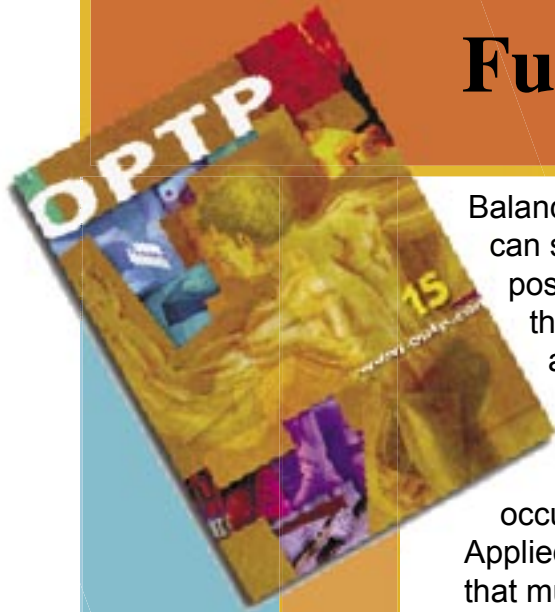


The Science Behind Functional Balance Training

August 2003



OPTP Newsletter

The Conservative Care Specialists

Balance and stabilization training can simply be thought of as a position or series of positions that occur during movement, and that are maintained when opposing forces equalize one another. Little or no movement occurs at the stabilized joint(s). Applied to movement, this means that muscles on both sides of a joint(s) contribute to stabilization via a co-contraction of agonist and antagonistic muscles. Co-contraction of muscles on either side of a joint(s), contribute to a body part or body position being maintained in a desired, or intended symmetry or asymmetry. In essence, this is balance and represents an important aspect of functional movement and training!

On the other hand, functional balance also trains dynamic movement patterns simultaneously. It is likely that most skilled movement of any kind simultaneously requires both stabilizing force production and bodily movement. For example, when skiing downhill or hitting a tennis ball, one part of the body, like the trunk, may require stabilizing force production, while another part of the body requires joint motion. Additionally, there will be

movement requirements that call the trunk region into play as a “mover” and not as a stabilizer.

It is obvious that balance is the foundation upon which all movement is based. Quite simply, balance and muscle contraction (or force production, more accurately) play critical roles in every type of physical movement. All human movement depends on skeletal muscle contraction and the nervous system (Plowman and Smith 1997; McArdle et al., 1996). Training balance and muscles is essential since skeletal muscles will not contract unless they receive a signal from the nervous system. Balance is indeed the foundational platform for all human movement and keeps our neuromuscular system functioning at a high level.

A number of components represent key building blocks that contribute to safe, effective and functional movement, as well as skilled performance. This concept of body equilibrium includes:

Balance represents an ability to stabilize and maintain a desired body position. Balance can also be thought of as correct, or efficient, positioning of a body part or the entire body.

Kinesthetic Sense is a feedback mechanism that allows you to be aware of how the body is positioned at any moment.



OPTP Newsletter

The Conservative Care Specialists

Kinesthetic or proprioceptive sense allows the body to perceive or feel movement, weight-shifts, resistance and position. To the point, kinesthetic awareness is the ability to know where your body parts are in 3-dimensional space.

Proprioception, which overlaps with kinesthetic awareness, provides a sense of body symmetry, or necessary balance and positioning between body parts, and specifically refers to a sense of joint position. Proprioception, as mediated by sensory organs like muscle spindles that are located between muscle fibers, represents the ongoing or normal awareness of the position, balance or movement of the body or any of its parts.

Note: The term kinesthesia is used to define a person's awareness of motion or position as it pertains to his/her limbs. Proprioception is defined as one's sense of movement as it relates to movement of the body and how it is oriented in space. Today, current literature uses the terms as though they are synonymous (Plowman and Smith, 1997).

Gradation of Force is an ability to control muscular force production and maintain an equalized, though dynamic, position regardless of the physical task at hand, is critical to any type of human movement. Correct application of force is complex, learned and under the direct influence of neural control. The regulatory control of muscular force

is referred to as "gradation of force." These four components of body equilibrium are important to consider-and train-when used in the context of sport performance and daily movement requirements. Balance, kinesthetic sense, proprioception, body symmetry and proper force application are key aspects of any activity that requires a dynamic, integrated, coordinated and skilled response. Being able to change your center of gravity to compensate for required movement is the key to moving skillfully. Agility is the technical term for this developed sense that incorporates



proprioception and balance, and allows us to move efficiently, confidently, gracefully and smoothly, while wasting little motion. The

smooth fusion and training of all of these elements can represent skillful or functional movement, and reflect the athletic qualities that everyone should seek to develop.

This article is excerpted from BOSU® Balance Trainer Integrated Balance Training - A Programming Guide For Fitness and Health Professionals, by Douglas Brooks, M.S. and Candice Copeland Brooks. ©Copyright 2002, DW Fitness, LLC. BOSU® is a registered trademark of DW Fitness, LLC.

References:

Plowman, Sharon and Smith, Denise (1997). Exercise Physiology for Health, Fitness and Performance. Needham Heights, MA: Allyn and Bacon.

McArdle, William et al., (1996). Exercise Physiology-Energy, Nutrition and Human Performance. 4th edition, Lea & Febiger, Philadelphia, PA.