Electronic supplementary material (ESM)

Temperature perception testing

Hot (HPT) and cold (CPT) temperature perception thresholds were measured on the pulp of the left big toe using a thermal aesthesiometer (HVLab Diagnostics Instruments) fitted with a circular aluminium disc (55 mm diameter) that varied in temperature between 5 and 55^{o}C [Seah et al 2008]. Temperature perception thresholds were measured using the method of limits. Depending on the threshold (i.e. either HPT or CPT), the temperature of the applicator increased or decreased at 1oC per second from a reference temperature of 32.5^{o}C. Participants were instructed to press a response button as soon as they perceived a change in temperature. The temperature of the applicator then returned to the reference temperature at 1^{o}C per second and remained at 32.5^{o}C for a random period between 3 and 5 s before the temperature increased or decreased again. A total of six judgements were obtained for each test condition.

The mean threshold (HPT or CPT) was calculated from the last four judgements. We also calculated a threshold perception index (TPI) for each individual as the arithmetic difference between HPT and CPT. Mean skin temperature measured at the big toe prior to testing was 28.2 ± 2.5^{o}C (n=90). If the temperature at the toe was below 25^{o}C, it was raised with a heat pad to 25^{o}C prior to testing. The hot and cold thresholds were always measured in the same order, with cold measurements undertaken before hot.

The intra-individual coefficient of variation (CV) was 6.4% for HPT and 5.4% for CPT, measured in 13 healthy volunteers (10 male) (age 35±11.4y) on two occasions .

Seah SA, Griffin MJ (2008) Normal values for thermotactile and vibrotactile thresholds in males and females. Int Arch Occup Environ Health 81: 535-543

Vibrotactile perception

Vibration perception thresholds (VPTs) at 125Hz were measured (Vibrotactile Perception Meter, HVLab Diagnostics Instruments) with a 6-mm diameter probe and a 2-mm gap to a 10-mm diameter surround (1). VPTs were determined using the von Békésy method (2): the vibration magnitude alternately increased and decreased at 3 dB/s according to whether the subject felt the vibration. A response button was pressed when the vibration was felt and released when the vibration was not felt. Measurements continued for 30 s or until a minimum of six pairs of reversals had been obtained, after excluding the first pair. Thresholds (m.s-2) were determined from the arithmetic averages of the logarithms of the root-mean-square vibration acceleration at the reversals (3). Tests were

performed on the pulp of the left great toe at baseline and end of study. The intra-individual coefficient of variation (CV) was 22% measured in 20 volunteers on two occasions.

Microvascular function

Cutaneous microvascular blood flow (MBF) was assessed on the ventral surface of the non-dominant forearm arm using laser Doppler fluximetry (Moor VMS LDF2 and DP1T probe, Moor Instruments Ltd, Axminster, UK) before at rest and during the dilator response to transient ischaemia (180 mmHg for 3 min; MoorVMS-PRES). Values for MBF were determined at rest (RF: mean value over the final 5 min before perturbation) and at maximum value after release of the pressure cuff (MF) in perfusion units (PU) using the manufacturer's software (MoorVMS-PC software, Moor Instruments Ltd, UK). The intra-individual CV measured in the forearm of 10 volunteers on two occasions, 7 days apart, was 15% for RF and 19% for MF/RF.

References

1. Seah SA, Griffin MJ (2008) Normal values for thermotactile and vibrotactile thresholds in males and females. Int Arch Occup Environ Health 81: 535-543

2. Gu C, Griffin MJ (2013) Spatial summation of vibrotactile sensations at the foot. Med.Eng Phys. 35: 1221-1227

3. Gu C, Griffin MJ (2011) Vibrotactile thresholds at the sole of the foot: effect of vibration frequency and contact location. Somatosens.Mot.Res. 28: 86-93.