

Non-thermal sweating in humans: an investigation of mental sweating from non-glabrous skin surfaces

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Human eccrine sweat glands are cholinergically innervated, possibly being transformed from adrenergic pathways during postnatal development. Some glabrous (non-hairy) regions receive cholinergic and adrenergic stimulation. Such sites are powerfully influenced by changes in mental or emotional states, but it is generally regarded that non-glabrous surfaces do not participate in such sweating. Herein are reported experiments to test the hypothesis that non-thermal (mental) sudomotor drive in the heat would elevate sweat secretion from non-glabrous surfaces of the head. Ten, resting (sitting) males were heated using a water-perfusion suit (46°C) and a climate-controlled chamber (36°C, 60% relative humidity). Subjects were shaved and instrumented. Mean body temperature was elevated (1.9°C) to induce generalised thermal sweating. Sweat rate was measured (0.2 Hz: 3.16 cm² capsules) at ten sites (forehead plus nine sites inside the hair line). After 25 min, subjects performed a cognitive-function task, requiring considerable concentration and mental effort. Sudomotor responses were evaluated during 5 min preceding (20-25 min), and 2 min immediately after that task (25-27 min). Since mean body temperature changes were minimal from 20-27 min (<0.04°C), differences in sudomotor sensitivity (over time) between these two periods were compared. At all sites, the mental task increased this sensitivity at least 5.5-fold, with these differences being significant ($P<0.05$), except at the occipital region. These observations demonstrate that the non-thermal (mental) sudomotor drive is not restricted just to glabrous skin. We are currently investigating the extent of this phenomenon, and its neuropharmacological significance.