01-3 Time-course changes in local and systemic vasomotor activities during a hand warming in young individuals

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Objectives: The early local vasodilator response to local warming is predominantly dependent on neural reflexes. However, it is suggested that systemic vasomotor activities are unaffected by a local warming at early stage. The purposes of this study were to assess the hypothesis that systemic vasomotor activities might make an adjustment at early stage of hand warming.

Materials and Methods: Thirty-nine young volunteers who were healthy were recruited. Each participant received a right hand bathing at 40°C for 10 minutes. Doppler ultrasound technique was used to monitor the brachial artery mean blood velocity (aMBV) at the heated arm, and changes in aMBV were used to evaluate local vasodilator response to hand warming. Photoplethysmographic technique was used to monitor digital volume pulse (DVP) at the unheated finger, and changes in the DVP derived peak amplitude (DVPampl), reflection index (DVPRI), stiffness index (DVPSI), and heart rate (HR) were used to evaluate vascular distensibility of the unheated upper limb, small artery tone in the lower body, large artery stiffness, and cardiac regulation respectively. The data collected in each minute were averaged as an interval. Comparisons of aMBV, DVPRI, DVPSI, and HR at each interval with their respective baseline values were performed using one-way ANOVA.

Results: Plots of one-minute intervals versus aMBV, DVPampl, DVPRI, DVPSI, and HR were shown in Figure. aMBV values presented significant increases with a early peak at the third minute. DVPampl presented significant decrease in the first minute and then reversed to a significant increase at the sixth minute. DVPRI presented a significant increase in the first three minutes, and then returned to the level of baseline. DVPSI and HR did not present any significant changes.

Conclusion: At the period of early local vasodilator response to hand warming, systemic vasomotor activities did make a significant adjustment by decreasing vascular distensibility of the unheated upper limb and increasing small artery tone of the lower body, though the activities in heart rate and large artery tone were unaffected. Later, vascular distensibility of the unheated upper limb made a reverse adjustment and reached a significant increase.

Keywords: Hot stimuli, Local warming, Vasomotor activities, Hand
Figure A  The brachial artery mean blood velocity (aMBV) measured at the heated upper limb is plotted as a functional representation of one-minute intervals.

Figure B  The DVP derived peak amplitude (DVPampl), reflection index (DV PRI), stiffness index (DVPSI), and heart rate (HR) measured at the unheated finger is plotted as a functional representation of the one-minute intervals. For each variable, the value shown is the average of the values obtained in each interval. Values shown are mean ± SE.

★ P<0.05 versus baseline (BL).