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SENSORY AND MOTOR PROPERTIES OF BULBORETICULAR AND RAPHE NEURONS IN AWAKE AND ANESTHETIZED CATS. S.F. Eisenhart, Jr.[3], T.J. Morrow[2,4], and K.L. Casey[1,2,4], Departments of [1]Neurology and [2]Physiology and [3]Neuroscience Program, University of Michigan, and [4]V.A. Medical Center, Ann Arbor, MI 48109, USA

Aim of Investigation: Bulboreticular and caudal raphe neurons have been implicated in mechanisms of pain activation and suppression. We tested this hypothesis by recording from single neurons in nucleus gigantocellularis (NGC), nucleus magnocellularis (NMC), and the adjacent raphe (R) nuclei in both awake, behaving and anesthetized cats.

Methods: The relation of extracellular unit activity to thermal stimuli (38°-55°C, 7 sec duration) and behavior was studied in six awake, partially restrained cats. In a companion study, unit responses to peripheral electric shock and a variety of natural stimuli were studied in four cats anesthetized with chloralose.

Results: In awake cats, most NGC, NMC, and R units discharged primarily during escape responses elicited by noxious thermal stimuli. Unit discharge also occurred independent of thermal stimuli. Some NGC and NMC cells, however, showed increased discharge during noxious thermal stimuli (51°-55°C); these cells were clearly unrelated to movement. In addition, some R cells were not related to sensory or motor events, but discharged primarily during attention to novel stimuli. In anesthetized cats, most NGC (73%), NMC (83%), and R (89%) neurons discharged to electric shock; brisk tap was the most effective natural stimulus. Some R neurons also responded to auditory, light, visceral, and noxious mechanical stimulation. Fewer NGC (5%) neurons responded to noxious mechanical stimulation than NMC (26%) or R (24%) neurons.

Conclusions: These data suggest that bulboreticular and raphe neurons participate in elaborating behavioral responses to noxious stimuli.

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TRIGEMINAL NEURONS PROJECTING TO THE MESENCEPHALON IN THE RAT AS REVEALED BY RETROGRADE TRANSPORT OF HORSERADISH PEROXIDASE (HRP). D. Menétrey and F. Roudier*, Unité de Recherches de Neurophysiologie Pharmacologique de l'INSERM (U.161), 2 rue d'Alésia, 75014 Paris, France.

Aim of Investigation: The origin of the trigeminomesencephalic connections in the rat were studied by unilateral HRP injections confined to the central gray, the cuneiformis area and the deep layers of the superior colliculus.

Methods: Microinjections or iontophoretic applications of HRP were done through micropipettes. Development was with the Hanker-Yates substrate or the tetramethylbenzidine procedure.

Results: All sites of injection resulted in predominantly contralateral labeling of similar areas ; only quantitative differences were noted.

- subnucleus caudalis (posterior to the obex). Projections mainly proceeded from the marginal zone, but occasionally from the subjacent magnocellular layers. Many labeled cells were seen in the reticular part of the "neck" of the dorsal horn. These distributions resemble those we previously reported at various spinal levels.

- subnucleus interpolaris (between the obex and caudal tip of the facial nucleus). Numerous labeled cells were seen throughout this nucleus.

- subnucleus oralis (between the planes passing through the rostral and caudal tips of the facial nucleus). The caudal part of this nucleus was almost free of labeling which progressively appeared in its ventral portion especially at its junction with the main sensory nucleus.

- main sensory nucleus (rostral to the facial nucleus). Labeled cells were located in its ventral segment with a clear tendency to gather medially as a vertical band spanning the border with the medial reticular formation.

Conclusions: The mesencephalic tegmentum which plays an important role in pain processes receives dense trigeminal afferents of various origins.