

Postural control disturbances in dysfunctions of the neuro-sensorial and myoartrokinetic system

Dana-Maria Dimulescu, Gheorghe Chiriți

Carol Davila University of Medicine and Pharmacy, Bucharest

Abstract

Postural control is not a simple summation of static reflexes, but, rather, a complex skill based on the interaction of dynamic sensory-motor processes. The postural behaviour has two functional goals: postural orientation and postural balance. Postural control comprises automatic postural responses, anticipatory postural responses and volitional postural movements.

Postural control affects the primary sources of peripheral inputs - the peripheral somato-sensitive system, visual and vestibular receptors. In proprioceptive loss, the automatic postural responses are diminished in amplitude and delayed in time; stretch reflexes in soleus and medial gastrocnemius are severely diminished; balance-correcting responses in tibialis anterior are diminished and delayed; backward motion of the trunk is reduced; movement strategies and synergies are disturbed.

In peripheral vestibular loss, there are increased trunk responses to disruptive stimuli, with hypermetric trunk muscle responses and hypometric knee responses, but unchanged synergies; pathological changes to the modulation depth are produced; the amplitude of balance correcting responses in ankle muscles is severely reduced.

Visual input serves to decrease the stiffness of the musculoskeletal system; it can be accomplished by decreasing the level of muscular activity across the joints of the lower limbs (in eyes-open subjects) or by reducing the gains of the other postural feedback mechanisms, the proprioceptive or vestibular systems (in eyes-closed subjects).

Keywords: postural control, proprioceptive insufficiency, vestibular loss.