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Research Interests

Research in our laboratory centers on the identification of central nervous system (CNS) mechanisms of nociception (pain perception) using functional brain imaging coupled with quantitative behavioral testing in animal models of acute and neuropathic pain. A high-resolution quantitative autoradiographic method, developed in our lab, employs a radiotracer labeled with [99m]Tc to image regional cerebral blood flow (rCBF) during nociception in awake, un-anesthetized animals. During imaging, changes in rCBF serve as the index of neuronal synaptic activity. Behavioral responses are measured and brain imaging is performed during the application of either innocuous (non-painful) or noxious (painful) mechanical, thermal or chemical stimuli applied to the skin. Statistical analysis correlates changes in the pattern and level of brain activation with behavioral data to determine functional significance.

Current studies combine quantitative behavioral testing, functional brain imaging and immunohistochemical techniques to identify supraspinal mechanisms of neuropathic pain in the streptozotocin (STZ) model of experimental insulin dependent diabetes mellitus (IDDM) in rats. This research promises to identify central nervous system mechanisms specifically involved in the induction and/or maintenance of chronic neuropathic pain in diabetes. Increasing our understanding of the CNS consequences and neural mechanisms of neuropathic pain in diabetes may provide new ideas toward development of improved approaches and therapies for the management and treatment of pain in diabetes, as well as in other chronically painful disorders.

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