
Human C-low-threshold-mechanoreceptor afferents respond to hair deflection

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Abstract

Mammalian hairy skin is innervated by a population of unmyelinated afferent fibres which are exquisitely sensitive to gentle stroking touch. In mice these afferents, termed C-low-threshold-mechanoreceptors (C-LTMRs), express tyrosine hydroxylase (TH) and form lanceolate endings around hair follicles. Whether human C-LTMRs innervate hair follicles is unknown - it is not possible to selectively stain C-LTMRs in human skin and responses of C-LTMRs to hair deflection have been poorly described. To determine the ‘functional anatomy’ of peripheral C-LTMR endings in humans we recorded the response of eight consecutive single C-LTMRs, identified during microneurography, to hair manipulation. All fibres responded robustly to gentle slow stroking (~3cm/s) with a soft brush. All fibres had mechanical thresholds less than 0.4g (M = 0.06g). Hairs in the receptive field were carefully deflected using either a fine probe or forceps under magnification, ensuring no contact with the skin; or using a custom-built device capable of deflecting and pulling hairs. A response to hair deflection, defined as a minimum of two spikes during stimulation, was seen in eight C-LTMRs. C-LTMRs (**6 out of 8**) also responded to gentle hair pull and **6 out of 6** exhibited after-discharges on mechanical hair removal. The findings indicate that human C-LTMRs are very likely to have a close anatomical arrangement to hair follicles, which may explain their exquisite mechanical sensitivity to gentle stroking touch to hairy skin.

Keywords: C, tactile Afferent, CLTM, Hair Deflection, Hair Pulling, Somatosensation, Nociception

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