Comparing the lower limb vascular response to a passive leg raising test by Laser Doppler Flowmetry and Photoplethysmography

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AIM: Photoplethysmography (PPG) is a reference for quantifying both macro and microcirculation, but progressively lost interest for laser Doppler flowmetry (LDF), currently the most widely used technique for microcirculatory assessment. Information about the combined use of these techniques is still lacking, so our goal was to assess the bilateral lower limb vascular response to a passive leg raising (PLR) test using both PPG and LDF.

METHODS: A group of 10 healthy volunteers (27.0 ± 5.2 y o) was selected after written consent. The PLR test consisted of three phases: (I) 10 min stabilizing period; (II) 10 min record after raising (30°) a randomly chosen leg, keeping the contralateral leg unmoved; (III) return to the initial position for further 10 min. PPG and LDF signals were recorded on the first and second toes of both feet. The Wilcoxon signed-rank test was used for statistical comparison (p<0.05).

RESULTS: The area under the curve (AUC) of the LDF signal decreased significantly on both feet between phases I and II which might be explained by the gravitational transfer of blood from the raised leg and by a centrally mediated vasoconstrictor reflex. No differences were found on the PPG signals’ AUCs of both feet between phases.

CONCLUSIONS: The combined use of LDF and PPG allows to quantify macro and microcirculatory contributions to the regulation of peripheral circulation in vivo, and suggests that PLR produces different impacts on different cutaneous vascular networks.