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Article

The gamma (γ) loop in the mediation of muscle tone

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Abstract

Two types of rigidities—the gamma and alpha rigidities or exaggerations of striated muscle tone—are revealed by single fiber records from dorsal roots. Tentative ideas concerning the role of the two kinds of spindle receptors—spindle primaries and spindle secondaries innervated by two kinds of fibers—are put forth. Both function as length-measuring instruments in the muscle, and both are essential in the bombardment of the motoneurons and the control of the setting of length for coordination within the muscular apparatus. The gamma release makes the intrafusal muscle too short relative to the extrafusal one and so the latter is forced by the loop to follow suit. In the intact decerebrate cat the extensors are stretched by forced bending of the knee; the secondary spindles check extensor tension, augmenting flexor tension, thus fixing the limb in a state of “plasticity.” It is suggested that spindle control is far better developed in the forelimbs than in the hind limbs, the subject of most previous studies. Recent work on respiratory movements shows the gamma loop cooperating with the alphas also in respiratory muscles. Differential diagnosis of both hyperresponsive and hyporesponsive states must take into account this alpha-gamma linkage of the efferents.

Citing Literature

