

POSTER PRESENTATION

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P01.25. Classification of L6 muscle spindle afferents in the anesthetized cat

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Purpose

Patients with low back pain demonstrate proprioceptive difficulties including spinal repositioning errors and impaired lumbosacral proprioceptive acuity. Few data are available regarding proprioceptive properties of muscle spindles in the low back. Muscle spindle afferents can originate from 2 types of receptive endings which terminate and respond to mechanical changes in 3 types of intrafusal fibers. Receptive endings may be primary or secondary. They terminate on dynamic bag (b_1) static bag (b_2) and/or chain (c) intrafusal fibers. We sought to classify lumbar paraspinal muscle spindle afferents based upon their receptive endings and intrafusal terminations. Classification was based on their responses to ramp and hold vertebral movement before and after intrafusal activation using succinylcholine (SCH, 100-300ug/kg.ia). Afferents terminating in primary endings are especially responsive to the dynamic ramp stimulus. During intrafusal activation, afferents terminating on b_1 fibers further increase their discharge to the dynamic ramp whereas those terminating on b_2 fibers increase their static resting discharge.

Methods

Electrophysiological recordings from spindle afferents ($n=195$) were obtained from L₆ dorsal root filaments with receptive fields in the L₆ longissimus and multifidus muscles in an anesthetized cat preparation. Controlled vertebral actuations that stretched the paraspinal muscles were applied to the L₆ spinous process in a dorsal-ventralward direction [1.5mm ($n=120$), 1.6mm ($n=21$), or 1.7mm ($n=54$) using a feedback motor system. Instantaneous discharge frequency was averaged

Table 1

	LONGISSIMUS			MULTIFIDUS		
	b_1c	b_2c	b_1b_2	b_1c	b_2c	b_1b_2
Primary	0	100	46	0	19	10
Secondary	0	0	0	0	4	1
Intermediate	0	5	0	0	1	0

and compared over three ramp cycles pre- and post-SCH injection.

Results

Conclusion

Almost all lumbar muscle spindle afferents showed static sensitivity responding as primary endings terminating on b_2 fibers. Approximately 1/3 of the afferents responded as primary endings terminating on both b_1 and b_2 fibers. No endings were exclusively sensitive to the dynamic ramp stimulus.

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