

# **Affective touch throughout life: From cortical processing in infancy to touch perception in adulthood**

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av

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Avhandlingen baseras på följande delarbeten:

- I. **Jönsson EH**, Kotilahti K, Heiskala J, Backlund Wasling H, Olausson H, Croy I, Mustaniemi H, Hiltunen P, Tuulari JJ, Scheinin NM, Karlsson L, Karlsson H and Nissilä I. Affective and non-affective touch evokes differential brain responses in 2-month-old infants. Manuscript (Under revision)
- II. **Jönsson EH**, Backlund Wasling H, Wagnbeck V, Dimitriadis M, Georgiadis, JR, Olausson H and Croy, I. Unmyelinated Tactile Cutaneous Nerves Signal Erotic Sensations. *Journal of sexual medicine* 2015; 12:6, p 1338-45
- III. **Jönsson EH**, Bendas J, Weidner K, Wessberg J, Olausson H, Backlund Wasling H, Croy I. The relation between human hair follicle density and touch perception. Manuscript (Accepted for publication in *Scientific Reports*)



# **Affective touch throughout life: From cortical processing in infancy to touch perception in adulthood**

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## **Abstract**

Affective, interpersonal touch is important for forming and maintaining social bonds. In the hairy skin of humans there is a specific type of nerve fibers called C-tactile (CT) afferents which are optimally activated by a light stroking of the skin, like a caress. These afferents have been suggested to be involved in the detection and relaying of affective touch. In the current thesis stroking touch stimulation, targeting the CT afferents, is used in three papers investigating different aspects of touch processing and touch perception.

In paper I slow (affective) and fast (non-affective) stroking was applied to the forearm of two month old infants while the cortical response was measured using diffuse optical tomography. Analysis of the hemodynamic response of the cortex following slow compared to fast stroking revealed activations in the temporal and insular cortices. These results are coherent with activations previously shown in adults and indicate that the human brain already in early postnatal life can distinguish between affective and non-affective touch.

In paper II and III the perception of stroking touch stimulation was tested in healthy adult subjects. The participants were stroked on the forearm and the inner thigh and asked to rate the pleasantness, eroticism and intensity of the stimulation. Paper II revealed no difference in ratings of stroking on the forearm or the thigh. However, for the first time it was shown that the ratings of eroticism follow the same pattern as previously has been reported for pleasantness ratings, and for the firing frequency of CT afferents. This may indicate involvement of CT afferents also in erotic touch perception. Furthermore, the ratings of eroticism decreased as a function of the duration of the romantic relationship. In paper III a skin sample was obtained together with the ratings of touch perception. In the skin sample the number of hair follicles were counted in order to test the hypothesis that CT afferents are connected to hair follicles, and that the density of hair follicles could have effects on the perception of touch. In this paper, the large sample sizes also allowed assessment of gender differences. Indeed, the results revealed gender differences both in ratings of touch perception and in hair follicle density, where women rated touch as more pleasant and had higher hair follicle densities. The gender difference in hair follicle density was however abolished when controlling for body size. No conclusive evidence for a correlation between hair follicle density and affective touch perception was found.

This thesis adds further knowledge to the growing field of affective touch. Specifically, it adds knowledge on how touch is processed in infancy, and how it is perceived in adulthood. It further also highlights some gender differences in how stroking touch is experienced.

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