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EFFECTS OF POSTURAL CHANGE FROM SUPINE TO HEAD-UP TILT ON SKIN SYMPATHETIC NERVE ACTIVITY COMPONENT SYNCHRONIZED WITH CARDIAC CYCLE IN WARMED MEN

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In humans, it has been suggested that the cutaneous vasodilatation response to hyperthermia is suppressed by baroreflexes to maintain arterial pressure when the posture was changed from supine to upright, and if the reflexes do not function sufficiently, it can cause heat syncope. However, the efferent signals of the reflexes have not been identified.

To identify the signals, we continuously measured skin sympathetic nerve activity (SSNA; microneurography), right atrial volume (RAV; echocardiography, the baroreceptors for the reflexes are reportedly located), cutaneous vascular conductance on the chest (CVC_{chest}; laser Doppler flowmetry), and esophageal temperature (T_{es}; thermocouple) in young men before and after passive warming with a perfusion suit, during which periods the posture was changed from supine to 30° head-up tilt positions. During these periods, we also simultaneously measured muscle sympathetic nerve activity (MSNA) to distinguish the SSNA from MSNA.

We found that an increase in T_{es} by ~0.7°C (P<0.0001) increased the total SSNA (P<0.004); however, the head-up tilt in hyperthermia did not change the total SSNA (P>0.26) although an increase in CVC_{chest} (P<0.018) was suppressed and RAV was reduced (P<0.007). In contrast, the SSNA component synchronized with the cardiac cycle increased in hyperthermia (P<0.014), but decreased with the postural change (P<0.016). The SSNA component was highly correlated with the CVC_{chest} (R^2=0.67, P<0.0001), but the MSNA component was not (R^2=0.13, P=0.085) when the values during the postural change before and after warming were pooled across all subjects.

Thus, the SSNA component might be involved in suppressing cutaneous vasodilatation during postural changes.

Key words: skin sympathetic nerve activity, active vasodilator system, baroreflexes, muscle sympathetic nerve activity