

Vibrations and their applications in sport. A review.

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In sport, mechanical vibration is used as a massage tool and/or for training purposes. Two varieties of vibration training (VT) can be distinguished: strength exercises with superimposed vibratory stimulation (VS exercises) and motor tasks performed under whole body vibration (the WBV training). Vibratory massage has been used extensively since the beginning of the 20th century while VT is a relatively new technique. In the research literature, the main subjects addressed have been acute and cumulative effects of VS on flexibility and strength. Marked enhancement effects were obtained in medium-duration stretching and short-duration dynamic strength exercises while prolonged efforts did not show positive impact. The observed effects of vibration depend on various neural facilitatory and inhibitory mechanisms. In comparison to VS exercises, WBV tasks generate more global neuromuscular, metabolic and hormonal responses. WBV training resulted in significant changes in several motor variables, with stretch-shortening cycle tests (such as countermovement jumps, serial high jumps, etc.) being the most sensitive to WBV treatment. Based on available knowledge about proprioceptive spinal reflexes-that feedback from the primary endings of motor spindles produces a stimulatory effect via increased discharge of a-motoneurons, and activation of Golgi tendon organs (GTO) evokes inhibition of muscle action-a hypothesis has been proposed that VT enhances excitatory inflow from muscle spindles to the motorneuron pools and depresses inhibitory impact of GTO due to the accommodation to vibration stimuli. The intensity and duration of vibration used in VT dramatically exceed the standards for occupational vibration established by the International Organization for Standardization.

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