

## Effect of aging on cerebral tissue oxygenation in relation to reflex syncope

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**Background:** There is an increased susceptibility to syncope with aging attributed to age-related physiological impairments. Cerebral oximetry non-invasively measures cerebral tissue oxygenation (SctO<sub>2</sub>) and has been shown to be valuable in syncope evaluation. SctO<sub>2</sub> has been found to decrease with aging but it is unknown whether the decrease in SctO<sub>2</sub> is related to increased susceptibility to syncope during orthostatic provocation. By measuring SctO<sub>2</sub> during head up tilt test (HUT) we can study age-related differences in SctO<sub>2</sub> and their impact on developing reflex syncope.

**Purpose:** To investigate the effect of age on the cerebral tissue oxygenation threshold for syncope and presyncope among patients with vasovagal syncope.

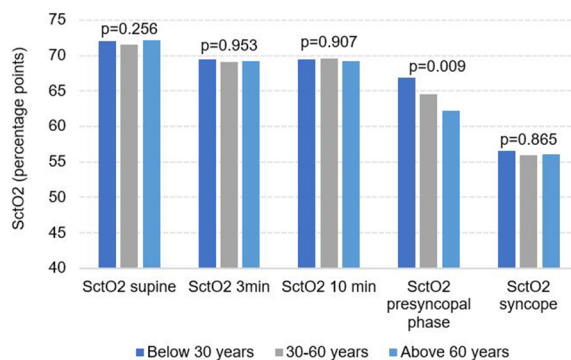
**Methods:** Non-invasive haemodynamic monitoring and near-infrared spectroscopy (NIRS) were applied during head-up tilt (HUT) in 139 vasovagal syncope patients (mean [SD] 45[17] years, 60% female), and 82 control patients with a normal response to HUT (45[18] years, 61% female). Group differences in SctO<sub>2</sub> and systolic blood pressure (SBP) during HUT in supine position, after 3 and 10 min of HUT, 30 seconds prior to syncope ("presyncopal phase") and during syncope in different age groups (<30, 30-60 and >60 years) were compared using one-way ANOVA and Tukey's multiple comparison test. Associations between age and SctO<sub>2</sub> were studied using linear regression models adjusted for sex and concurrent SBP.

**Results:** Lower SctO<sub>2</sub> in supine position was associated with increasing age among controls (B=-0.085, p = 0.010) but not among VVS patients (B=-0.036, p = 0.114). No age-related differences in SctO<sub>2</sub> were found after 3 and 10 minutes of HUT and during syncope. Mean SctO<sub>2</sub> (%) during the presyncopal phase decreased over the advancing age groups (<30: 66.9 ± 6.2, 30-60: 64.5 ± 6.1, >60: 62.2 ± 5.8; p = 0.009 for inter-group comparison). In contrast, mean SBP during the presyncopal phase did not differ by age groups (<30: 85.6 ± 21.8, 30-60: 77.6 ± 19.7, >60: 77.6 ± 20.8 mmHg, p = 0.133). Age was associated with lower SctO<sub>2</sub> during the presyncopal phase after adjusting for sex and SBP (B = 0.096, p = 0.001).

**Conclusion:** Older VVS patients have lower cerebral tissue oxygenation in the presyncopal phase compared with younger patients independently of systolic blood pressure. These results suggest either that with imminent reflex syncope cerebral tissue oxygenation diminishes more with advancing age or that cerebral deoxygenation is better tolerated by older reflex syncope patients.

Abstract Figure.

Cerebral tissue oxygenation according to age in vasovagal syncope patients during head up tilt test.



P-values are from one way-ANOVA for differences in mean SctO<sub>2</sub> in patients below 30 years, between 30-60 years and over 60 years of age. SctO<sub>2</sub>, cerebral tissue oxygenation.