Averaged magnetoencephalography (MEG) following somatosensory stimulation, somatosensory evoked magnetic field(s) (SEF), in humans are reviewed. The equivalent current dipole(s) (ECD) of the primary and the following middle-latency components of SEF following electrical stimulation within 80-100 ms are estimated in area 3b of the primary somatosensory cortex (SI), the posterior bank of the central sulcus, in the hemisphere contralateral to the stimulated site. Their sites are generally compatible with the homunculus which was reported by Penfield using direct cortical stimulation during surgery. SEF to passive finger movement is generated in area 3a or 2 of SI, unlike with electrical stimulation. Long-latency components with peaks of approximately 80-120 ms are recorded in the bilateral hemispheres and their ECD are estimated in the secondary somatosensory cortex (SII) in the bilateral hemispheres. We also summarized (1) the gating effects on SEF by interference tactile stimulation or movement applied to the stimulus site, (2) clinical applications of SEF in the fields of neurosurgery and neurology and (3) cortical plasticity (reorganization) of the SI. SEF specific to painful stimulation is also recorded following painful stimulation by CO(2) laser beam. Pain-specific components are recorded over 150 ms after the stimulus and their ECD are estimated in the bilateral SII and the limbic system. We introduced a newly-developed multi (12)-channel gradiometer system with the smallest and highest quality superconducting quantum interference device (micro-SQUID) available to non-invasively detect the magnetic fields of a human peripheral nerve. Clear nerve action fields (NAFs) were consistently recorded from all subjects <sup>1)</sup>.

## 1)

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