

Low-density lipoproteins, body mass index, and the female sex are predictors of reduced cutaneous reactive hyperemia in human skin

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Purpose: The human cutaneous circulation is a representative vascular bed to assess systemic microvascular dysfunction associated with preclinical cardiovascular diseases. Laser speckle contrast imaging (LCSI) is a state-of-the-art method used to measure skin blood flow (SkBF), imaging a larger surface area compared to single-point laser-Doppler flowmetry. Using LCSI, we sought to determine what cardiovascular risk factors were most predictive of the cutaneous reactive hyperemic (RH) response in human subject with a broad range of age cardiovascular disease risk factors. **Methods:** A standardized RH protocol consisting of three, five minute suprasystolic occlusions was performed on 38 human subjects ranging in age (19-82 years), body mass index (BMI: 19.7-36.2 kg/m²), mean arterial pressure (MAP: 67-99 mmHg) and serum low-density lipoproteins (LDL) (54-185 mg/dl). Following the occlusion, the RH SkBF response was imaged using the full-field LCSI. Regions of interests (ROI) were determined, integrated, and normalized to cutaneous vascular conductance (CVC, integrated ROI flux/MAP). A stepwise regression analysis was performed to determine the best predictors of RH parameters including the peak SkBF, and the total hyperemic response (THR). **Results:** Subject sex ($R^2=0.158$, $P<0.001$), BMI ($R^2=0.195$, $P<0.001$), and serum LDL ($R^2=0.27$, $P<0.001$) were all significant predictors of peak RH CVC. Both age ($R^2=0.108$, $P<0.001$) and BMI ($R^2=0.147$, $P=0.012$) significantly predicted the THR. **Conclusion:** Increased BMI, serum LDL, and the female sex, are associated with decreased peak SkBF response during RH. Increased age and BMI are associated with a decreased total hyperemic response. (NIH R01 AG07004-19-25)