
Skeletal muscle fibres respond to the action potentials generated in motoneurones by activating contractile mechanisms that produce force and ultimately movement. Measuring the force output of a muscle rarely provides much insight into the mechanisms by which the motoneurone action potentials are produced, that is, until the study by Collins *et al.*

The authors show that there are two components to the force generated in the calf muscles of human subjects in response to electrical stimulation applied over the muscle. One component, the unsurprising one, is due to the direct activation of the axons of the motoneurones innervating the muscles. The second unanticipated component is due to the synaptic activation of motoneurones by sensory afferents whose axons are also excited by the electrical stimulus. The surprising result is not that excitation of afferents can augment the force output, but that it does so in a very non-linear way. The authors illustrate that the non-linear component is central in origin, rather than peripheral, and that it is not due to voluntary inputs added on top of the stimulus evoked response. In fact, the response could even be elicited in sleeping subjects.

In concluding the authors convincingly argue that the origin of the non-linearity is due to the bistable membrane properties of spinal motoneurones. This is of particular interest to motor control research that seeks to determine the relationship between descending motor commands and the final force output of the muscles. If human motoneurones were capable of self-sustained discharge then a brief descending motor command would be sufficient to produce a prolonged force output from the muscle. The implications of this research are sure to be far reaching as more experiments are done to determine how plateau potentials are generated in human motoneurones.

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