# Intracortical microstimulation

Microstimulation is being explored as a method to deliver sensory percepts to circumvent damaged sensory receptors or pathways. For example, stimulation of primary visual cortex create phosphenes (flashes of light) which can be used to restore some vision for a blind individual. Other applications include bladder prostheses; cochlear and brain-stem auditory prostheses and retinal and thalamic visual prostheses.

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Intracortical microstimulation of the somatosensory cortex offers the potential for creating a sensory neuroprosthesis to restore tactile sensation. Whereas animal studies have suggested that both cutaneous and proprioceptive percepts can be evoked using this approach, the perceptual quality of the stimuli cannot be measured in these experiments. We show that microstimulation within the hand area of the somatosensory cortex of a person with long-term spinal cord injury evokes tactile sensations perceived as originating from locations on the hand and that cortical stimulation sites are organized according to expected somatotopic principles. Many of these percepts exhibit naturalistic characteristics (including feelings of pressure), can be evoked at low stimulation amplitudes, and remain stable for months. Further, modulating the stimulus amplitude grades the perceptual intensity of the stimuli, suggesting that intracortical microstimulation could be used to convey information about the contact location and pressure necessary to perform dexterous hand movements associated with object manipulation [1)].

1)

Flesher SN, Collinger JL, Foldes ST, Weiss JM, Downey JE, Tyler-Kabara EC, Bensmaia SJ, Schwartz AB, Boninger ML, Gaunt RA. Intracortical microstimulation of human somatosensory cortex. Sci Transl Med. 2016 Oct 19;8(361):361ra141. Epub 2016 Oct 13. PubMed PMID: 27738096.