense and not very engaging.

Our Brain Injury Sensory Prosthetic (BISP) aims to transform smooth pursuit eye movement training by turning it into an engaging, computerised and self-administered therapy. BISP is a computer programme integrated into a lightweight augmented reality technology headset. The patient wears comfortable see-through glasses, that show images and play sounds to the patient. Importantly, BISP also tracks where the patient is looking. Because of this, BISP can adjust itself to each individual patient, for example by regulating how fast the objects move or how loud is the sound. BISP also notifies the patients about the objects they missed. This way we hope to gradually train the patients to notice more and more objects on their impaired side. Animorph's team works with leading neuropsychologists and neuroscientists specializing in spatial neglect, vision and data analysis at the University of East Anglia. In the proposed study, we will improve BISP using opinions of brain injury survivors with neglect, carers and clinicians. In addition, to inform the next stages of the research, we will explore how usable and acceptable BISP is in people's homes. This is important because any training we create needs to be acceptable by those people for whom it is intended.

THAT'S ITT!

(Take Home Attention Training for Stroke, Integrating Technology into Treatment) Dr Polly Peers, University of Cambridge

Stroke is the leading cause of long-term disability in the UK and has a huge cost for patients, families and society. It can cause obvious problems with walking, hand movements and language as well as more 'hidden' cognitive and mood problems. Attention difficulties are common, linked with slow recovery and reliance on others, and have been identified as a priority area for improved intervention by researchers, patients and clinicians alike. Due to the striking spatial difficulties many patients show (eating food from only one side of the plate, or dressing only one half of their bodies), therapies have focused on using spatial strategies to help patients overcome their difficulties. Work in our lab, and others, suggests that patients spatial difficulties are linked to other attentional problems, such as staying awake, being able to maintain attention (concentrate), and being able to focus on what is important and not get distracted. As a result of this basic research we have developed a series of internet based 'games' designed to help patients hone their attentional skills by daily practice on tasks that adapt to patients' changing abilities. We have shown that a month of practising these 'games', not only improves patients' performance on tests of attention, but crucially also impacts more broadly on their everyday lives. In partnership with patients, their families, clinicians and regulatory experts we will use our seedcorn funding to develop a modern, accessible app for patients as they leave hospital and start their rehabilitation journey.

Development of wearable electronic sleeve for self-management of stroke rehabilitation

Dr Kai Yang, Etexsense Ltd

Every year, over 100,000 strokes occur in addition to the existing 1.2 million stroke survivors, resulting in yearly personal and societal care cost of £26 billion. Over 75% stroke survivors report arm weakness that stops them to carry out daily living activities.

Intensive movement practice can restore lost upper limb function following stroke. However, stroke patients often have little or no movement, so cannot practise. Functional Electrical Stimulation (FES) is a technique that uses low-energy electrical pulse to stimulate the muscle to generate artificial movement. It is a clinical proven technology used to help stroke survivors to re-learn lost skills by enabling them to practice and regain lost arm movement, and in-so-doing create new nerve connections in their brain.

This project is to address the remaining challenges in the development of a practical FES system developed by Odstock Medical Ltd, by developing a wearable novel electrode sleeve (e-sleeve) to replace the gel electrodes used in the current system. This will eliminate the need of a carer/physio to set up the system and enable the patient to self-manage their rehabilitation activities. It will also provide a cost effective solution as the e-sleeve is washable and reusable.

***...and stay tuned for more in the next Newsletter in 2020!
Merry Christmas and a Happy New Year!***

NIHR Brain Injury MedTech Co-operative

Dept. of Clinical Neurosciences
University of Cambridge
Box 167 - Cambridge Biomedical Campus

T: 01223 336 944

W: www.brainmic.nihr.ac.uk

Twitter: NIHRBrainMIC