New Insights into the Function of the Corticospinal System in Health and Disease

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Online Webinar

For Researchers

Speaker:

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Abstract

I will highlight a number of new findings about the organization and function of the corticospinal system which show it to be a multifunctional control system that has a rather different set of functions across different species. I will focus on corticospinal function in the primate. The direct, cortico-motoneuronal system is found only in larger primates and is particularly well-developed in humans. Three other interrelated corticospinal features are specific to primates: the first is the presence of large, fast-conducting fibres that extend the range of corticospinal diameters from very small (~0.2 μm) to very large (>10 μm). The second is the presence of the fast K+ channel Kv3.1b in the soma and dendritic membrane of corticospinal neurons, and the third feature is very brief or 'thin' spikes, with a rapid recovery cycle, found in larger corticospinal neurons. Although these features provide primates, including humans, with an extremely versatile cortical control system, they also represent a serious vulnerability to trauma and disease, including spinal injury and ALS.

1. Lemon RN (2019) **Recent advances in our understanding of the primate corticospinal system.** F1000Res 274 doi: 10.12688/f1000research.
2. Lemon RN (2021) **The cortical "Upper Motoneuron" in health and disease.** Brain Sci doi: 10.3390/brainsci11050619.
3. Lemon RN, Baker SN, Kraskov A (2021) **Classification of cortical neurons by spike shape and the identification of pyramidal neurons.** Cereb Cortex doi: 10.1093/cercor/bhab147.

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