Perinatal hypoxic-ischaemic encephalopathy (HIE):
- Affects 1-2 in 1000 live births
- Responsible for 15-25% of cerebral palsy cases
- Associated with neurodevelopmental problems and early mortality

Biphasic pattern of cerebral energy failure with a brief "therapeutic window" for clinical intervention

There is an urgent need for real time in-vivo measurements of brain tissue metabolism for effective clinical assessment of these neonates before the onset of secondary energy failure. Near-infrared spectroscopy (NIRS) measured values of metabolism could provide an non-invasive solution to this need.

Animal models of HIE have shown that NIRS measured changes in the oxidation state of cytochrome-c oxidase (CCO) correlates with magnetic resonance spectroscopy (MRS) biomarkers of cerebral energy failure, measures of oxygenation do not.

CCO has the potential to be an early biomarker of brain tissue recovery after HIE if it can be measured in the clinical environment.

This is a feasibility study to assess the optical measurements of metabolism (changes in the oxidation state of cytochrome-c oxidase) in the asphyxiated newborn brain.

To accurately measure this chronophore we need a large number of wavelengths in the NIR as the CCO concentration in the brain is one-tenth of the haemoglobin concentration; a broadband source and detector are required.

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