Functional Training:
Unlocking the key to performance enhancement

By: Dr. Andreo A. Spina

Introduction

Athletes are constantly bombarded through popular media via television, magazines, and the ever-dangerous “word of mouth”, on training tips on how to enhance their athletic performance. Thus they embark on various training programs that are developed based on information from the commercial bodybuilding literature in hopes that their newly acquired muscle will bring success to their athletic endeavors. Little do they know that these routines, aside from building esthetically pleasing bodies, do little to improve their functional capabilities whilst they participate in their respective sport. Perhaps we are all looking in the wrong place for advice! Instead of asking what the “gym science” says, we should more commonly be looking into what the real science says.

The components of most training programs include performing a multitude of exercises to target individual muscles one at a time, using maneuvers that are unlikely to be performed in any sporting event. Thus the question arises, “does getting stronger at these movements translate into functional strength required on the playing field?” Unfortunately for most, the answer to this question is no. During my on-field coverage of amateur and pro sport, I have observed relatively small athletes ‘man-handle’ larger ones. Thus, it has become apparent that the largest, most muscular individuals are often not the ‘strongest’ on the ice or field, contrary to what one would believe.

What is functional training?

The next logical question is “how do I get stronger at the activity that I need to get stronger in?” and the answer is to *train functionally*. In the scientific community there has been a paradigm shift towards functional training. In fact, functional training has become a buzzword in clinics, gyms, and academic institutions.

What is function? Function is integrated, multi-planar (i.e. multiple directions) movement that involves acceleration, deceleration, and stabilization. Typically, most programs involve uniplanar force production (i.e. force produced in a single direction). Very little time is dedicated to training that integrates motions in a variety of planes that are similar to the demands placed on the body during activities.

Functional training not only trains the body to build muscular strength in various planes of motions, it also trains the nervous system to function optimally thereby creating efficient and correct activation of the entire musculoskeletal system whilst in action.

The Nervous system - Motor Programming

It has long been a flaw of many training programs to assume that the conscious activation of muscle as occurs when we perform (for example) a bicep curl, will translate into an un-conscious activation of that muscle when it is needed during a high-speed athletic situation. This is why I commonly see athletes at our clinic with shoulder instability (for example) who are over 250 lbs of pure muscle. Giving them basic strength training exercises will not help them, as they are already very strong. Their problem lies in the timing of activation of their muscles, which then directs the blame to``` the nervous system.

Nerves course out from the spinal cord to innervate (i.e. supply) muscles resulting in contraction. However when a puck is fired at an NHL goalie at over one hundred miles per hour, they don't have to think about activating the muscle, it happens automatically in a 'pre-programmed' fashion because of the nervous system. These pre-programmed movements, or reflexes, are termed **motor programs** and are stored in the cerebrum of the brain. Similar to programs on a computer, certain cues (ex. A punch coming towards a fighter in a boxing match) runs/releases a motor program suitable for the movement or action necessary (i.e. dodging the punch). The program sent from the brain, through the spinal cord, and to various muscles carries information with regards to the sequence of contraction of individual muscles, force of contraction of each muscle, speed of contraction, etc. Because these actions occur automatically, movement execution is carried out in the absence of direct conscious control. Initially a program might be capable of controlling only a short string of actions. With practice, however, the motor program becomes more elaborate, controlling longer and longer strings of behavior, and perhaps even modulating various reflexive activities that support the movement goal.

How are these motor programs developed? The easy answer is through many years of practice. The longer, scientific answer is via feed back control. Each joint, muscle, tendon, and ligament of the body contain what are known as **proprioceptors**. Proprioceptors are specialized sensory receptors located inside muscles, joints, and tendons that monitor the length and tension of the musculotendonous complex. In so doing, they provide the central nervous system with information concerning kinesthetic sense, or appreciation of the body in three-dimensional space. The brain compiles this information to determine what the limbs and torso are doing. It then compares what is actually occurring, to what was intended to happen, and makes the necessary corrections. This is termed the **closed-loop control system** that involves the use of feedback and error detection to maintain the desired goal. Via this system, the body develops, and perfects (with years of training), the necessary motor programs that are then "run" perfectly (hopefully) without the use of feed-back.

Functional training utilizes motions that will be encountered in athletic situations to support, and improve upon the execution of motor programs. It also challenges the bodies' proprioceptive system by, for example, creating an unstable base with the use of core balls instead of the stable

weight machines. Thus it can help to further train the nervous system to adapt to external challenges, thereby perfecting the execution of specific motor programs. Therefore, rather than just training the muscles to act independent of one another, in non-functional/realistic circumstances as is done with traditional training methods, functional training also trains the nervous system as well such that it reinforces correct muscle activation sequences, timing, balance, etc.

How to include functional training in your routine

An elaborate description of how to train functionally is out of the scope of this article. The following tips are meant to guide the interested reader as to what *types* of exercises should be included in a good functional program.

Replace Open Kinetic Chain with Closed Kinetic Chain Exercises: Closed kinetic chain means that the distal segment, be it the arm or leg, is 'fixed' to the non-movable surface (usually the floor). Open chain means that the distal segment is moving. For example, where a squat is a closed kinetic movement (because the feet are fixed to the ground), a leg curl, or leg extension is an open chain movement because the feet and lower legs are moving while the torso remains still. Closed kinetic movements challenge the bodies proprioceptive system, involve various muscle groups, require contraction of joint stabilizing muscles, and closely relate to movements utilized during various athletic situations.

Add Core/Physio Ball exercises to the mix: Using the core ball challenges the functions of the nervous system by providing an unstable working surface. This in turn trains the nervous system to activate stabilizing muscles (for example the multifidii in the lower back) while simultaneously activating effector muscles of the limbs. For example, try placing your back on the core ball and your feet at 90 degrees planted on the floor while doing dumbbell chest presses. Many people develop strength, power, neuromuscular control and endurance in their prime movers, but few individuals have developed adequate core stabilization to allow optimum performance and injury prevention.

Utilize Plyometric exercises: Plyometric refers to exercises that enable a muscle to reach maximal strength in as short a time as possible. Such exercises usually involve some form of jumping, but can involve other types of movements. Plyometric exercises utilize the force of gravity (e.g., you step off a box) to store energy in the muscles (potential energy). This energy is then utilized immediately in an opposite reaction (e.g., you immediately jump up upon landing), so the natural elastic properties of the muscle will produce kinetic energy. Studies have shown that plyometric exercises can increase the kinesthetic awareness of the joints in the body.

Balance Training: Balance training is an essential component to athletic training. When done properly, balance training can help to develop stability of joints and increase proprioceptive awareness of the bodies' tissues. Try adding simple initiatives to your routine such as one leg balancing with eyes open, and then progressing to eyes closed. Balance boards (rocker or wobble boards) can be utilized by the advanced athlete, in conjunction with more difficult movements such as single leg stance with a knee to chest motion.

This article is meant to provide an examination of the concepts and principles involved in functional training. For a more in-depth understanding of how to integrate these concepts into your training routine, consult a strength and conditioning specialist and discover how you can unlock the key to performance enhancement using functional training.