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Patient Tips

Effective Stretching

- **Warm up *before* stretching:** walking or a light jog will warm up your muscles and make the stretching session much more valuable.
- **Focus on the muscles used:** stretch the muscles that will be most used in your workout.
- **Begin slowly:** push yourself only as your muscles loosen up.
- **Don't bounce:** hold the stretch and feel a constant pull in the muscles.
- **Hold the stretch:** hold the position for a count of 10.
- **Don't rush your stretching routine:** if you cut your workout short, don't skip the stretching.
- **Stretch both sides:** use the same stretchesfor both sides of your body.
- **Do it again:** stretch after your workout.
- **Get professional help:** consult your physical therapist on ways to improve your routine.

Part I: **Aerobic Training and Conditioning:** Creating an Effective Patient Program

In the May and June issues of *Golden Hills Journal* we discussed the key role exercise training and conditioning play in helping the patient/athlete reduce his or her risk of injury while enhancing strength, endurance, speed and coordination. In July and August, we delved deeper into this topic with a two-issue series on resistance training. Based on the positive feedback we received on those articles, we're rounding out our training and conditioning series in September and October with a two-part series on aerobic training. Our goal with the entire training and conditioning series is to provide you and your patients with an understanding of the extensive benefits of both resistance and aerobic exercise, as well as a wealth of information to use in creating an effective patient workout program.

Aerobic Exercise Defined

"Aerobic" literally means "with oxygen," and signifies that oxygen is used during cellular respiration to generate power for endurance exercise, such as running, swimming, rowing, cross country skiing and cycling. Aerobic exercise is by definition of low to moderate, or "submaximal," intensity and is undertaken for a duration of at least 3-4 minutes up to hours.

Aerobic exercise can be contrasted with anaerobic (or resistance) exercise, such as strength training and weight training. The two types of exercise differ by the duration and intensity of muscular contractions involved, as well as by how energy is generated within the muscle. Unlike anaerobic conditioning, aerobic conditioning uses molecular oxygen along with protein, fat and carbohydrate (glycogen) to synthesize ATP-CP—a complex chemical compound formed with the energy released from food and stored in cells—for energy.

Initially during aerobic exercise, glycogen is broken down to produce glucose, but in its absence, fat metabolism is initiated instead. The latter is a slow process, and is accompanied by a decline in performance level. The switch to fat as fuel is a major cause of what marathon runners call "hitting the wall."

Anaerobic exercise, in contrast, refers to the initial phase of exercise, or any short burst of near maximal or maximal exertion, in which the glycogen is consumed without oxygen, and is a far less efficient process. Operating anaerobically, an untrained 400 meter sprinter may "hit the wall" short of the full distance. On the other hand, a seasoned marathoner could easily run 26.2 miles at a low-intensity rate ($\leq$ 60% maximum oxygen consumption, or Vo_2), with the aerobic metabolic system providing a seemingly endless supply of fuel to the muscles.

Aerobic Training: Creating an Effective Program (Continued)

Activity Duration	Classification	Energy Supplied By
1 to 4 seconds	Anaerobic	ATP (in muscles)
4 to 20 seconds	Anaerobic	ATP + PC
20 to 45 seconds	Anaerobic	ATP + PC + Muscle glycogen
45 to 120 seconds	Anaerobic, Lactic	Muscle glycogen
120 to 240 seconds	Aerobic + Anaerobic	Muscle glycogen + lactic acid
240 to 600 seconds	Aerobic	Muscle glycogen + fatty acids

Both the term "aerobic exercise" and the exercise method were developed by Kenneth H. Cooper, MD, an exercise physiologist for the U.S. Air Force. Dr. Cooper was puzzled by why some subjects with excellent muscular strength were prone to poor performance at tasks such as long-distance running, swimming and bicycling. He began measuring systematic human performance using a bicycle ergometer, and began measuring sustained performance in terms of the subject's ability to utilize oxygen. His groundbreaking book *Aerobics* was published in 1968, and included scientific exercise programs using running, walking, swimming and bicycling. Cooper's study provided the scientific baseline for almost all modern aerobics programs, most of which are based on oxygen-consumption equivalency.

The Importance of Aerobic Conditioning

Many experts consider a base of aerobic conditioning to be the foundation for any comprehensive training and conditioning program and a key to achieving longterm health and fitness. In addition to its many direct benefits, discussed below, even athletes involved in anaerobic activities can benefit indirectly from having a high level of aerobic fitness. For example, aerobic fitness can greatly assist athletes in avoiding injuries related to muscle fatigue, which is notorious for affecting muscle strength, reaction time, agility and neuromuscular coordination.

Any aerobic exercise program should be individualized to meet the patient's specific training goals, including achieving optimal physical health, losing weight, enhancing cardiovascular fitness, improving sports performance or recovering from an injury.

Benefits

Aerobic conditioning programs are incredibly beneficial for athletes and non-athletes alike, as they can enhance respiratory function, increase metabolism and energy levels, and establish a basic level of fitness and endurance that holds many long lasting health benefits. Specifically, aerobic exercise:

- Strengthens muscles involved in respiration
- Strengthens and enlarges the heart muscle to improve its pumping efficiency and reduce the resting heart rate
- Tones muscles throughout the body, which can improve circulation and reduce blood pressure
- Increases the number of red blood cells, facilitating the transport of oxygen
- Reduces the risk of death due to cardiovascular problems
- Stimulates bone growth
- Reduces risk of osteoporosis
- Can aid the patient's recovery from stroke, cancer or cardiovascular disease

In addition to the health benefits of aerobic exercise, there are numerous performance benefits:

- Increases storage of energy molecules, such as fats and carbohydrates, within the muscles, improving endurance
- Neovascularizes the muscle sarcomeres to increase blood flow through the muscles
- Increases speed at which aerobic metabolism is activated within muscles, allowing a greater portion of energy to be generated aerobically
- Improves the ability of muscles to use fats during exercise, preserving intramuscular glycogen
- Enhances the speed at which muscles recover from high intensity exercise

While aerobic exercise notably does not increase the resting metabolic rate as much as some forms of resistance training, it allows for longer, more frequent activity and consumes more energy when the individual is active. In addition, the metabolic activity of an individual is heightened for several hours following a bout of aerobic activity.

In next month's issue, we will present strategies for building an effective aerobic training program. For more specific information about our patient-centered approach to aerobic training, **call us today at (408) 274-0888**.