Recurrent inhibition plasticity induced by eccentric strength training

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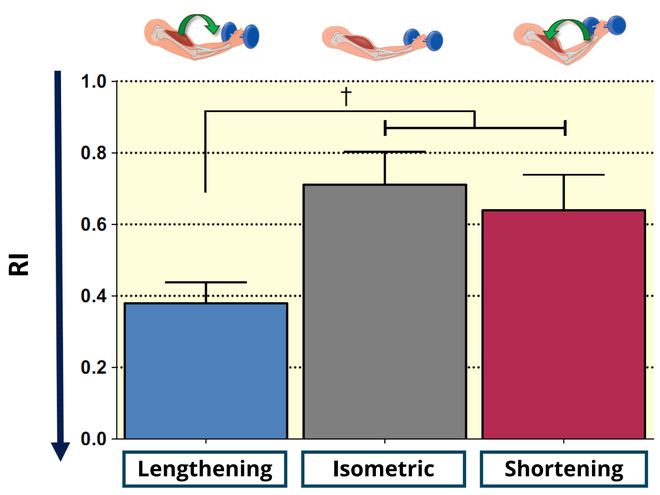
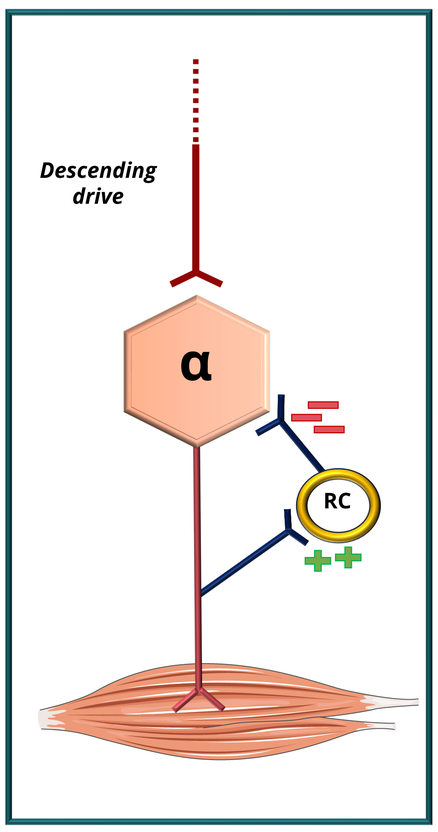
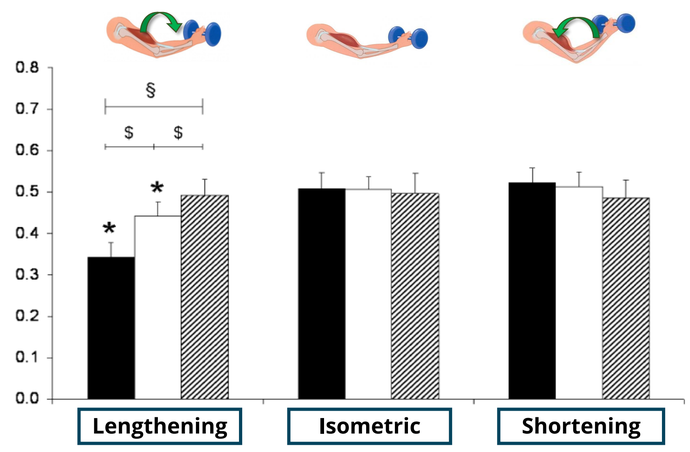
Recurrent Inhibition (RI) is a self-inhibitory mechanism generated by the spinal motoneurons through the Renshaw Cell (RC), and is involved in the spatial and temporal recruitment of motor units.
Pierrot-Deseilligny & Burke (2012)



† *p < 0.01: Lengthening VS Isometric and Shortening*





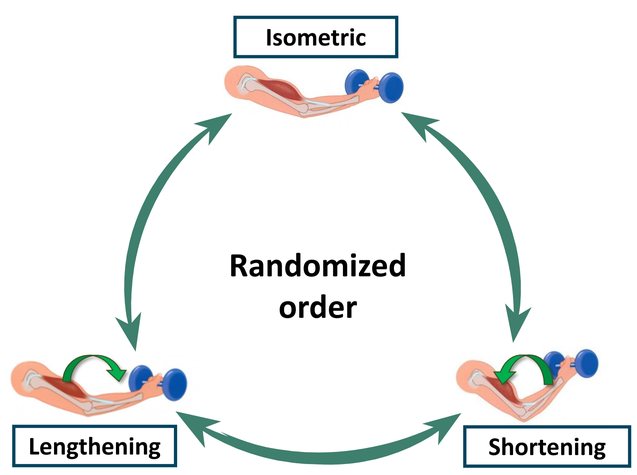
* *p < 0.01: Lengthening Vs Isometric and Shortening*
§ *p < 0.01: PRE vs POST training*

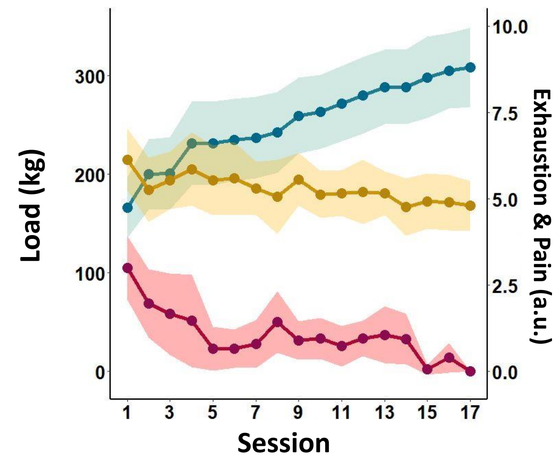
RI may vary between contraction types, and is classically higher during lengthening contractions.
Barrue-Belou et al. (2018)

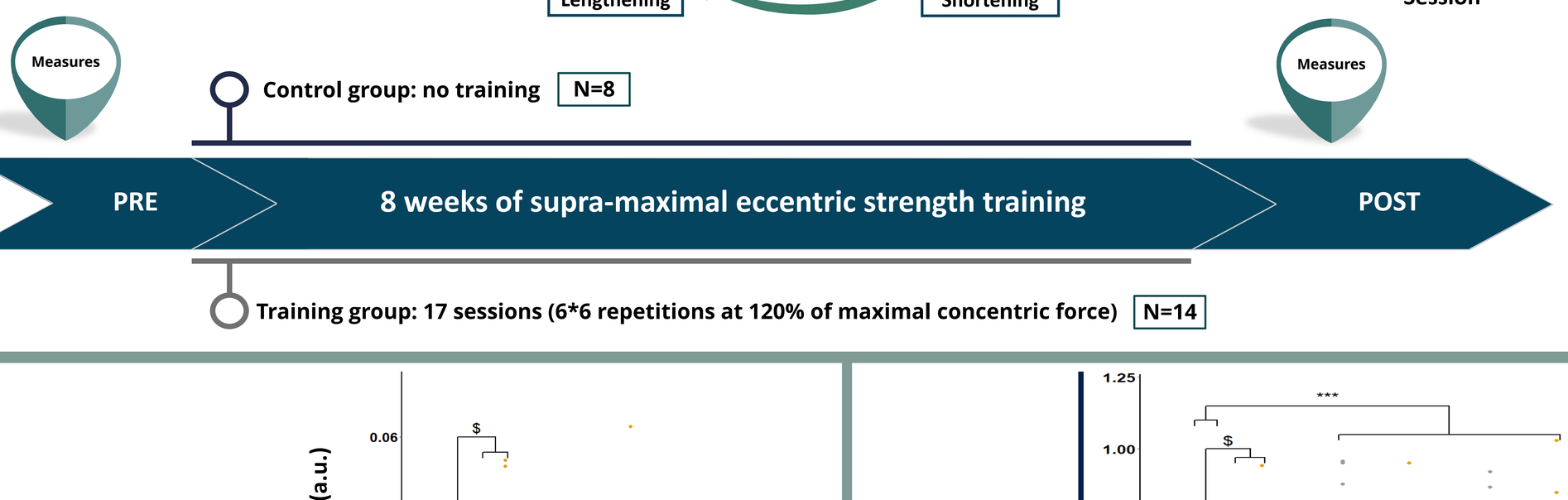
Initially reduced spinal excitability during lengthening contractions may increase following eccentric strength training.
Duclay et al. (2008)

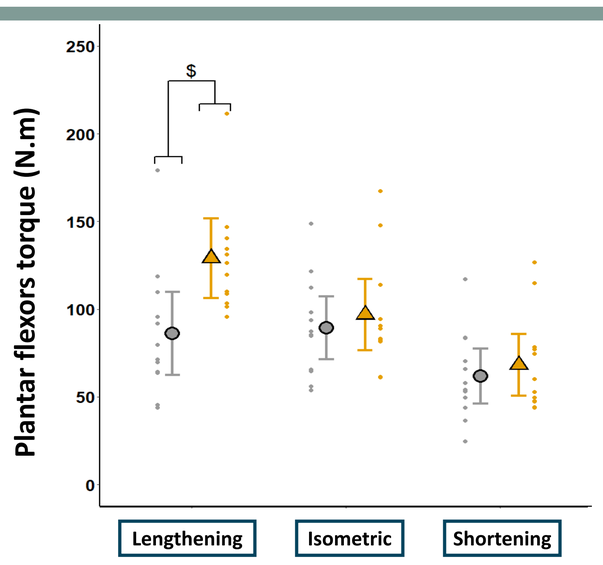
This study investigated the potential influence of eccentric strength training on RI, especially during lengthening contractions. Thus, RI was compared between three contraction types, in the soleus muscle, during maximal voluntary contractions, before and after such training.

Motor performance was quantified through torque and electromyographic (EMG) activity of the plantar flexors. RI was quantified through paired H-reflex technique.

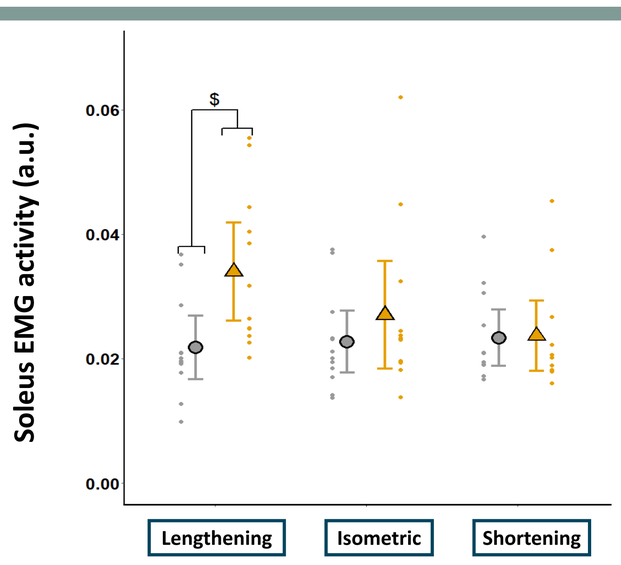






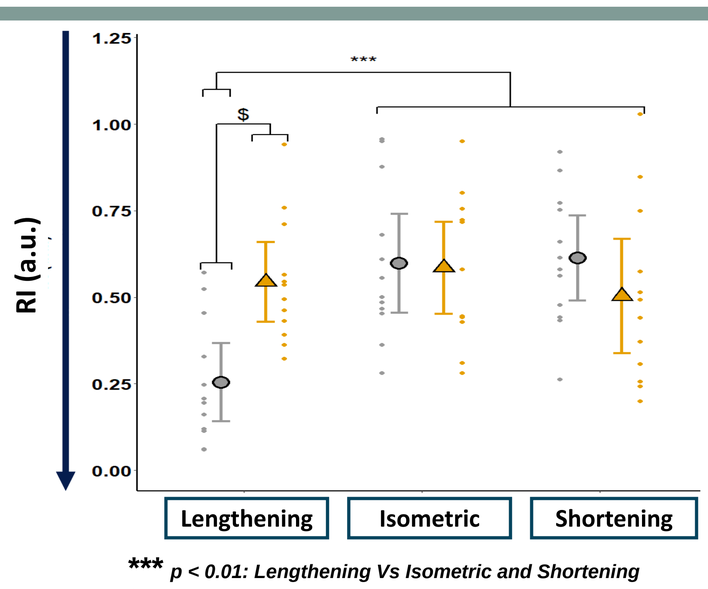


$ *p < 0.01: PRE vs POST training*



$ *p < 0.01: PRE vs POST training*

Plantar flexors torque and Soleus EMG activity increased significantly after training during lengthening contraction (p<0.01).



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$ *p < 0.01: PRE vs POST training*

In the soleus, RI was initially increased during lengthening contractions compared to isometric and shortening ones (p<0.01).
RI decreased significantly after training during lengthening contraction (p<0.01), to the point were no difference was observed between contraction types.

Collectively, these results highlight a decrease in the RI following eccentric training, associated with higher motor output reflected by an increase in both plantar flexors torque and the soleus EMG. This study strongly suggests that an increased efferent drive after strength training may influence the regulation of specific inhibitory mechanisms, such as RI, modulating spinal motoneurons excitability.

Barrue-Belou S. et al. (2018) Acta Physiologica 223, e13064
Duclay J. et al. (2008) Medicine & Science in Sports & Exercise 40, 722–734
Pierrot-Deseilligny & Burke (2012) The circuitry of the human spinal cord: spinal and corticospinal mechanisms of movement