

Le basi scientifiche del recupero: gli aspetti neurofisiologici

Neurophysiology

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Contemporary research regarding the preservation and restoration of knee function now recognizes the significant neurosensory role of capsuloligamentous and tenomuscular structures, as well as their contribution to neuromuscular coordination and the dynamic restraint mechanism.

The clinical relevance can be appreciated by strong correlations established between knee function and aberrations in the sensorimotor system that compromise joint homeostasis.

A thorough understanding of these relationships is pertinent to many health professionals for at the foundation of most injury prevention and rehabilitation techniques is an attempt to enhance joint stability and function by manipulating the neuromuscular system.

This presentation will review knee neurophysiology, discuss the sensorimotor system in normal and pathologic joints, and outline theoretical considerations for surgical management and rehabilitation.

The capacity of the sensorimotor system to simultaneously coordinate high velocity, skilled movements while providing dynamic restraint are of primary concern because this ostensibly dichotomous role of muscles may account for the incidence and severity of many sports related injuries.

Conflicts can occur within the sensorimotor system when attempting to interpret sensory information and coordinate the concentric contractions needed for smooth, powerful motions but also control eccentric muscle lengthening necessary for joint stabilization.

Two neuromuscular mechanisms for motor control are involved with interpreting afferent information and coordinating efferent responses.

- The first is Feed-forward neuromuscular control and involves planning movements and preprogramming muscle activation based on past experiences.

- The second is a feedback process that continuously modifies muscle activity through numerous reflex pathways.

The level of muscle activation and elastic properties of the tenomuscular unit determines total muscle stiffness.

Most health care professionals have an intuitive understanding of muscle tone, and possibly stiffness, however few in-vivo measurements with clinical application have emerged from basic science research. Efficient regulation of muscle tone and stiffness embodies numerous components of the musculoskeletal and neuromuscular systems thus may be the most vital measure related to muscle control, joint stability and functional outcome.

Therefore, neural regulation of muscle stiffness appears to be an important component in the selection and performance of movement strategies.

Muscle tone and stiffness regulation are two qualities that have a profound effect on the entire spectrum of human movement from performing activities of daily living to elite professional sports participation
