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SYSTEMIC ADAPTATIONS TO EXERCISE TRAINING IN SKIN MICROCIRCULATION IN HUMANS

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Objective.
To assess whether microcirculatory vascular responses to lower limb training occur systemically, and whether shear stress contributes to such adaptations.

Methods.
9 subjects completed 8-weeks of cycle ergometer training, with unilateral forearm cuff inflation to manipulate upper limb blood flow and shear stress during each exercise bout. To test skin microvascular function at 0 and 8 weeks of exercise training, we measured forearm skin flux in response to local heating from 33 to 44ºC.

Results.
Acutely, cycling onset increased skin flux (12.1±4.1 to 131.7±35.0PU) and temperature (31.7±0.4 to 33.6±0.9°C), whilst in the cuffed arm (60mmHg) skin flux (11.91±2.22 to 52.92PU) and temperature (31.5±0.3 to 31.7±0.8°C) responses were attenuated or absent (both $P<0.001$). Chronically, after 8-weeks of cycling, skin flux responses during heating to 44°C (3.65±0.30 to 2.84±0.44PU/mmHg) were significantly lower in the uncuffed arm, but unchanged in the cuffed limb (3.70±0.39 to 3.46±0.30PU/mmHg).

Conclusions.
Cycling exercise is associated with increased skin perfusion in the upper limbs, an affect which is ameliorated by placement of a cuff. Cycle training decreased the skin vasodilator response to an identical local heating stimulus, suggesting enlargement of the capillary bed and associated increases in skin blood flow transit time. We speculate that this impact of leg exercise training in the upper limbs may enhance systemic heat loss following training. No changes in the cuffed arm were apparent, suggesting that increases in shear stress may mediate some of this adaptation in the skin microcirculation.