

# Neurophysiology of Cingulate Pain Responses and Neurosurgical Pain Interventions

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Pain is generally considered to consist of at least two distinct dimensions, the sensory-discriminative component and the motivational-affective component (Melzack & Casey, 1968). The sensory-discriminative component encompasses qualities such as the intensity, location, and descriptive qualities of pain. The motivational-affective component may be characterized as “unpleasantness,” representing the negative valence which motivates the behavior evoked by pain, and generating pain’s affective tone (LeDoux, 1996; Price, 2000). Evidence suggesting the presence of a discrete motivational-affective component of pain were derived from the early observations of analgesia after cingulotomy. Specifically, after lesions involving the anterior cingulate cortex (ACC - anterior to the marginal branch of the cingulate sulcus which includes midcingulate cortex - MCC -) patients with chronic pain reported that they continued to have pain, but that it was “not particularly bothersome” (Foltz & White, 1962). This observation led to the conclusion that the ACC is involved in the motivational-affective component of pain. Many observations since that time have demonstrated that the cingulate gyrus has a role in pain unpleasantness, attention, and cognition.