

- Never bounce or force a stretch ("ballistic" stretching\*)
- Perform three to six repetitions
- Beginners should hold 10-15 seconds working up to 20-30 seconds
- The longer the hold the better the results. ( Research has shown the need to hold at least 20 seconds, holding up to a minute produces better results.)

\*Ballistic stretching and stretching to the point of pain both will reflexively tighten that muscle to protect the body.

Research has also shown stretching 2-3x per week will show results in 5-6 wks. The body can hold those results up to 4 wks. upon cessation of stretching. The contraindications to stretching are a recent fracture or any acute injury causing significant inflammation, sharp acute pain, hematoma or other significant trauma. Stretching is also not done when contractures or tight muscles provide joint stability or are needed for functional abilities (for example for people with paralysis or severe muscle weakness).

In addition to the static stretching techniques noted above there are 3 other ways to stretch using neurological properties of the body. These are as follows:

Sherrington's law of reciprocal inhibition is used to gain additional flexibility. This is especially useful if a muscle is in spasm. Put the muscle to be stretched in the appropriate position to provide a comfortable stretch. Then contract the opposite muscle group against a light resistance. This causes the tight muscle to relax (inhibition) and elongate as the joint moves in that direction.

The next 2 techniques are associated with what we call proprioceptive neuromuscular facilitation (PNF). There are studies that debate these benefits, but is still found to be successful. Contract-relax involves actively contracting the muscle that you are stretching against resistance from a partner for 5-10 seconds, then relaxing for 5-10 seconds. The partner then actively moves the extremity further into a comfortably stretched position through the gained ROM, rest 5-10 seconds and repeat.

Contract-relax- contract is as above except after the contract relax phase the person actively contracts the opposite muscle group to actively move the extremity into the gained ROM again holding 5-10 seconds relax and repeat. Many fitness experts feel this is the most beneficial static stretching technique. Personally I have found that adding a rotary component to the stretch helps. This involves rocking or rolling the extremity gently back and forth when its in its stretched position.

Static stretching should not be done before an event or important practice because it can actually cause fatigue and decrease coordination.

Dynamic flexibility or functional flexibility considers 5 factors that affect flexibility:

- The elasticity and length of a muscle and tendon
- Joint structure (for example the shoulder is a ball and socket joint versus the knee which is a hinge joint)
- Level of coordination/motor control
- Fitness level.
- Physiological or emotional status (Increased tension results in decreased flexibility).

Dynamic flexibility activities should be performed prior to an event or important practice. This is why you see football players doing skips, hops, and lunges across the field before a game and at half-time instead of the traditional static stretches in the past. A dynamic flexibility routine needs to be sport and athlete specific. It should hit the muscle groups that undergo the most stress during that activity as well as the major muscle groups used the most. It is also advantageous to hit two joint muscle groups. Stretches should be held 1-2 seconds. Physical therapists or athletic trainers could prescribe the dynamic flexibility program for you or your team.

Other assorted principles regarding flexibility should be noted. Joint integrity is the most important factor to be considered when addressing a flexibility routine. Flexibility is individual and may change from day to day. Properly performed weight training will increase ROM and flexibility not make an individual muscle bound or decrease their flexibility.

Children ages 6-10 stretch and should avoid it. After the age of 10, usually around the ages of 12-14, flexibility training may be beneficial. Flexibility training at that time is needed for the muscle groups where the bones are growing the most to avoid bad posture and susceptibility to injury. Around the age of 14 stretching should be emphasized in a sports specific manner. Lastly, stretching is very important after a workout or competition to decrease soreness from lactic acid, take advantage of cardiac benefits, decrease muscle spasm, and to promote a regeneration effect.

Flexibility activities should be an integral part of every training regime. It is advised that you perform static stretching for hamstrings, calves, and other muscle groups used in your specific sport or position. Prior to a game or important workout perform a proper warm up with dynamic stretches designed by a trainer or therapist. Research has shown how these short routines will improve your athletic performance and decrease your injury potential. ■

## Smart Moves health news update off the court!

### Tennis Season



Julie Kerr, M.D.  
Akron Children's Hospital

The game of tennis as we know it today dates back to the 19<sup>th</sup> century. It is the oldest of all racquet games. The first tennis court in the United States was built in 1876 and the game has been gaining in popularity ever since. In the United States alone, 25 million people have reported playing the game within the past year. Considered a lifelong sport, tennis is played by adults and children alike. The following information is an overview of important considerations for any level of tennis player.

### Preseason Conditioning

Training programs initiated in the preseason should encompass three important principles: aerobic power, strength, and flexibility. Incorporating these into a regular training routine maximizes the athlete's ability to achieve fitness and minimizes the risk of overuse injuries due to "too much, too soon" participation. Effective aerobic training should mimic the way a tennis player would compete and be personalized to the athlete's fitness level. An important feature of strength training involves core exercises designed to stabilize and strengthen the trunk musculature. These muscles are then able to assist in generating force for ball strike. Optimal flexibility can be defined as the amount of range of motion (ROM) at the joint that allows for maximum performance of the activity while protecting the joint from acute or chronic injury. Static stretching is done by slowly moving the joint to the end of its ROM, holding that position for 15 – 20 seconds, and repeating the stretch four times. This type of static stretching is one of the safest techniques for increasing flexibility.

### Injuries

The nature of tennis play involves short explosive bursts of energy with frequent changes in direction of the lower extremities with simultaneous upper extremity motion with the racquet. These rapid movements can create great demands on the tennis athlete and can result in acute musculoskeletal injuries. Overuse injuries are also a consideration. As the volume and intensity of training increase, so too does the risk of overload injuries.

### Lower Extremity

Among all body areas, the greatest number of injuries occurs in the lower extremity. In the thigh area, sudden acceleration and position change cause most muscle strains or tears of the hamstring and quadriceps muscle groups.

Patellofemoral pain and patellar tendinopathy are the most common knee injuries and are typically of an overuse etiology. Acute knee injuries can occur with a twisting motion of the knee while the foot is planted. With such a mechanism, meniscal (cartilage) tears or medial collateral ligament sprains most often result.

"Tennis leg" is a partial tearing of the medial calf or gastrocnemius muscle at the junction of the muscle and tendon. Other injuries of the lower leg include soleus muscle strains, Achilles tendinopathy, and stress fractures. Ankle sprains in particular are most common among the lower extremity. Stress to the ankle joint occurs because of the jumping, twisting, stopping, starting and running involved in matches and in practice sessions. "Tennis toe" refers to a sprain of the joints of the toe from repetitive jamming of the great or second toe against the toe box of the shoe during starting and stopping motions. Blood may collect under the toenail causing a subungual hematoma.

### Trunk

Between 53% and 70% of all trunk injuries have been attributed to the back. The twisting of serving, forehand and backhand strokes create increased pressures to the trunk and low back. Decreased flexibility in this region and in the lower

extremity as well as poor core strength and endurance can be implicated in the high prevalence of low back injuries. A tendency toward hyperextension of the lumbar spine during the serve leads to injuries to the facet joints of the back and can lead to lumbar spine stress fractures known as spondylolysis in adolescent participants.

### Upper Extremity

Among upper extremity injuries, those of the shoulder joint dominate. The tremendous rotational forces placed upon it combined with the highly repetitive motion required of the shoulder predispose it to injury. Rotator cuff impingement and tendinopathy and labral injuries are commonplace during tennis season.

"Tennis elbow" or lateral epicondylitis is certainly one of the more commonly known injuries among tennis players. Up to 45% of world-class tennis athletes have suffered from tennis elbow. The mechanism of injury is one of overuse of the wrist extensor tendons with repetitive backhand and ground strokes.

### Heat Illness

Since much of the outdoor tennis season occurs during the warmest months of the year here in Northeast Ohio, heat illness issues deserve mention. The forms of heat illness include, from mild to increasingly severe: heat cramps, heat syncope, heat exhaustion, and heat stroke. Each tournament should have guidelines in place regarding how play may be held or altered in warm weather conditions. The heat index or apparent temperature is determined using the air temperature and percent relative humidity. An apparent temperature of greater than 90<sup>0</sup> F is the cutoff point for "extreme weather conditions." Multiple websites, such as <http://www.weather.com> or <http://www.weather.yahoo.com> can provide the relative humidity and air temperatures for any area of the United States. The numbers can be plugged into the chart below to plot the apparent temperature/heat index:

Relative humidity, %	Air temperature, °F										
	70	75	80	85	90	95	100	105	110	115	120
	Apparent temperature										
64	69	73	78	83	87	91	95	99	103	107	
10	65	70	75	80	85	90	95	100	105	111	116
20	66	72	77	82	87	93	99	105	112	120	130
30	67	73	78	84	90	96	104	113	123	135	148
40	68	74	79	86	93	101	110	123	137	151	
50	69	75	81	88	96	107	120	135	150		
60	70	76	82	90	100	114	132	149			
70	70	77	85	93	106	124	144				
80	71	78	86	97	113	136	157				
90	71	79	88	102	122	150	170				
100	72	80	91	108	133	166					

Players should adhere to the following guidelines to lower their risk of overheating: maintaining hydration, acclimatizing to a warmer climate, resisting alcohol (in adults) and caffeine consumption, being at an adequate fitness level, and preventing sunburn.

Hopefully, this overview will arm you with some information to help you have both a safe and enjoyable tennis season. If this article has sparked some questions, please feel free to contact the SportsHealth and Rehab Center to get them answered. ■

## Kids Are Number One Run

Sunday, June 4, 2006

### Scheduled Events

<u>Open Registration</u>	11 a.m.	Participants may register up to 15 minutes before the start of each race. Pre registration ends May 31.
<u>Fun Run</u>	1:00 p.m.	One-mile, noncompetitive run/walk for all ages. All finishers will receive recognition for completing the course.
<u>Miracle Mile</u>	1:25 p.m.	Intended for competitive runners capable of running less than a seven-minute mile.
<u>5K Run</u>	1:45 p.m.	5K race through Glendale Cemetery in downtown Akron with awards for overall winners (male and female). Awards will also be given for 1st, 2nd and 3rd places for females/males in the following age categories: 14 and under, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65 and over.
<u>Paws for a Cause</u>	2:30 p.m.	Canine participants (and their owners) can join the Children's Doggie Brigade for a one-mile noncompetitive run/walk.

**Registration:** Entry forms are available at athletic stores, fitness centers, hospitals, churches, pet stores and area retail establishments or go on line to [www.akronchildrens.org/kidsrun](http://www.akronchildrens.org/kidsrun)

	<u>Pre-Registration</u> (Ends May 31)	<u>Day of Registration</u>
Fun Run	\$10	\$12
Miracle Mile	\$10	\$15
5K Run	\$15	\$20
Paws for a Cause	\$10	\$15

#### For Information:

Contact Carolyn B. Hofmann at (330) 543-3897, or [chofmann@chmca.org](mailto:chofmann@chmca.org) or fax us at (330) 543-3176

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# Sports Health & REHAB CENTER

On The Canal

May 2006



**Flexibility is Underrated**  
Dave Rogers, PT  
Allied Health Rehab Centers

The value of flexibility training in relation to the time an athlete puts in with training for strength, endurance, speed, etc. is underrated. We are probably all aware of these benefits from flexibility training:

- Reduce injury potential
- Increase range of motion (ROM)

It can also:

- Increase strength
- Increase speed
- Increase body awareness
- Assist in learning to relax
- Focus on proper breathing
- Improve athletic performance

When stretching is combined with a proper warm-up it will additionally:

- Increase core body temperature
- Increase level of nervous system excitation
- Improve cardio respiratory efficiency
- Decrease reaction time
- Improve work capacity

Obviously if someone is not participating in an appropriate flexibility training program they may not experience the benefits of all the factors listed above. It should also be noted that with inadequate flexibility normal body mechanics may be altered and this can contribute to injury.

Flexibility is defined as the ability of a muscle to relax and yield to a stretch force. Tightness is a mild

decrease in the length of soft tissue. Some things to remember here are that ROM is also determined by skin, connective tissue, and joint mobility.

There is much debate over the relationship between joint looseness and athletic performance. Hyper-mobility is not always beneficial in contact sports or sports where quick direction and speed change is important. Joint hypomobility may seriously restrict an athlete in a sport such as gymnastics or skating. For the purpose of this article we are discussing muscle flexibility. Lastly, we must realize the big difference between flexibility assessed in a resting state (which is not part of an athletic performance) and the amount of motion a joint exhibits in a sports activity. Not surprisingly a pitcher may exhibit 90 degrees of external rotation at the shoulder during a game, but will probably not come close to that measurement at rest in the clinic.

Generally speaking soft tissue (skin, tendon, ligament, muscle, and fascia) all respond and can change various characteristics by the physiological stresses put on it. This is part of the SAID principal (Specific Adaptation to Imposed Demands) Stretching techniques can also use the neurophysiological mechanisms of the body to increase flexibility. Two types of stretching we will discuss are static and dynamic.

Static Stretching should be done regularly. It is best performed at times other than before competition or an important practice or work out session, possibly in the evening while watching TV or relaxing. Static stretches are the traditional stretches done independently for individual muscle groups. Well accepted parameters are:

- Relax
- Stretch to the point where you feel a good stretch, but no pain
- Breath deep in through the nose and exhale through the mouth

Safety Zones



Quality People, Quality Care, Quality Results