

Overview:

The paper identifies the extended somatosensory localization of the modality specific points on the face in the issue of phantom pain, taking the consideration of 3 amputated humans.

The study is on perceptual correlates of massive cortical reorganization corresponding to the changes observed in physiological studies. According to the physiological relation of Arm and face, the study was carried on some somatosensory points. Though the other researches of Dr.Ramachandran observed the modalities of 'pain' and 'kinesthetics', the present abstract illustrates the research on 'touch' and 'temperature'.

The study observes the localization of these somatosensory experiences on specific parts of the body. These are called reference fields, which are not distributed randomly, but are found on 2 regions one on the same side of face and one below the amputated line. The reaction on face to amputated arm refers that there is a mapping. Dr.Ramachandran and Rogers identified that there is 1 to 1 mapping between specific regions of the face and the individual digits points. The memories observed were also very short-term, ranging between 7 to 8 seconds. Further they observed that the reorganization of the cortical region is very rapid, as the phantom pain was observed after 4 weeks in a patient with a limb amputation.

The study was systematically related to animal physiology as the modality points from hand are related to 2 cluster points, one on face and another on line of amputation, hence giving a way to further study of cortical region of hand.

The reorganization after 4 weeks gives an understanding of unmasking of synapses rather than sprouting of axons. Further it is found that when an amputation occurs the synapses

are unmasked through disinhibition, resulting the reorganization of cortex. The study could not conclude that the inhibition is permanent or short tem.

The study could not illustrate much on misinterpreting signals of prprioceptors of the missing limb with the phantom pain.

Interpretation of Study:

Summarizing the research of Dr, Ramachandran, Pone agrees that the above study has shown the area of reorganization in brain after Peripheral or central damage. And he also agrees on the sole responsibility of central mechanism for the phantom pain. Further he observes the dissociation effect of adjacent neuromass on the stimulation of cortical region, which is taken as advantage by Dr. Ramachandran.

Though Tim.P.Pons agrees with the idea of Dr.Ramachandran that sprouting of new inputs does not cause phantom pain, he is not agreeing the other cause referred as “unmasking of synapses”. As explained by Pons, as there is no direct representation map in cortex for Face and hand. By applauding the work of Dr. Ramachandran, as great contribution to the field of processing sensory inputs by reorganized cortex, the objection raised against ‘unmasking synapses’ made the mechanism of cortical reorganization to observe further.

Other view of reorganization:

The studies reveal that a chemical signal, arising from the surface of the skin may be responsible for somatotrophic pattern formation in Somatic cortex. Neurotrophins like NGF promote survival and differentiation of primary sensory neurons. Further the article explains about the structural similarity of Transforming Growth factor Beta-2 and Nerve Growth Factor. The extra cysteine, which forms an intersubunit disulfide in TGF-beta, is

absent in NGF and will probably reflect the different arrangements. Though the paper explains about the structural difference of the hydrophobic nature of the homodimers, it does not explain the significance of functional activity of these proteins in the cortical reorganization process.

Importance of the findings in medical use:

Deafferentation due to local anesthetic block, amputation or nerve transection in the upper extremity leads to very rapid cortical synaptic remodeling, resulting in a distorted cortical hand representation as well as in enlarged and overlapping cortical receptive fields. The assumption could be more observed in the purview of anaesthetical science

Need for further research:

- The mechanism of Cortical reorganization has to be explained clearly in the light of more research
- As peripheral nerve repair techniques are not available on the study, there is a need for new and improved strategies for sensory relearning following nerve repair.
- More modality specific points need to be identified for the use of physiotherapy techniques in amputees.
- The relevancy of neurotrophins in cortical reorganization has to be explained further