

Acute Coronary Syndrome (ACS) refers to a range of acute myocardial ischemic states that occurs after the sudden blockage of a coronary artery. This may cause a reduction in blood supply to certain areas of the myocardium and results in ischemia (Warnica, 2008). Treatments for ACS includes medical treatment, percutaneous coronary intervention (PCI), and coronary artery bypass grafting (CABG) with or without the use of cardiopulmonary bypass (CPB).

Cardiac surgery and anaesthetic techniques have improved over the years, but Central Nervous System (CNS) dysfunction continues to be a major cause of morbidity after cardiac surgery (Fun-Sun, Chia-Chih, Chee-Yueh, Serle and Powel, 2004). Cerebral micro-embolism and hypoperfusion have been proposed to be major mechanisms of dysfunction, where low perfusion pressure and re-warming during CPB may cause an imbalance between oxygen supply and demand. In both mechanisms, tissue hypoxia is the common pathway causing cerebral dysfunction (Fun-Sun *et al.*, 2004).

Performing CABG without cardiopulmonary bypass (off-pump CAB) has shown to reduce the risk of peri-operative stroke. Whether off-pump CAB (OPCAB) reduces the incidence of less severe neurocognitive impairment has not yet been clearly established (Scarborough, White, Derilus, Mathew, Newman and Landolfo, 2003).

Heart manipulation during OPCAB can impair cardiac output and induce hypotension, which can result in significant brain hypoperfusion (Berry, McGarvey, Zeng and Woo, 2005).

Greater focus is being put on neuro-protective strategies to improve quality of life. Various neurological complications remain prevalent, but regional ischemia leading to adverse outcomes is detectable and correctable and a variety of parameters have been used traditionally to guide the question of whether oxygen supply is meeting oxygen demand at tissue level. Blood pressure, pulse oximetry ( $SpO_2$ ) central venous oximetry ( $SvO_2$ ), arterial blood gasses and serial lactates are a few examples of these parameters.

The Somanetics® INVOS® Cerebral Oximeter (Covidien) augments these existing strategies by providing a new “vital sign” called regional saturation of oxygen ( $rSO_2$ ). The system alerts clinicians of cerebral ischemia and proved an early warning for regional oxygen imbalances that may be encountered in surgery or in the cardiac laboratory.

The aim of this study is to predict the incidences of complications and clinical outcomes in patients with acute coronary syndrome related to reduced cerebral perfusion. Observations with near-infrared spectroscopy will be done during on-pump and off-pump CABG to measure cerebral oxygenation, and will be related to hemodynamic changes and intra-operative manipulation.