

Pump-Priming Grant

Report – Syed Hussain Abbas

Title: The utility of hand-held near infrared micro-spectrometry in predicting the severity of steatosis in human livers procured from deceased donors.

Liver biopsy remains the gold standard for the quantification of steatosis. Although, biopsy confirmation prior to transplanting steatotic livers is desirable, awaiting results is not feasible in the clinical setting (histological confirmation can take several hours after organ retrieval) and the decision to transplant has been made to avoid the deleterious effects of cold-ischaemia. Common practice in the United Kingdom has therefore relied on the retrieval surgeon's assessment of steatosis based on macroscopic appearance. However, this method has the limitations of under/over estimating steatosis and can lead to unnecessary discard of human livers. This has inevitable negative consequences on organ utilisation and waiting list deaths. Hand-held near infrared micro-spectrometry is an emerging technology that can be used to predict the histological absence (<30%) or presence ($\geq 30\%$) macrosteatosis in real-time.

Hypothesis: Hand-held near infrared micro-spectrometry will accurately predict the histological absence (<30%) or presence ($\geq 30\%$) macrosteatosis in human livers procured from deceased donors.

Objective: The overarching aim of this study is to assess the utility of a CE marked pocket-sized micro-spectrometer for real-time assessment of hepatic steatosis in liver grafts procured from deceased donors and preserved using normothermic machine perfusion (NMP). The specific objectives include:

1. To correlate the conventional histopathology report of macrosteatosis in donor livers procured from deceased donors with hand-held near infrared micro-spectrometry (SCiO device)
2. To investigate the ability of the (SCiO device) to detect gradient changes in macrosteatosis during NMP (up to 24h) with and without defatting interventions. This will be correlated to tissue histology.

Method & Results

Following device calibration, the pocket-sized micro-spectrometer (SCiO device) is placed vertically within 1cm of the liver capsule. The SCiO device connects with Bluetooth and to any smartphone which transmits (via 4G/WiFi) to a cloud algorithm. The end result is a percentage prediction of liver macrosteatosis. *This study is an on-going collaboration with Dr Nicolas Golse (developer of the algorithm), Paul-Brousse Hospital, Paris.

Outputs (publications/presentations)

Final results to be submitted as an abstract to British Transplant Congress

Next Steps (what is it leading to)

Use of the SCiO device in the Defatting of donor transplant livers during normothermic machine perfusion - A randomised clinical trial