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Chapter Seven - Enkephalins and ACTH in the mammalian nervous system

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Abstract

The pentapeptides methionine-enkephalin and leucine-enkephalin belong to the opioid family of peptides, and the non-opiate peptide adrenocorticotropin hormone (ACTH) to the melanocortin peptide family. Enkephalins/ACTH are derived from pro-enkephalin, pro-dynorphin or pro-opiomelanocortin precursors and, via opioid and melanocortin receptors, are responsible for many biological activities. Enkephalins exhibit the highest affinity for the δ receptor, followed by the μ and κ receptors, whereas ACTH binds to the five subtypes of melanocortin receptor, and is the only member of the melanocortin family of peptides that binds to the melanocortin-receptor 2 (ACTH receptor).

Enkephalins/ACTH and their receptors exhibit a widespread anatomical distribution. Enkephalins are involved in analgesia, angiogenesis, blood pressure, embryonic development, emotional behavior, feeding, hypoxia, limbic system modulation, neuroprotection, peristalsis, and wound repair; as well as in hepatoprotective, motor, neuroendocrine and respiratory mechanisms. ACTH plays a role in acetylcholine release, aggressive behavior, blood pressure, bone maintenance, hyperalgesia, feeding, fever, grooming, learning, lipolysis, memory, nerve injury repair, neuroprotection, sexual behavior, sleep, social behavior, tissue growth and stimulates the synthesis and secretion of glucocorticoids.