Activity patterns and skin microcirculation in healthy young and middle-aged adults

Chronic venous insufficiency, a common cardiovascular problem in the elderly, causes changes in the skin microcirculation. The influence of normal aging on skin microcirculation in the absence of disease remains unknown. This study investigated the effect of age and activity patterns on non-invasive measures of skin microcirculation in the lower extremities of healthy adults. We hypothesized the following: 1) skin temperature (Ts), skin oxygen (PtcO2), and skin blood flow (laser Doppler flux (LDF)) would be lower while skin carbon dioxide (PtcCO2) would be higher in middle-aged compared to young adults, and 2) there would be a positive relationship between the amount of time spent exercising and PtcO2 and LDF. 56 young (23.6±4.1 yrs) and 54 middle-aged (57.4±6.4 yrs) healthy adults with no history of anemia, diabetes mellitus, autoimmune, cardiovascular, peripheral vascular, pulmonary, or renal disease participated. Ts and heated (44°C) PtcO2/PtcCO2 and heated (44°C) LDF sensors were placed on the lower extremities. Baseline, resting supine values were obtained after 30 minutes of equilibration. Subjects recorded the number of minutes/day spent in different activities for 7 consecutive days. Activity data were collapsed into 4 categories for analysis. Data were analyzed using Wilcoxon Rank Sum test and are presented as mean±SD. Number of minutes/day spent lying supine was greater for younger (564.0±93.0) than middle-aged subjects (514.7±73.1, P=0.006). Mean number of minutes/day spent sitting, standing/walking, or exercising was not different between the groups. Lower extremity PtcO2 was higher in younger (74.2±11.6 mmHg) compared to middle-aged subjects (67.3±10.8 mmHg, P=0.001). Ts, PtcCO2, and LDF were not different for the groups. There was no relationship between amount of time spent exercising and PtcO2 or LDF values. This study establishes normative, baseline skin microcirculation data for healthy middle-aged adults.