Recent neuroimaging studies have shown that anterior cingulate cortex (ACC) involves in the emotional aspect of pain. The medial pain system that constitutes the medial thalamus (MT) and ACC may mediate the emotional nociceptive information processing. The present study examined the distribution and localization of field potentials and multiple unit activities in the ACC evoked by electrical paired-pulse stimulation (0.1ms, 100-300µA, inter-pulse interval, 100ms) of the ipsilateral MT in rats anaesthetized with halothane. C-fos proteins were immunohistochemically stained and examined in some rats. Paired-pulse could facilitate field potentials and multiple unit activities elicited from several MT nuclei. The amplitude ratio of 2nd and 1st negative field potentials is 2.54±0.23 and this ratio for integration of multiple unit activities is 1.64±0.12. The maxima of negative field potentials expanded from layer 2-3 (1st component) to layer 2-5 (2nd component) in secondary motor cortex (M2), cingulate cortex area1 (Cg1) and prelimbic cortex (PrL). The maxima of multiple unit activities expanded from layer 5 (1st component) to layer 2-5 (2nd component) in M2, Cg1 and PrL. The expansion of the paired-pulse facilitation was localized markedly in Cg1. The c-fos numbers in the ACC elicited from MT stimulation (10 Hz) were increased significantly. These results showed neuronal plasticity change in the ACC following the electrical stimulation of the MT. This change may mediate the emotional response associated with painful stimuli.