

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

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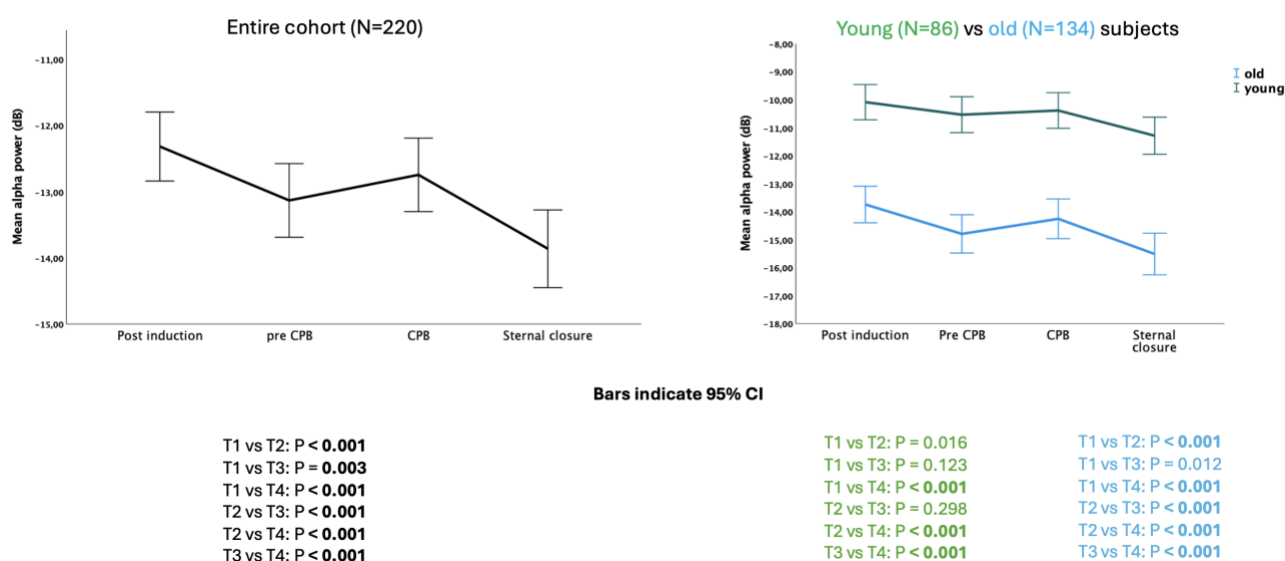
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Objective: We sought whether mean frontal α power was lower after conclusion of CPB in young and elderly subjects undergoing cardiac surgery.

Background: Frontal α in combination with slow-delta oscillations are the main characteristics of the EEG during propofol or sevoflurane-based anesthesia.¹ Otherwise, intraoperative frontal α power significantly decreases with age.¹ It is however unclear whether α 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 α band (8-12 Hz) power (μV^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 ≥ 65 y: 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 ± 33 min (36 - 278 min) in elderly and 106 ± 39 min (41 - 231 min) in young subjects (Student t-test; P = 0.282). Fig 1 represents mean frontal α power for the entire cohort and both groups.



Conclusions: This is the first study to analyze frontal α power under controlled and stable sevoflurane anesthesia. Our results show that α 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 α 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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