



P18 Vascular Aging Index of the Finger Photoplethysmogram: A Validation Study with Vascular Stiffness, Mental Stress, and Day-to-Day Variability

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ABSTRACT

Background: Daily assessment of vascular health may predict cardiovascular incidence. Vascular aging index (VAI) calculated from second derivative of photoplethysmogram (SDPTG) is a simple, non-invasive measure possibly reflecting vascular stiffness. However, the effects of daily life events such as mental stress and day-to-day variability as well as its relation to other indices of vascular stiffness remain unclear.

Purpose: To determine whether VAI measured by finger SDPTG is 1) correlated with peripheral augmentation index (pAI), 2) altered by acute mental stress, and 3) affected by day-to-day variability.

Methods: Simultaneous measurements of finger photoplethysmogram and radial artery tonometry were performed in 68 healthy subjects (age = 22–64 years) of whom 31 subjects were further tested during a 30-second mental arithmetic and 10 subjects underwent day-to-day variability assessment for 5 consecutive days. VAI was calculated from a 20-second segment of photoplethysmogram data [1].

Results: At rest, VAI was positively correlated with pAI ($r = 0.62$, $p < 0.001$). During mental arithmetic, VAI increased when compared with the control condition ($p = 0.032$) whereas pAI did not show significant change. Five day measurements of VAI demonstrated the overall coefficient of variation of $21.1 \pm 13.7\%$ across all subjects.

Conclusion: VAI calculated from the finger SDPTG is related to a measure of vascular stiffness and sensitive to mental stress with fair day-to-day variability. These findings suggest that VAI assessment needs to be performed at the quiet resting condition.

REFERENCE

- [1] Takazawa K, Tanaka N, Fujita M, Matsuoka O, Saiki T, Aikawa M, et al. Assessment of vasoactive agents and vascular aging by the second derivative of photoplethysmogram waveform. *Hypertension* 1998;32:365–70.

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