VASOMOTOR RESPONSES DURING SINUSOIDAL EXERCISE IN GLABROUS AND NONGLABROUS HUMAN SKIN

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Reflex control of the vasculature in nonglabrous skin is mediated by a vasoconstrictor system and an active vasodilator system, whereas that in glabrous skin is mediated by a vasoconstrictor system only. In the present study, to test whether vasomotor responses to dynamic exercise differ in glabrous and nonglabrous human skin, we determined the phase response and amplitude response of cutaneous vascular conductance (CVC) in dorsal hand, forearm and palm to sinusoidal exercise. Nine healthy subjects exercised on a cycle ergometer with a constant load (35 % of peak O_2 uptake) for 20 min; for the next 40 min they exercised with a sinusoidal load at an ambient temperature of 25°C and relative humidity of 60 %. The sinusoidal load variation ranged from 10 % to 60 % of peak O_2 uptake over a 4-min period. Skin blood flow was monitored by laser-Doppler flowmetry. CVC was evaluated from the ratio of blood flow to mean arterial pressure. During sitting rest and exercise, CVC in dorsal hand and forearm showed lower values than that in palm ($P<0.05$). During sinusoidal exercise, the amplitude in CVC in palm was three times and forty six times greater than those in dorsal hand and forearm, respectively ($P<0.05$). The phase lags in CVC in dorsal hand (58±14 s) and forearm (76±17 s) were smaller than that in palm (135±6 s) ($P<0.05$), because CVC in palm was decreased promptly with the increase of exercise load. These findings suggest that nonglabrous skin vasomotor shows a smaller amplitude response and prompter phase response than glabrous skin vasomotor during cyclic changes of dynamic exercise load. The difference of cutaneous vasomotor control in glabrous and nonglabrous regions during dynamic exercise may be partly due to active vasodilator system.

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