Neuromagnetic SII responses do not fully reflect pain scale

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摘要

Abstract

To elucidate the role of somatosensory cortices in coding pain magnitude, we recorded the neuromagnetic responses of ten subjects to mild, moderate, and severe pain stimulation by delivering thulium-laser pulses on the dorsum of the left hand. The stimulus intensities for producing different pain levels were determined individually, and the mean values across subjects were 255, 365, and 490 mJ for mild, moderate, and severe pain, respectively. We obtained 40 responses for each intensity condition, and analyzed the averaged cortical signals by multi-dipole modeling. All subjects showed consistent activation over the bilateral secondary somatosensory (SII) cortices for each intensity level, peaking around 150–230 ms, with 15-ms earlier on the contralateral hemisphere. The SII dipole strength was significantly larger for the moderate than for the mild pain stimulation, but lacked further increase as the pain magnitude elevated to the severe level. In contrast, the primary somatosensory cortical response was detected in only half of our subjects, and thus it seemed difficult to evaluate its role in pain intensity coding. Our results suggest that activation strength in human SII cortices reflects the magnitude of peripheral noxious inputs only up to the moderate level, and some other cerebral correlates may get involved in sensing a further increment of pain magnitude.