FOR SPORTS MEDICINE PATIENTS

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ICE OR HEAT?

EXERCISE,
DEHYDRATION & FLUIDS

SHOULDER PAIN

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A HEALTHY APPROACH TO FITNESS TRAINING

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ICE OR HEAT?

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Probably the most frequently-asked question regarding sports injuries is, “When do I use ice and when do I use heat, and with which injuries do I use which?” It is fair to say that most people will use ice following their initial injury and after a few days begin to use heat to treat the injury.

This is a fairly safe approach to take. However, by understanding the very basics of ice and heat treatments, one will be less likely to actually aggravating the injury.

With either minor or major muscle strains or ligament sprains, an actual tissue injury occurs. This injury is in the form of torn tissue with secondary bleeding and inflammation. By using ice during the first 24 to 48 hours, the small blood vessels will constrict, reducing the amount of both bleeding and inflammation, resulting in an improvement in pain. Sometimes the inflammation and swelling can last way beyond 48 hours or can be periodically aggravated by normal activities of daily living which might require extended periods of icing. The best rule of thumb to go by is if the injured extremity is beginning to swell and throb, then ice is appropriate treatment. This will most often occur after resuming activities. The need for episodes of icing may last several days to a week, depending on the severity of the injury.

Ice therapy usually needs to last a minimum of 20 minutes to provide good cooling which will promote decreased swelling. Ice can remain on an extremity for hours as long as the patient is careful to assure the skin is not frozen, which could cause blistering.

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Heat therapy is used to increase circulation to and within muscle tissue, as well as decrease the viscosity of the fluids around tendons and ligaments and within joints which decreases stiffness. This helps to promote better range of motion which will decrease the risk of injury to tendons and ligaments when they are stressed. This is analogous to a good warm-up program prior to any activity. Therefore, heat is best used prior to any rehabilitation of an injured extremity which will allow one to more fully rehab the extremity with decreased risk of re-injury. Heating of an extremity takes 10 to 15 minutes or longer, depending on the mode of heat application. Similar to ice therapy, one must take caution in preventing any thermal injury to the skin.

To summarize, major and minor muscle strains and ligament sprains are best treated with ice therapy indefinitely until the extremity has recovered. Ice should be used after any physical therapy or rehabilitation in order to decrease secondary swelling and inflammation. Heat is most appropriately used prior to any rehabilitation or return to activities in order to decrease the risk of re-injury.

The final note is the use of heat and ice contrast. This is when heat and ice are alternated in 10 to 20 minute intervals following rehabilitation of an injured extremity or following activities. This technique is felt to better facilitate the healing and recovery potential of an injured extremity after its physical rehabilitation. One must keep in mind if they are going to use heat and ice contrast therapy, they should always end their program with a minimum of 20 minutes of icing. This will help minimize the amount of recurrent swelling, inflammation and pain.
Anyone who has participated in endurance activities, long practices, continuous labor, or just spent the day by the pool in the sun has experienced the sense of profuse fluid loss through sweating and evaporation.

It is not uncommon in more tense activities in hot climates to lose up to two to four liters per hour through sweating alone. This amount of fluid loss can have a profound effect on an athlete’s performance and mental status as well as become potentially life threatening. It is therefore mandatory that participants, players, coaches and event organizers all have a basic knowledge of the fluid requirements of those participating.

**FLUIDS—WHAT TYPE?**

One commonly asked question is “What is the best fluid to drink while I am exercising?” There are basically two types of fluids to use. One is water and the other is a glucose and electrolyte fluid such as 10K or Gatorade. To choose the best fluid, one must consider the body’s basic needs during the competition or practice. During competition and practices in the heat, all athletes will lose a tremendous amount of fluid through sweating in order to keep their body temperature down. Though some electrolytes are lost during this process, the main vital element lost which needs to be replaced is water.

The body has the ability to shift electrolytes present within the cells as well as the surrounding tissue to maintain correct concentrations as water is lost. The best replacement therapy during competitions and practice is water alone. This is not to say that electrolyte solutions are not effective in replacing needed fluid but they actually will decrease the amount of water the body is able to absorb orally because of the electrolyte concentration of the fluid. Once the fluid enters the intestines, the rate of water absorption by the body is less than with regular water. Some of the electrolytes are also absorbed but the total amount of water absorbed is decreased. Therefore, to obtain maximal fluid absorption, plain water is ideal. Another option is to dilute any electrolyte solutions in half with water. This will increase the amount of water the body is able to absorb compared to regular concentration electrolyte solution. »
FLUIDS—WHAT TEMPERATURE?
Another commonly asked question is “Which is better: cold fluids or body temperature fluids?” This question is simply answered—the colder, the better. The body’s intestines have the ability to absorb cold water quickly. Therefore, whenever possible, fluids should be maintained as cool as possible during events and practices. This will enhance the athlete’s ability to absorb the fluid taken orally.

FLUIDS—HOW MUCH?
Athletes often ask “Will drinking too much fluid inhibit my performance?” This question has two answers, depending on what the athlete is trying to ask. Simply put, you cannot consume too much water during an activity. Our bodies are constantly losing water even when sitting quietly in a cool room. Once an athletic event begins, we are playing catch-up with fluid loss. Ideally, one should continuously consume fluid through an activity. This is best done constantly in small amounts rather than filling one’s stomach once or twice during an activity. Sometimes when a person consumes a large amount of fluid all at once, it makes the athlete feel bloated and hence the feeling that his performance is deteriorating.

The practice by the coaching staff to limit fluid consumption during practices has no beneficial effect to the athlete. It in fact can be harmful and will always decrease the athlete’s ability to perform. Each athlete will lose fluid at a different rate depending on his or her own body mechanics. To limit the availability of fluids in order to increase an athlete’s stamina for future events does not work. If athletes are allowed to consume fluid as they feel needed during a practice or a game, they will be able to compete longer and harder. This is the only effective way of increasing their stamina. Also, by allowing athletes continuous availability to fluids, they are more likely to consume the fluid in smaller portions on a regular basis rather than large quantities at the one to two water breaks typically allowed. Also along these lines, frequent water stations during marathons and triathlons will allow the participants to consume continuous small portions of fluid which will enhance their performance and decrease their risk of dehydration.

FREQUENT WATER STATIONS DURING MARATHONS AND TRIATHLONS WILL ALLOW THE PARTICIPANTS TO CONSUME CONTINUOUS SMALL PORTIONS OF FLUID WHICH WILL ENHANCE THEIR PERFORMANCE AND DECREASE THEIR RISK OF DEHYDRATION.
CONCLUSION
With proper diet, conditioning and training, an athlete can compete in all day events such as marathons, triathlons and two-a-day practices without the need for glucose or electrolyte supplements during the event.

Even the best trained athletes, however, will need to replenish their ongoing water loss during such events. The best means to replenish this water loss is through continuous intake of water. The colder the solution and the higher concentration of water in the solution (such as water alone or half strength electrolyte solutions), the higher rate of absorption of water by the body.

This is not to say that glucose and electrolyte solutions do not have their proper place in training and conditioning. Following completion of strenuous events, the rapid rate of water loss will dramatically decrease. At this point, the use of glucose and electrolyte solutions is very effective in replenishing the electrolytes that have been lost by the body as well as replenishing glucose stores. It must be kept in mind that until appropriate rehydration occurs and intracellular and extracellular electrolytes return to their more normal equilibrium, efficient usage of these electrolyte solutions by the body will not occur.
Shoulder pain has always been a common complaint in throwing athletes as well as weight lifters. With the increasing role of strength training by most general athletes, as well as the increasing popularity of fitness training, shoulder pain has become a common symptom.

ANATOMY
The shoulder joint has the remarkable capability of providing almost unlimited motion as well as the ability to suspend tremendous amounts of weight. This freedom of motion, however, makes the joint inherently unstable and requires a complex set of ligaments (called the “joint capsule”) to allow for this freedom of motion yet maintain stability of the joint. If this capsule becomes stretched through sports or improper training, instability of the shoulder joint (ball and socket) can result.

HOW INJURY OCCURS
With proper training techniques, you can strengthen the surrounding muscles (rotator cuff) to help protect the capsule without resulting in excessive stretching of the capsule.

Improper training can stretch the capsule resulting in instability, causing pain with certain movements such as throwing in baseball, spiking in volleyball, serving in tennis and butterfly presses or behind the head presses in weight training.

In throwing sports, such as baseball, tennis and volleyball, the shoulder capsule can slowly stretch out. The athlete attempts to gain more external rotation in the shoulder in order to get more velocity (whip on the ball) when he throws or serves.

He usually does this without maintaining a proper muscle balancing program. This results in the ball (humeral head) sliding out the front of the socket (glenoid) because of stretching of the anterior capsule. This abnormal motion results in pain with throwing which can eventually lead to tendinitis as the athlete tries to compensate for the pain.

Similar stretching of the capsule occurs in weight training when the athlete allows heavy weight to stretch the shoulder joint to its extremes. This is often referred to as “getting a
SHOULDER PAIN

good stretch”. Keep in mind that this stretch is intended for the muscles and not the capsule. The problem occurs when the muscles are not conditioned well enough to keep the humeral head in the glenoid, and capsular stretching occurs. This is commonly seen on butterfly press, behind the neck press, and behind the neck pull-downs. Once stretching occurs, all upper body training can become painful.

HOW TO AVOID OVERSTRETCHING THE CAPSULE
When working out your upper body, keep one simple principle in mind. Keep your elbows in front of the plane of your chest at all times. This is best done by pretending there is a sheet of plywood on your chest, and your elbows must stop in front of this plywood. If you follow this principle, you will need a wider grip, the bar will never touch your chest in bench press maneuvers, and you will not get the sense of a “full stretch”. But that’s okay to start. This will allow your muscles to develop while protecting your shoulder capsule.

Once you have reached your maximal weights with this technique, you can begin to allow your elbows to sneak below the plane of your chest, but this should be with complete muscle control using slow and methodical movements with no bouncing. In order to do this, you will need to decrease your weight at first.

ONCE STRETCHING HAS OCCURRED
If you have already stretched your shoulder capsule and have been unable to work out without pain, the above concepts will be helpful. However, you will probably require a more structured program to balance the shoulder muscles. Also, the abnormal stretching in the front of the capsule allows the back to tighten up, allowing the humeral head to slide out the front of the glenoid. This requires an aggressive posterior shoulder stretching program as well.

OTHER CAUSES OF SHOULDER PAIN
Bursitis/tendinitis can occur from straining the rotator cuff, or as a result of stretching out the capsule. The former will respond to more conventional treatments. The latter is best treated by focusing on the problem of instability as outlined above. When tendinitis occurs in the dominant arm of a throwing athlete or in someone engaged in upper body weight training, underlying instability should be ruled out.

CONCLUSION
The shoulder is a very complex joint which relies extensively on well balanced muscular and capsular function. With proper knowledge and appropriate training techniques, imbalance, strain and pain can be avoided. Once pain occurs, it may require a structured program outlined by your physician.
Participation in organized sports or fitness training has become a way of life for many of us. This has led to a dramatic increase in what most refer to as sports injuries. These injuries can range from annoying aches and pains to catastrophic injury resulting in quadriplegia or even death.

Although it is impossible to eliminate all risks of injury, it is possible to prevent most of them, both minor and catastrophic. Part of the role of an orthopedic surgeon specializing in sports medicine is in educating participants in how to decrease the risk of injury. However, the actual responsibility for injury prevention lies primarily with the athlete, his coaches and trainers.

PRE-PARTICIPATING PHYSICAL EXAMINATION
In order to participate in organized school sports, most schools require a yearly pre-participation physical. The focus of this physical is to identify factors which place the athlete at increased risk of injury. Because the physical is done on a single visit and not during actual athletic participation, physicians have found that the history the athlete provides is the most reliable means of detecting these factors. Most conditions which predispose an athlete to a catastrophic injury such as quadriplegia or sudden death, cannot be detected with a routine physical.

After the physical, there are three things the participant and his family should keep in mind. First, notify the coach and the physician immediately of any new symptoms that develop. Symptoms not present during a routine physical should be taken as a warning sign that further medical evaluation is indicated.

The second is that pre-existing medical problems do not preclude participation in athletic sports. Patients with such diseases as asthma and diabetes can participate in any activity they desire as long as their condition(s) are well controlled and monitored routinely by the treating physician.

The third to keep in mind is that an athlete who has no pre-existing health problems and has a normal pre-participation physical exam is still at risk for injury. Their risk is similar to that of the general population participating in
the sport. In sports such as football, this risk is
greater than in baseball, tennis or swimming.
However, no sport is completely without risk,
but coaches, trainers, parents and the athlete can
have an impact on decreasing these risks.

CATASTROPHIC INJURY
Although the incidence of catastrophic neck
injury is extremely low in high school and
college football, there is some risk. The number
one cause for paraplegia or quadriplegia in this
group of athletes is improper tackling techniques
(Spearing). It is, therefore, mandatory that
coaches teach the basic fundamentals in tackling
to their players. Parents must also be involved
and encourage their athletes to use proper
techniques.

ANOTHER GROUP AT RISK OF
CATASTROPHIC INJURY ARE THOSE
WITH UNDETECTED CARDIAC
ABNORMALITIES WHICH CAN LEAD
to Sudden Death.

Some athletes are at risk for neurologic
problems that cannot be detected with routine
pre-participation physicals. These patients almost
always have warning signs while participating in
athletics. Such warning signs include “burners”
or “stingers” involving both upper extremities at
the same time (pain and/or numbness radiating
down both arms at the same time). The isolated
“burner” or “stinger” that involves only one
upper extremity at a time, and resolves with
rest, has not been determined to predispose the
athlete to an increased risk of catastrophic neck
injury, but it can become a recurrent problem.
Again, this must be reported to parents or coaches
and appropriate medical follow-up should be
obtained. Other sports activities at increased risk
of catastrophic neck injury include gymnastics,
diving and equestrian events.

Another group at risk of catastrophic injury
are those with undetected cardiac abnormalities
which can lead to sudden death. Once again,
these abnormalities are seldom detectable on a
pre-participation physical examination without
a pre-existing history of symptoms. In most
cases, the athlete will have experienced episodes
of heart palpitations (skipping beats), headaches,
blurred vision, dizziness or fainting, while
participating in athletic events. These symptoms
are usually first related to either the coach or
the parents and it is their responsibility to seek
appropriate medical attention.

MAJOR INJURIES TO THE SHOULDER,
KNEE AND LONG BONES
The incidence of major ligamentous injuries
and joint dislocations, as well as fractures to the
long bones, can be decreased with proper use
of equipment and proper techniques, especially
in such sports as football, soccer, basketball and
baseball. Again, ensuring that the athlete follows
proper technique is the responsibility of the
coaching staff and should be reinforced by the parents and teammates.

A majority of major ligamentous injuries of the shoulder, knee and ankle occur late in games and practices when most players are fatigued. It is the responsibility of the athlete to assure he is properly conditioned at the beginning of any season in both strength, flexibility and stamina.

**PULLS, PAINS AND SPRAINS**
Essentially all annoying injuries, such as pulled muscles, aching joints and minor sprains can be prevented with proper physical conditioning. Also, proper stretching and warm-up is essential prior to any athletic event, and should be performed with the same intensity as is applied to the sport itself. It is all too common for the athlete to use this time for socializing and simply go through the motions of stretching. This can result in chronic nagging problems such as pulled muscles, minor sprains and minor joint pain.

**CONCLUSION**
Although injuries are as much a part of sports as the thrill of competition, with proper education, training, conditioning and by listening to your own body, sports can become one of the safer pastimes. Preventive medicine occurs prior to a visit to the doctor’s office. It necessitates athletes to be as genuine in their technique, conditioning and training as they are in their desire to excel in sports. It also requires appropriate, positive feedback by coaches and family to assure the athlete is properly preparing himself for athletics and taking heed of any warning signs that might develop during their competition. As sports physicians, it is our responsibility to educate athletes and properly screen them for participation in sports.

If you have any questions or concerns regarding appropriate training and conditioning in your specific sport, contact your coaches or trainers, or your local sports physician. He or she should be able to outline an appropriate conditioning program for you.

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Whether it’s jogging, aerobics, Stairmaster, weight training or swimming, fitness training has become a major part of many American lives. Though these types of activities are felt to be relatively safe forms of fitness training, they do tend to lead to more common orthopedic complaints such as tendinitis, bursitis or over-stress syndromes.

Whether it’s strength training or endurance training, the concept is to push the body to the point of stress to allow for improved conditioning from these activities. By their very nature, repetitive actions are required which do result in mechanical fatigue, very similar to a machine. The human body, however, does have the unique ability to, in many cases, repair itself unlike mechanical devices.

Following some basic principles, you can dramatically decrease the likelihood of such fatigue injuries. In starting any strength or fitness program, you should begin by choosing a program which will best achieve your desired outcome. You must also be willing to set aside specific time during the day and make this a routine which is seldom missed. Two initial mistakes include performing a fitness or endurance program in a sporadic manner and not allowing a reasonable time frame to achieve your desired goals. It is all too often that through sporadic workouts, we do not maintain our achieved improvements, yet try to push beyond in subsequent workouts to get ahead quickly and end up injuring ourselves. Also, people tend to try to achieve speed, distance or strength goals in a short time-frame which dramatically increases the likelihood of overstressing the body by doing too much too soon.

CONDITIONING PROGRAMS
In any conditioning program, there are three basic variables:
1. the speed at which the activity is performed;
2. the length of time in which the activity is performed;
3. the terrain (counter-resistance) which is encountered during the activity. For example, the three variables in running include the speed at which one runs, the
distance or length of time one runs, and the type of terrain (hilly vs. flat).

WEIGHT-TRAINING PROGRAMS
In weight training, these would consist of:
1. The speed at which one lifts weights;
2. the length of time one lifts weights;
3. the amount of weight actually lifted.

Once you break your activity down into these three components, you can easily map out a course to achieve your goals. To achieve a desired outcome such as being able to run five miles at an average of seven minutes a mile through typical Charlotte neighborhoods, you should decide which variable is most important to you. If the distance of each run is most important, then you should start your training by increasing your distance in an incremental fashion while keeping the speed initially slow, i.e., eight to twelve minute miles every other day. Also, beginning on a track or more level terrain would be ideal. Once you are able to achieve the desired distance, you can then vary one of the other two factors, such as starting to jog seven minute miles. This typically requires you to back down slightly on the first achieved goal, i.e., five miles per run. Once you have achieved running five miles at an average of seven minutes per mile, the third variable can be changed, i.e., a more hilly terrain. Again, this might require slowing down each mile or even backing down on how many miles you run. The same correlation can be made to weight training as well.

One must be willing to set aside some extra time prior to any activity, whether it’s aerobics, running, basketball or tennis, for appropriate warm-up. It is all too often, for time’s sake, this appropriate warm-up time is bypassed. This will also dramatically increase the likelihood of aches, pains and strains. One should always permit ten to fifteen minutes for appropriate stretching of all major joints prior to any particular activity.

You must listen to your body and when pain develops with a certain activity, you should be willing to back down on the intensity of that activity. This can be in the form of cross training, such as biking or swimming, or by simply decreasing the speed you run a mile, or the terrain or distance. By taking your activity down a notch, you can usually continue to perform while letting your body adjust to the overuse condition. Once the symptoms resolve, you can again pick up the pace, keeping in mind to change only one variable at a time.

Lastly, when you are unable to overcome an overuse injury by following the above guidelines, as well as the use of ice, stretching and inflammation medicine, you should be willing to consult a physician for further guidance and evaluation.

CONCLUSION
First set appropriate goals and give yourself appropriate time to achieve these goals. Second, break your workout into these three basic parameters: Speed of training, length of training, and resistance encountered in training. Thirdly, have patience and be willing to vary the above parameters in a stepwise manner. By following these concepts, you can dramatically decrease the likelihood of overuse injuries to the body.