Topic 4

bioDensity™ and Power Plate® for Amplification of Motor Neuron Function

Greater the Force Production = Greater Motor Neuron Activation
The "Henneman size principle" (1965) is a widely-accepted law in neurology dictating the order in which muscle fibers are recruited. As movement of the body demands greater force, more motor neuron activation occurs calling muscle fibers to action. The activation moves from small motor units to larger motor units as more force is called upon.

Force Production in Functional Movement
Sprinting/explosive-running has traditionally been seen to activate the highest amounts of motor neuron units. Neuromuscular EMG testing shows that even the most highly trained athlete activates 80% of potential muscle fiber while sprinting, with the majority of individuals activating less than 50% (Wiemann and Tidow, 1995). In an effort to increase motor neuron activation as well as practicality of use, researchers have attempted to isolate positions of the greatest force potential. In these positions, individuals can comfortably produce forces that can equal multiples of bodyweight (Jaquish, et al. 2012).

bioDensity Enables the Greatest Force Production and Maximizes Motor Neuron Activation
bioDensity provides a method for maximizing activation of motor neuron units in a safe and controlled environment. Over a weekly use protocol, research shows the level of activation is far higher than with the sprinting example. The movements used in bioDensity are all movements designed around natural multi-joint action, isolated in positions of optimal biomechanics. **Previous literature shows optimal biomechanical positions to allow for the highest levels of human force production** (Wakim, et al. 1950; Ismail & Ranatunga, 1978; Gandevia et al. 1983). Specific neurological studies, performed by McKenzie & Gandevia (1987, 1988) analyzed muscular performance of this specific action confirming the greatest force production and motor neuron activity in the specific positions. Immediately upon use, the bioDensity stimulation engages maximum levels of motor neuron activation. Bhem (2004) illustrated an increase in short-term explosive force neural potentiation (increase in neurological activation) with short-duration and high resistance maximal voluntary contractions.

Power Plate for Building Proprioception and Fine Motor Neuron Control
Upon activation with bioDensity the neural potentiation effect can last for approximately 10 minutes (Trimble and Harp, 1998), and in that window motor neurons can be used to stimulate long term increases in fine motor control by challenging coordination and balance. The use of Power Plate destabilizes the body through dynamic movement, so that performing a balance protocol post-bioDensity session can amplify the neurological activity in balancing the body. As the body is destabilized on the Power Plate platform, reflexes engage activating other supporting muscles automatically. By doing this repeatedly the effect becomes a part of motor learning. Thus the permanency of the extra balance and control from the use of Power Plate can enable individuals to perform activities of daily living with far greater speed, balance, proprioception, and control. Intellectually we can assume that neuromuscular effects that have already been seen with Power Plate use (Bautmans, et al. 2005), can now be amplified to a far greater degree when used in conjunction with bioDensity.

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