Near-Infrared Spectroscopy for Brain death

Compared to traditional diagnostic methods of brain death, near-infrared spectroscopy (NIRS) is a non-invasive, objective, cost-effective, and safe way of assessment of brain death. Eighteen brain dead patients and 20 healthy subjects were studied by NIRS, with a multiple-phase protocol at varied fractions of inspired O2 (FIO2). They found that the changes in the concentration ratios of oxyhemoglobin to deoxyhemoglobin (Δ [HbO2]/ Δ [Hb]) in the cerebral cortex of brain dead patients were significantly higher than those of healthy subjects, and its low-to-high FIO2 phase was most sensitive, with a recommended threshold in the range 1.40-1.50. The study indicated that NIRS is a promising technology for assessing brain death. The success of this application potentially offers a supplementary technique for the assessment of brain death in real-time in order to be able to promptly offer quality-assured donor organs ¹⁾.

In 2018 used a portable fNIRS oximeter to measure the physiological data of fifteen brain death patients and twenty-two patients under natural state. The varied fractional concentration of inspired oxygen (FIO2) were provided in different phases. They found that the ratio of the concentration changes in oxy-hemoglobin to deoxy-hemoglobin(Δ [HbO2]/ Δ [Hb])in normal patients is significantly lower than in brain death patients, and it restores oxygen change process in the low-high-low paradigm is more remarkable. This resulting promotion indicates the potential of the fNIRS-measured hemodynamic index in diagnosing brain death ².

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