

**Title:** Magnitude of frontal alpha ( $\alpha$ ) band power under sevoflurane anesthesia in patients undergoing cardiac surgery with cardiopulmonary bypass (CPB).

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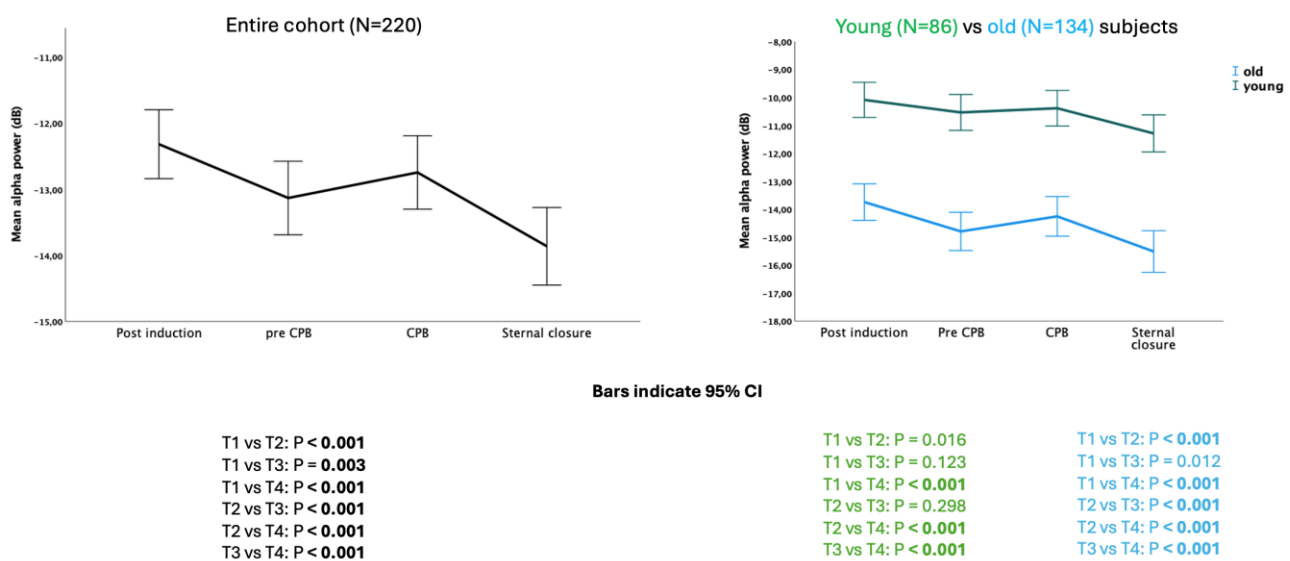
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**Objective:** We sought whether mean frontal  $\alpha$  power was lower after conclusion of CPB in young and elderly subjects undergoing cardiac surgery.

**Background:** Frontal  $\alpha$  in combination with slow-delta oscillations are the main characteristics of the EEG during propofol or sevoflurane-based anesthesia.<sup>1</sup> Otherwise, intraoperative frontal  $\alpha$  power significantly decreases with age.<sup>1</sup> It is however unclear whether  $\alpha$  power shows any variations during standardized and stable anesthesia and whether these variations are more pronounced in elderly subjects.

**Methods:** This is a sub-analysis of a prospective study (NCT03706989) in patients undergoing elective cardiac surgery with CPB. 32-channel EEG data from 220 patients under sevoflurane anesthesia (guided by NeuroSENSE depth-of-anesthesia monitor to avoid EEG burst suppression) were collected at 30 minutes after anesthesia induction (T1), before CPB (T2), during CPB (T3), at sternal closure (T4). Frontal  $\alpha$  band (8-12 Hz) power ( $\mu V^2$ ) was extracted from the EEG power spectrum using MATLAB®. Spectral analysis results were then converted into decibels (dB) to obtain normally distributed data. Patients were stratified in function of age (< 65 y: young vs  $\geq$  65y: old). Paired t-test was used to compare within group analyses. Bonferroni posthoc analysis was applied. A **P<0.008** was considered statistically significant.

**Results:** 134 (60.9%) patients were considered as old and 86 (39.1%) as young. Mean  $\pm$  SD (Range) CPB time was  $100 \pm 33$  min (36 - 278 min) in elderly and  $106 \pm 39$  min (41 - 231 min) in young subjects (Student t-test; P = 0.282). Fig 1 represents mean frontal  $\alpha$  power for the entire cohort and both groups.



**Conclusions:** This is the first study to analyze frontal  $\alpha$  power under controlled and stable sevoflurane anesthesia. Our results show that  $\alpha$  power after conclusion of CPB is significantly lower in both young and elderly as compared to start of anesthesia. Whether the non-pulsatile CPB flow and cerebral perfusion contributes to this result is unclear. Future studies need to analyze the magnitude of  $\alpha$  power in cardiac surgery with and without CPB.

**References:** 1. Purdon PL, KJ Pavone, Akeju O, et al. The ageing brain: Age-dependent changes in the electroencephalogram during propofol and sevoflurane general anesthesia. Br J Anaesth 2015; 115:i46-i57

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