**TRAINING**

**STRENGTH AND MUSCLE MASS**

Typically, athletes train intensely when preparing for a contest or competition and then cut back on the volume and intensity of training during down periods. Muscle performance depends on a complex combination of muscle fiber type, muscle size, muscle density and nervous control of muscles. Training increases strength and mass, but these changes reverse when you stop exercising. A study by French and Canadian researchers showed that curing deconditioning, submaximal strength decreased first- followed by maximum force and maximum power. However, the declines were influenced by age, gender and training experience. You will lose muscle capacity when you stop training, but the extent of these losses is fairly unpredictable. (Scandinavian Journal Medicine & Science in Sports, 23: e140-e149, 2013)

**STRENGTH AND ENDURANCE TRAINING**

Bodybuilders and power athletes don’t run 80 miles per week because it causes undesirable adaptions that don’t match the requirements of the sports. Weight training activates the mTOR-S6K1 pathway that promotes muscle hypertrophy, strength and power. Conversely, endurance training activates the AMPK pathway, which increases muscle cell mitochondria and enhances the muscles’ energetic capacity. A study from the Swedish School of Sport and Health Sciences found that protein synthesis resulting from either high-volume or high intensity weight training programs was not affected by a 30 minute aerobic workout on a stationary bike. However, the weight training did repress the endurance exercise stimulation of AMPK. This was an interesting, sophisticated study that did not agree with most findings in the scientific literature. (American Journal of Physiology, published online April 30, 2013)

**COMPETING IN HEAT**

How much does it influence recovery? Danish scientists examined chemical markers of muscle damage; post-exercise performance and muscle glycogen levels in semi-professional soccer players after playing matches in temperatures of 109°F and 70°F. Even though muscle temperatures were higher after the game in heat, markers of muscle damage (creatine kinase, myoglobin), glycogen and post-competition performance were unaffected by competing in the heat. (Medicine Science Sports Exercise, 45:860-868, 2013)

**OXYGEN METABOLISM NOT IMPAIRED BY BIG MUSCLES**

Diffusion works by moving substances from high concentrations to lower concentrations. Bodybuilders often have huge muscles, which can interfere with diffusion. Capillary density sometimes decreases muscles as they hypertrophy, so the oxygen must travel further to get from the blood to the mitochondria (cell energy centers). Italian researchers found people compensated for increased diffusion distances by improving the capacity of mitochondria, which could use oxygen more efficiently. In fit bodybuilders, large muscles do not impair their ability to use oxygen. (Journal Applied Physiology, in press March 21, 2013)

**STABLE TRANIING BUILDS STRENGTH BEST**

Exercising on unstable surfaces, such as BOSU balls, Swiss balls and wobble boards is a central component of most of these core strengthening programs. Most studies show that instability training is not effective for building the core. A study from Li Yongming the lower body and spine was similar when squats were performed on stable and unstable surfaces. Researchers measured muscle activation during the squat performed on stable and unstable surfaces (Reebok core board) using electromyography (measures the electrical activity of muscles). Subjects performed the squats using low loads. Studies using higher load showed that exercising on firm ground is best for building muscles during the squat. (Journal Strength Conditioning Research, 27:1349-1353, 2013)

**HOW DOES OCCLUSION TRAINING WORK?**

While the practical significance of these findings are not clear, it is important that we understand the mechanisms of how blood flow restriction (called Kaatsu training) influences strength gains. Letters to the editor Alan Mikesky from Indiana University-Purdue in Indianapolis and a group led by Jeremy Mikesky and colleagues from the University of Oklahoma described the controversy. The Oklahoma group attributed the changes to muscle to the effects of low-load training and not to any crossover effect. Dr. Mikesky argues that occlusion training with low loads affects the entire body and was an important trigger for muscular hypertrophy and strength. (Medicine and Science in Sports and Exercise, 45:1018-1019,2013)

**NERVE TENSION CONTRIBUTES TO STRENGTH LOSS AFTER STRECHTING**

Almost all fitness and athletic training manuals outlines pre-exercise warm-up stretches. That changed when scientists discovered that static stretching before exercise or competition decreased strength and power and possibly increased the risk of injury. An interesting study from Lenox Hill Hospital in New York City showed that stretches that pulled on nerves in the legs decreased strength more than those that didn’t. stretching the hamstrings with the spine in a neutral position caused less strength loss. (Journal Strength Conditioning Research, 27: 1327-1332, 2013)

**TRADITIONAL WEIGHTS**

Decreasing muscle blood flow may trigger cell damage, inflammation, cell stress and anabolic hormone release. Muscles grow in response to physical and chemical stress, so it seems reasonable that restricting blood flow to muscles during training might promote hypertrophy. British researchers compared the effects of low resistance, blow-flow restricted training with non-occluded controls. The men trained with a blood pressure cuff on their leg pumped up to 180 millimetres of mercury and performed exercises at 70 percent of maximum effort. They trained three times per week for three weeks. They showed improvements in the bench press, squat, sprint times, leg power and testosterone. Occlusion training allowed athletes to make strength gains while using lighter loads. Try it; it might work. (International Journal Sports Physiological Performance, published online April 23, 2013)

**HEALTH**

**BACTERIAL IMBALENCES IN THE MOUTH CAUSE BAD BREATH**

These chemicals are released by millions of bacteria-consuming food and tissue in the mouth, which causes a smell like rotten eggs, rotten cabbage, garlic or fish. University of California, Los Angeles, scientists found that 100 to 200 bacterial species live in the mouth. Imbalences between them cause bad breath. Bacteria found below the gum line and crevices in the tongue are particularly guilty of emitting foul odors. Scientists are working on new techniques for balancing mouth bacteria. In the mean time, brush and floss frequently and don’t let your mouth dry out. (Scientific American, May 2013, p 30-33).

**EXTREMELY LOW SODIUM INTAKE DANGEROUS**

The American Heart Association recommends that people limit sodium intake to 2,300 milligrams per day. African-Americans, people over 51 years old and those with high blood pressure, diabetes or kidney disease should consume 1,500 milligrams per day. American adults consume 3,400 milligrams per day. The Institute of Medicine of the Centers for Disease Control concluded that studies do not support reducing salt intake to 1,500 milligrams per day. Extremely low sodium intake can lead to health problems. (http://www.iom.edu/Reports/2013/Sodium-Intake-in-Populations-Assessment-of-Evidence.aspx

May 14, 2013)