



# Golden Hills

Orthopedic and Sports Physical Therapy

# j o u r n a l

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## Golden Hills' Use of Pre-training Evaluation

To ensure that the patient gets the most out of any training program and avoids injury, we work with him or her to diagnose and correct movement pattern imbalances.

Our pre-training evaluation helps the patient:

- 1) Develop a precise center of rotation for any joint, proper flexibility and strength between agonist and anti-agonist
- 2) Align body posture with the line of gravity
- 3) Analyze gait for any abnormalities
- 4) Test for strength, endurance, flexibility and coordination

The evaluation will help the therapist target the prime causes of movement pattern imbalances and develop a treatment plan with the function and health of the total body in mind.

## Part I: **A Guide to Exercise Training and Conditioning**

Exercise training and conditioning have become an integral part of any competitive athletic activity, helping the athlete reduce his or her risk of injury while enhancing the four building blocks of athletic performance: strength, endurance, speed and coordination.

They also hold significant health benefits for non-competitive athletes. With a balanced training and conditioning program, any patient, young or old, can:

- Develop stronger bones
- Control body fat
- Reduce the risk of injury
- Boost stamina and energy
- Achieve better sleep patterns
- Improve sense of well being

In past issues of *Golden Hills Journal*, we've discussed our clinic's supportive approach to helping patients recover peak physical function following an injury. In this two-issue series (May and June), we focus on the role training and conditioning can play in helping your patients prevent injury and realize significant long-term health benefits.

Based on the hands-on experience of Saad Shaban, PT, founder and owner of Golden Hills, this article will help you communicate with your patients about

the importance of establishing a training and conditioning routine that supports a healthy lifestyle and allows them to realize their full physical potential. Our team of skilled physical therapists cares about the health and safety of your patients and is happy to work with them to establish a program suited to their athletic activity, lifestyle and performance goals.

### Training and Conditioning Basics

The sports medicine discipline has contributed to the methodologic development of athletic training and conditioning programs with the end goal of achieving optimal physiologic function and peak performance characteristics for the athlete. These scientifically based principles focus on physiologic and metabolic adaptations that enhance the efficiency and function of the human organism.

In other words, any regular physical activity *conditions* the body's various physiologic and metabolic systems to adapt to the stress induced during the activity. Effective training and conditioning programs, therefore, are built around a systematic modeling of these adaptations, which include:

- Somatomorphic alterations
- Muscular strength and endurance

# A Guide to Exercise Training and Conditioning (Continued)

- Soft tissue proliferation and enhanced elasticity
- Central and peripheral cardiorespiratory efficiency
- The ability of all metabolic systems to withstand greater amounts of stress without fatigue

## Performance Characteristics Defined

Although the specific training and conditioning requirements of each sport vary depending on the skills necessary to perform the activity, there are general underlying characteristics that are common to all performance: strength, endurance, speed and coordination. Although particular sports may draw on one of these characteristics more than others, or may draw on a combination of characteristics, conditioning programs must ultimately address them all in order to enhance the athlete's performance and decrease the risk of injury.

### Strength

Muscular strength is the tension generated within a muscle group(s) against a fixed resistance and angular velocity in one maximal effort. Athletes require muscular strength to compete at high levels of exercise intensity. Strength is the combination of the structure of the muscle and neurologic stimulation that enables the muscle's functional unit to contract. Maximal strength development is, therefore, a combination of morphologic alteration, known as hypertrophy, and neurological adaptations, resulting in enhanced neural stimulation.

Muscular power enhancement depends on the force and acceleration of contraction. Therefore,

power training necessitates neuromuscular adaptations that increase the speed and force at which the muscular contraction takes place.

### Endurance

For athletes whose performance demands sustained levels of strength, a key element of their conditioning is the enhancement of muscular endurance. Endurance involves both strength and the ability to delay the onset of fatigue. The endurance capacity of an athlete is a function of the oxidative pathways. Many factors affect aerobic endurance, including cardiorespiratory capacity and efficiency (transport), metabolic substrate availability, and cellular metabolic activity (use). Also important is the power output (workload) in terms of skeletal muscle function. Therefore, conditioning responses for endurance in athletes involves both mechanical (power output) and metabolic (substrate transport and utilization) adaptations.

Because endurance activities usually induce fatigue, physical conditioning goals are to delay the onset of fatigue and to allow the athlete to work at high-intensity levels before fatigue is reached.

### Speed

One of the most important characteristics for successful athletic performance is speed. Speed is defined as the capacity to move quickly and refers to locomotion. An athlete's speed is mediated predominantly by neuromuscular factors that include contractile capacities (power) and mechanical characteristics (gait and technique). Physiologically, speed adaptations are induced when

selective neuromuscular units are enhanced through increased metabolic substrate availability and speed of muscular contractions.

### Coordination

Coordination is generally defined as harmonious action, as seen in muscles. This characteristic of performance requires input from the other three characteristics (strength, speed and endurance) to allow the athlete to function at peak performance levels. The central nervous system (CNS) is the most rudimentary ordinate that mediates coordinated motion. The peripheral afferent and efferent branches of the CNS regulate coordinated motion by inhibiting and/or activating specific muscle groups, which produce movement patterns. Through repetition from physical training, the neuromuscular system is conditioned to provide the requisite movement patterns, or engrams, for developing the strength, speed, endurance and agility that are key to performance.

Coordination is classified as general or specific, depending on the degree of complexity. General coordination encompasses normal body movement such as walking. Specific coordination is the technical movement or movements required for a specific activity. Sport-specific coordination may not carry over to general coordination. On the other hand, general coordination has been attributed to athletes who are very skilled at their sport.

In next month's issue, we will delve into specific training modalities, including strength training, anaerobic conditioning and aerobic conditioning, and discuss how the patient can benefit from each.