

## Spinal Mechanisms of the Functional Stretch Reflex

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**Summary.** A sudden and rapid angular displacement of the limb evokes, in human and monkey subjects, a segmented pattern of electromyographic activity in muscles which are stretched. While the first segment is acknowledged to represent a tendon jerk, it has been proposed that the second segment, occurring with a shorter latency than a reaction time, is mediated by a transcortical loop. The present experiments were conducted in cats to determine the properties of muscle responses to torque perturbations analogous to those used in the monkey, and to determine if the integrity of supraspinal pathways is required for the individual response segments to occur.

Torque perturbations which flexed the forearm evoked a segmented response in the electromyogram of the cat triceps muscle. This response typically consisted of three early segments with latencies of 10, 30 and 60 msec which were similar to the M1, M2, and M3 segments described in the monkey. The M3 and occasionally M2 components were depressed when the cat followed rather than resisted the perturbation. A torque pulse of 10 msec duration was sufficient to elicit a near maximal M1 response while torque pulses in excess of 20 msec were required to evoke the M2 response.

To determine if any of these components required mediation by the cerebral cortex, experiments were conducted in decerebrate and spinal cats. Similar torque perturbations produced segmented electromyographic responses in the triceps muscles which were indistinguishable in their timing from those observed in intact cats. The torque required to produce the segmented responses was comparable as well. All three segments were dependent upon the activation of receptors in the homonymous muscle and did not require cutaneous input. These observations show that receptor properties and/or spinal mechanisms involved in the stretch reflex are sufficient to produce a segmented response similar to that observed in intact animals.

**Key words:** Functional stretch reflex – Spinal cord – Cat – Tracking

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