On the emergence of somatosensory maps in the first months after birth: preliminary data

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Abstract

The somatosensory cortex plays a major role in our ability to perceive and use our body to interact with our environment (e.g., locomotion, grasping) and others (e.g., speech, writing). Since the seminal work of Penfield and Boldrey (1937), the last thirty years of sensorimotor research focused primarily on its functional characterisation in adult individuals. However, recent studies comparing individuals who lost a hand at different developmental stages (Hahamy et al, 2017) re-emphasised the crucial role of early development in determining sensorimotor organisation. Surprisingly, while touch is the first sense to develop in humans, very little is known about how somatosensory maps evolve in the first months after birth. Only a handful of neuroimaging studies reported the existence of proto-maps in neonates and infants (Meltzoff et al, 2018; Dall'Orso et al, 2018). We aimed to address this gap by scanning (3T MRI) typically-developing full-term infants at 1 month (n=4 out of 7 included) and 3 months of age (n=3 out of 4 included). All infants received tactile pneumatic stimulation of the cheek, dorsum of the hand and sole of the foot on the right side, during natural sleep. A block design with 8s of stimulation interleaved with 7s of rest was used. A variable number of data was collected for each infant depending on their sleep duration (6 to 12 blocks per condition). I will present preliminary univariate fMRI data obtained in these infants as a first proxy to i) characterise somatosensory maps, and ii) assess the viability of our paradigm.

Keywords: development, primary somatosensory cortex, functional MRI, infants

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