**INTRODUCTION**

The mismatch negativity (MMN) is a cortical response thought to index a sensory change in the environment. It has been claimed as an objective index of perception, due to its functional independence from voluntary attention. Auditory, visual, and somatosensory stimuli can evoke a MMN. Yet, there is no evidence of MMN evoked by nociceptive stimuli. The MMN has been advocated as a tool for assessing abnormal brain function in a large number of clinical conditions, except that for chronic pain conditions [1]. Therefore, since a pre-attentive electrophysiological index of nociceptive-related brain activity would benefit in both basic and clinical pain studies, we aimed to (i) identify a nociceptive MMN (nMMN) as compared to somatosensory MMN (sMMN) and to (ii) discriminate the cortical effects of mismatch against the effects of attention.

**METHODS**

**Subjects.** 15 healthy right-handed volunteers (8 females) aged 21±1.6 (mean ±SD).

Stimulation. Non-painful somatosensory (transcutaneous electrical stimulus, TES) [3] and painful nociceptive stimuli (intra-epidermal electrical stimuli, IES) [3] consisted of three rapidly succeeding constant-current square-wave pulses (0.5 ms and 12 ms inter-pulse interval) either delivered through a needle cathode pair of surface electrodes or through three concentric bipolar needle electrodes (a needle cathode surrounded by a cylindrical anode) [3].

**EEG recording.** Somatosensory and nociceptive evoked potentials (SEPs and NEPs) were recorded by concentric bipolar needle electrodes (a needle cathode surrounded by a cylindrical anode) [3].

**EEG data.** EEG data were segmented into epochs of 700 ms (200 ms pre-stimulus and 500 ms post-stimulus) according to the rhythm of nociceptive stimuli. EEG epochs of 700 ms (200 ms pre-stimulus and 500 ms post-stimulus) were created at 0.01-30 Hz. EEG epochs of 700 ms (200 ms pre-stimulus and 500 ms post-stimulus) were created at 0.01-30 Hz.

**EEG epochs.** EEG epochs of 700 ms (200 ms pre-stimulus and 500 ms post-stimulus) were created at 0.01-30 Hz.

**EEG epochs.** EEG epochs of 700 ms (200 ms pre-stimulus and 500 ms post-stimulus) were created at 0.01-30 Hz.

**EEG epochs.** EEG epochs of 700 ms (200 ms pre-stimulus and 500 ms post-stimulus) were created at 0.01-30 Hz.

**REFERENCES**


**CONCLUSIONS**

Only early negativities (100-250 ms) located at the bilateral temporal regions of the scalp revealed a selective modulation of mismatch regardless of attention (Fig. 3). The modulation of sMMN had earlier onset than the nMMN (110 ms vs. 182 ms) as well as a larger difference of latency between the contralateral and ipsilateral onset of the activity (52 ms vs. 4 ms). Altogether, these findings provide evidence that (1) a nMMN can be elicited by painful nociceptive stimuli [2] the nMMN is topographically similar to the sMMN while differing in latency and possibly in functional organization of their generators.

**ACKNOWLEDGMENTS**

Li Hu is supported by Southwest University. The authors declare no competing financial interests.