THE IMPACT OF CHANGES IN PROPRIOCEPTIVE INPUT FROM THE NECK ON LOWER LIMB MOTONEURON EXCITABILITY

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Proprioceptive inputs from the neck are known to make important contributions to the complement of reflexes used to maintain postural stability. One of these reflexes is the *tonic neck reflex (TNR).* Together with vestibular reflexes they act to maintain a stable posture by adjusting extensor muscle tone with changes in head and neck posture. The aim of this study was to isolate proprioceptive inputs from the neck (from other sensory systems involved in maintaining postural stability, notably vestibular afferences) and examine whether an alteration in proprioceptive inputs was capable of modulating the amplitude of the Triceps Surae Hoffmann (H) reflex in Humans.

Neck proprioceptive inputs were isolated by stabilising the subject's head and rotating the body around the stabilised head - referred to as longitudinal body rotation against a steady head. The triceps surae H reflex was used as a measure of lower limb motoneuron excitability. Phasic stretch reflexes are prone to spontaneous fluctuations in amplitude. The procedure of triceps surae muscle conditioning was used in order to systematically alter the amplitude of the test triceps surae phasic stretch reflex (Gregory *et al.*, 1987). Muscle conditioning is a procedure which systematically alters the movement and activation history of the muscle. This in turn alters the tonic output from the muscle spindle which in turn alters the amplitude of the reflex response. (Gregory *et al.*, 1990) This test reflex was then used to determine the effect of changing proprioceptive inputs from neck structures on the size of the conditioned triceps surae H reflex.

The current experiments used the following protocol. It was first established that each subject demonstrated a consistent change in H reflex size after conditioning the right triceps surae muscles at a length longer than and shorter than the test length. The right triceps surae muscles were then conditioned at a length shorter than the test length at which the H reflex was elicited. This was deemed to be the control (hold-short) reflex. After a second hold-short muscle conditioning sequence, the seated subject was rotated 60 degrees to the right while their head was maintained in a "straight ahead" position. In this position the H reflex was again elicited.

The results showed that after right longitudinal body rotation with the head maintained in a "straight-ahead" position, the hold-short H reflex was consistently larger than after the control hold-short conditioned H reflex. These findings support the proposal that alterations in proprioceptive inputs from the neck induced by longitudinal body rotation against a head maintained in a "straight-ahead" position are capable of modulating lower limb motoneuron excitability.

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