# CARNet Clinical Science Lab

Wednesday, June 29, 6:30 pm till 8:00 pm; Room 3-133

The Cerebrovascular Autoregulation Research Network (CARNet) Clinical Science Lab, provides a platform for the presentation and discussion of project ideas, early-stage or ongoing projects, and encourages the audience to provide feedback to the presenter on possible directions of the work, funding or collaboration opportunities. The following topics will be presented:

**No 1:**

**Endogenous circadian rhythm in cerebrovascular reactivity**

*Kun Hu, PhD*; *Director, Medical Biodynamics Program, Brigham & Women's Hospital*, *Assistant Professor of Medicine, Harvard Medical School, Boston, USA*

**Aim 1** To determine the influence of the circadian system on cerebrovascular reactivity

**Aim 2** To determine the response of cerebrovascular reactivity to bright light during the nighttime

**Aim 3** To determine the role of autonomic function in the circadian influence on cerebrovascular reactivity

**No 2:**

**Accurate Noninvasive ICP using an Individualized Dynamic System Modeling Approach**

*Xiao Hu, PhD; Associate Professor of Physiological Nursing and Neurosurgery, Affiliate Member of Institute for Computational Health Science, Affiliate UCB/UCSF Joint Bio-Engineering Graduate Program, University of California, San Francisco, USA*

**Aim 1** To design and standardize a protocol to develop a signal repository that will at a minimum include concurrently measured invasive ICP, at least one lead of electrocardiogram (ECG), cerebral blood flow velocity (CBFV), and invasive or noninvasive arterial blood pressure (ABP).

**Aim 2** To assess the full-potential of a novel noninvasive ICP algorithm using the database.

**Aim 3** To advance the state-of-the-art of noninvasive ICP by using this database to fairly benchmark noninvasive ICP methods that are developed at different laboratories.

**No 3:**

**The changes of cerebral blood flow velocities to follow patients with acute not traumatic brain injury admitted to the intensive care unit – INCN**

*Maria Mercedes Chumbe Mendoza, MD; Intensive Care Physician, Emergency Department, National Institute of Neurological Science, Lima, Peru*

**Aim 1** To identify the individual optimal mean arterial pressure in the acute setting.

**Aim 2** To identify the end diastolic velocity (EDV) and the pulsatility index (PI) utility as accessible tools to follow interventions and outcome in non-traumatic brain injured patients.

**No 4:**

**Cerebral blood flow regulation during and after thrombolysis for acute ischemic stroke: a prospective study**

*Ricardo Nogueira, MD; Neurology Department, Hospital das Clínicas, University of Sao Paulo, Sao Paulo, Brazil & Department of Cardiovascular Sciences and NIHR Biomedical Research Unit on Cardiovascular Disease, University of Leicester, Leicester, United Kingdom*

**Aim 1** Study Cerebral Blood Flow regulation during and after thrombolysis for acute ischemic stroke

**Aim 2** Correlate hemodynamic impairment with infarct size and clinical outcome

**Aim 3** Evaluate if r-tPA therapy causes impairment of blood flow regulation

**No 5:**

**Diastolic Closing Margin predicts brain injury in premature infants**

*Christopher J. Rhee, MD, MS, FAAP; Baylor College of Medicine, Texas Children's Hospital, Section of Neonatology, Houston, USA*

**Aim 1** Prospectively determine whether high brain perfusion pressure (i.e., high Diastolic Closing Margin, DCM) is predictive of Intraventricular Hemorrhage (IVH)

**Aim 2** Prospectively determine whether low brain perfusion pressure (i.e., low Diastolic Closing Margin, DCM) is predictive of Periventricular Leucomalacia (PVL)

**Aim 3** Determine whether physiologic measurements of brain perfusion are predictive of neurodevelopmental outcomes

**No 6:**

**Validation and combined assessment of non-invasive ICP methods**

*Danilo Cardim, MSc, Department of Clinical Neurosciences, Brain Physics Laboratory, University of Cambridge*

**Aim 1** to design and standardise experimental and clinical protocols for validation of these methods against gold standard techniques.

**Aim 2** to compare these methods with other non-invasive ICP methods, such as TCD-based methods.

**Aim 3** to assess potential uses of these methods outside neurocritical care environments.

**No 7**

**How to decipher the Heart-Brain-Cross-Talk after Traumatic Brain Injury**

Pietro Lió, PhD; Computer Lab, Department of Science, University of Cambridge, United Kingdom

**Aim 1** Modeling the transient interaction between Intracranial Pressure and Heart Rate after Traumatic Brain Injury (TBI) in pediatric patients

**Aim 2** Machine learning approach to identify patterns and conditions of Heart-Brain-Cross-Talk

**Aim 3** Prospective evaluation in order to predicting critical conditions after TBI