



Our Mission

"To provide outstanding, progressive care in a nurturing environment that prioritizes individual treatment, with accountability to standard of care; where rehabilitation, fitness, performance and an overall healthy lifestyle contributes to best serving our patients and the community."

Calendar of Events

Included in this issue is a calendar of upcoming events. See Page 3.

Ask the Physical Therapist:

Is there a question that you would like to ask a Physical Therapist?

Here is your chance for an answer. Send your questions to ppt@frii.com, and your question will be answered and possibly printed in the next newsletter.

Going Green! Please email us if you would like to receive this newsletter via email. Contact: ppt@frii.com

Performance Physical Therapy (970) 493-8727 www.performance-physicaltherapy.com

Flexibility Training Impacts Performance

Flexibility training is perhaps the most undervalued component of conditioning. While recent and ongoing debate questions its role in injury prevention, athletes can still gain much from a stretching regime.

From a volleyball spike to a rugby drop kick, flexibility of the body's muscles and joints plays an integral part in many athletic movements.

In general terms, flexibility has been defined as the **range of motion** about a joint and its surrounding muscles during a passive movement. Passive in this context simply means no active muscle involvement is required to hold the stretch. Instead gravity or a partner provides the force for the stretch.

The Benefits of Flexibility Training

By increasing this joint range of motion, performance may be enhanced and the risk of injury reduced. The rationale for this is that a limb can move further before an injury occurs.

Tight neck muscles for example, may restrict how far you can turn your head. If, during a tackle, your head is forced beyond this range of movement, it places strain on the neck muscles and tendons.

Ironically, static stretching **just prior** to an event may actually be detrimental to performance and offer no protection from injury. The emphasis is on "may" however, as a closer examination of the scientific literature shows that effects are often minimal and by no means conclusive.

Muscle tightness, which has been associated with an increased risk of muscle tears, can be reduced before training or competing with dynamic stretching. For this reason many coaches now favor dynamic stretches over static stretches as part of the warm up.

Competitive sport can have quite an unbalancing effect on the body. Take racket sports for example. The same arm is used to hit thousands of shots over and over again. One side of the body is placed under different types and levels of stress compared to the other. The same is true for sports like soccer and Australian Rules football, where one kicking foot is usually dominate. A flexibility training program can help to correct these disparities preventing chronic, over-use injury.

Of course, a more flexible athlete is a more mobile athlete. It allows enhanced movement around the court or field with greater ease and dexterity. Some other benefits may include an increase in body awareness and a promotion of relaxation in the muscle groups stretched - both of which may have positive implications for skill acquisition and performance.

A number of anatomical and physiological factors influence an athlete's flexibility. While some we are stuck with (such as age, gender, and joint structure), others are under our control. These include activity level, muscle bulk and stretching exercises.

Continued on Page 2

Flexibility Training Impacts Performance

Continued from Page 1



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The Physiology of Flexibility

1. Joint Structure

There are several different types of joints in the human body. Some intrinsically have a greater range of motion (ROM) than others. The ball and socket joint of the shoulder for example, has the greatest range of motion of all the joints and can move in each of the anatomical planes. Compare the shoulder joint to the ellipsoidal joint of the wrist. It moves primarily in the sagittal and frontal planes. The hinge joint of the ankle is similar while the modified hinge joint of the knee allows ROM in the sagittal plane.

2. Age & Gender

ROM and flexibility decreases with age. This is due, in part to the fibrous connective tissue that takes the place of muscle fibers through a process called fibrosis. Females tend to be more flexible than males. Older individuals should take encouragement that, just as with strength and endurance, flexibility can be increased at any age with training.

3. Connective Tissue

Deep connective tissue such as fascia and tendons can limit ROM. In particular, two characteristics of connective tissue, **elasticity** and **plasticity** are related to ROM. Elasticity is defined as the ability to return to the original resting length after a passive stretch. Plasticity can be defined as the tendency to assume a new and greater length after a passive stretch. Ligaments do not seem to display any elastic properties. However, with exposure to stretching they may extend to a

new length. The strength and conditioning coach must remember that increased mobility in the ligaments reduces the stability of the joint - often an unfavorable adaptation, particularly in contact sports.

4. Muscle Bulk & Weight Training

Hypertrophy of skeletal muscle can adversely affect ROM. It may be difficult for very bulky athletes to complete certain stretches such as an overhead triceps stretch. However, in these athletes, significant muscle mass is usually more favorable to their sport than extreme ROM.

Resistance training can increase flexibility although when heavy loads are used within a limited ROM, weight training can reduce flexibility.

5. Proprioceptors

The capacity of the neuromuscular system to inhibit the antagonists (those muscles being stretched) influences flexibility.

There are two important proprioceptors involved in the mechanics of stretching and flexibility. The first is the **muscle spindles**. Located within the muscle fibers they monitor changes in muscle length. The **stretch reflex** is the body's involuntary response to an external stimulus that stretches the muscle and causes a reflexive increase in muscular activity. It is the muscle spindles that activate this response. *Continued on Page 3*

Flexibility Training Impacts Performance

Continued from Page 2

When stretching, it is best to avoid activating the muscle spindles and the stretch-reflex response, as it will limit motion.

Static stretching does not elicit the muscle spindles, allowing muscles to relax and achieve a greater stretch.

The other important proprioceptors are the **golgi tendon organs** (GTO). These are located near to the musculotendinous junctions and are sensitive to increase in muscle tension. When the GTO is stimulated it causes a reflexive relaxation in the muscle. When this relaxation occurs in the same muscle that is being stretched, it is referred to as **autogenic inhibition** and can facilitate the stretch.

Autogenic inhibition can be induced by contracting a muscle immediately before it is passively stretched – a technique used in PNF stretching.

Reciprocal inhibition occurs when the GTO is stimulated in the

muscle opposite to that being stretched (i.e. so the opposing muscle relaxes). This can be achieved by simultaneously contracting the opposing muscle group to the one being passively stretched.

6. Internal Environment

The athlete's internal environment affects ROM. For example, mobility is decreased immediately upon waking after a night's sleep. Ten minutes in a warm bath increases body temperature and ROM.

7. Previous Injury

Injuries to muscles and connective tissue can lead to a thickening, or **fibrosing** on the affected area. Fibrous tissue is less elastic and can lead to limb shortening and reduced ROM. Fibrous nodules in connective tissue and muscle are often called **trigger points**. A technique called myofascial release may be able to alleviate pain and restriction caused by trigger points.



“For example, mobility is decreased immediately upon waking after a night's sleep”

Upcoming Events to Mark on Your Calendar

Sixth Annual Take a Kid Mountain Biking Day

When: Saturday October 3, 2009.
Free event for kids (and parents) to go on a guided mountain bike ride.

Lunch provided.

Register at <http://www.overlandmtb.org>

Registration ends September 26, 2009.

Nature of the Poudre River Tours

Location: Along the Poudre River

Date: Saturday, October 10, 2009

Time: 3:00PM - 5:00PM

Discover the beautiful Cache la Poudre River as it flows near downtown Fort Collins on a 2-hour walking tour loop on paved and soft surface trails. Meet at Lee Martinez Park, in the lower parking lot near the tennis courts. Tours are family friendly.

Free – NO registration required.

Phone: 970-416-2815

<http://www.fcgov.com/naturalareas/pdf/09program-guide.pdf>



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Suggested Websites

www.theprrt.com

www.vestibular.org

www.muscleactivation.com

www.totalmotionrelease.com

View video of MAT and PRRT
techniques on our website!

We're on the Web!

See us at:

www.performance-physicaltherapy.com