

Intra-segmental distribution of emotional sweating

C.A. Machado-Moreira and N.A.S. Taylor, School of Health Sciences, University of Wollongong, Wollongong, NSW 2522, Australia.

It is well accepted that glabrous (non-hairy) skin surfaces respond to changes in emotional states (e.g. anxiety, fear, cognitive stress) with increased sweat secretion. However, little is known about the participation and regional distribution of non-thermally-mediated sweating in non-glabrous skin regions. We have previously reported increased sudomotor responses at glabrous and non-glabrous skin surfaces of the head during cognitive stress (Machado-Moreira *et al.*, 2006). In the current study, we mapped the distribution of this non-thermal sweating over the entire body, and also investigated its intra-segmental distribution. Twenty six healthy and physically-active males and females participated in five experiments. Generalised, thermally-induced sweating, was established through 25 min of passive heating (climatic-controlled chamber: 36°C, 60% relative humidity; and water-perfusion suit: 40°C), which increased mean body temperature from $35.2 \pm 0.2^\circ\text{C}$ to $37.0 \pm 0.1^\circ\text{C}$. Subjects were then asked to perform a series of arithmetic calculations, and were challenged and verbally encouraged to solve as many problems as possible within 60 s. Across the five experiments, separated by at least 1 month, sweat rates from the torso (6 sites; $N=10$), upper and lower arm (5 sites; $N = 5$), hand (4 sites; $N = 10$), thigh (6 sites; $N = 5$), leg (6 sites; $N = 5$) and foot (5 sites; $N = 10$) were measured using ventilated sweat capsules (1.40 and 3.16 cm²). Significant increases in sweating due to the mental stimulus ($P < 0.05$) were observed in 38% of the 32 skin surfaces investigated, with low sudomotor responsiveness verified at the upper arm, thigh and leg. All sites within the forearm, hand and foot showed increased mentally-induced sweat rates ($P < 0.05$), except for the palm ($P > 0.05$) and sole ($P = 0.06$). Within the torso, the abdomen and back regions showed increased emotional sweating ($P < 0.05$), while no significant augmentation of sweat rate was observed for the ventral (chest) and lateral regions of the torso ($P > 0.05$). Changes in sweat rates (peak - baseline) within the torso and hand segments are shown in the Figure.

The current results strongly reinforce our previous observations that mental sweating is not restricted to glabrous skin surfaces (e.g. palms and soles), as is often considered. Indeed, many skin surfaces participate in emotional sweating once thermal sweating has been established, and the participation of palms and soles becomes less evident in this condition. Furthermore, although intra-segmental variations in sudomotor responses to mental stress exist, the changes in sweat rates from glabrous and non-glabrous skin surfaces do not differ significantly within each body segment ($P > 0.05$). Our current research foci centre upon examining differences in the recruitment of eccrine sweat glands during thermal and emotional sweating, and evaluating emotional sweating in non-sweating, thermoneutral individuals.

Machado-Moreira CA , Caldwell JN, Meijer AK , Wilmink F & Taylor NAS. (2006) *Proceedings of the Australian Physiological Society*, **37**: 93P.

