

## MP3-19

### Glial Fibrillary Acid Protein – a potential biomarker for cerebral injury in neonates and infants undergoing surgery for congenital heart disease

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**Objectives:** Mild to moderate neurodevelopmental impairment is common in children with congenital heart disease requiring cardiac surgery as neonates or infants. Perioperative hypoxic-ischemic brain injury might contribute to adverse neurodevelopment. Monitoring techniques and biomarkers for perioperative brain injury are of special interest. We evaluated Glial Fibrillary Acid Protein (GFAP), an astrocyte cytoskeleton protein, as a biomarker for neuronal cell damage in neonates and infants (<1 year) undergoing cardiac surgery. The relation between GFAP levels and perioperative cerebral tissue oxygenation was evaluated.

**Methods:** Serum levels of GFAP were measured before and 0, 12, 24 and 48 hours after surgery (Human GFAP ELISA, Abbexa®). Cerebral tissue oxygenation (ScO<sub>2</sub>) was derived by near infrared spectroscopy (INVOS, Covidien®) for 12 hours before, during and for 48 hours after surgery. Cerebral oxygen extraction was estimated by calculating the difference between arterial and cerebral tissue oxygen saturation ( $\Delta\text{SaO}_2\text{ScO}_2$ ). Normal GFAP levels were determined based on preoperative values. GFAP levels above the 90th percentile were defined as elevated.

**Results:** GFAP levels and ScO<sub>2</sub> were obtained in 22 neonates and 30 infants. Preoperative GFAP was not different between groups. Among postoperative measurements, only median GFAP at 24 hours was higher in neonates (2.48  $\mu\text{g/l}$  [IQR: 1.43-5.26] vs. 1.48 [IQR: 0.51-3.45]). Elevated GFAP levels between 24 and 48 hours were found in 8 (36%) neonates and 5 (17%) infants ( $p=0.121$ ). In neonates, median age at surgery was higher in cases with elevated compared to normal postoperative GFAP (6 [4-7] vs. 3 [2-4] days,  $p=0.006$ ). In neonates with elevated GFAP, mean intraoperative ScO<sub>2</sub> was lower compared to cases with normal GFAP ( $68 \pm 8\%$  vs.  $79 \pm 7\%$ ,  $p=0.004$ ). Early postoperative and mean  $\Delta\text{SaO}_2\text{ScO}_2$  of the first 12 postoperative hours were higher ( $41 \pm 9\%$  vs.  $30 \pm 10\%$ ,  $p=0.016$  and  $34 \pm 9\%$  vs.  $25 \pm 8\%$ ,  $p=0.032$ ).

In infants, mean ScO<sub>2</sub> of the entire postoperative course was lower in cases with elevated GFAP ( $61 \pm 9\%$  vs.  $69 \pm 8\%$ ,  $p=0.047$ ).

**Conclusion:** GFAP might be a useful biomarker for subclinical brain injury in neonates and infants undergoing cardiac surgery. Neurodevelopmental outcomes and the association to GFAP levels and cerebral tissue oxygenation still need to be determined.