**Relationship between brain tissue oxygenation and metabolism during rewarming after neonatal hypoxic-ischaemia relates to the degree of initial electrical abnormality**

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**Abstract:** Therapeutic hypothermia (TH) has become a standard of treatment for neuroprotection following perinatal hypoxic-ischemic encephalopathy (HIE). Following 72 hours’ whole body TH, rewarming is commenced and the body temperature is gradually increased to 37oC.

The aim of this study was to assess the cerebral metabolic and hemodynamic changes during the rewarming period, in a cohort of infants admitted to the neonatal unit in University College London Hospital following perinatal hypoxic-ischaemic brain injury. We hypothesized that changes in cerebral oxidative metabolism, measured as Δ[oxCCO], in relation to changes in oxygenation (measured as Δ[HbD]) during rewarming will correlate with injury severity as evidenced on aEEG/EEG at initial presentation. Relationship between [oxCCO] and [HbD] can be a useful biomarker of perinatal brain injury1,2.

Broadband NIRS monitoring was commenced as early as possible in the rewarming phase and data were collected over a mean of 12.5 h from a cohort of 14 infants. All infants were monitored with video EEG telemetry using a standard neonatal montage. aEEG and EEG background was classified into mild, moderate and severely abnormal groups based on the aEEG pattern classification3 (mild abnormality: normal aEEG upper (>10 uvolts) and lower border (>5 uvolts), but low amplitude cortical activity on EEG, moderate abnormality: abnormal aEEG upper and/or lower margin with a degree of EEG discontinuity, severe abnormality: abnormal aEEG voltage with discontinuous or flat EEG trace).

2 infants had mild, 6 infants had moderate and another 6 infants had severe abnormality at presentation. The relationship between [oxCCO] and [HbD] was evaluated between two groups of infants with abnormal electrical activity (mild vs moderate to severe). A significant difference was noted between the groups in the relationship between [oxCCO] and [HbD] (as r2) (p=0.02). This result indicates that the mitochondrial injury and deranged oxidative metabolism persists in the moderate to severely abnormal group during rewarming.



**Figure A:** Different metabolic response between two groups of abnormal cortical electrical activity (mild vs moderate to severe) (p=0.02) (figure A).

References: 1. Mitra S, 2016 2. Bale G, 2018 3. Al Naqeeb N, 1999

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