The Sports Injury Handbook

Practical Tips for the Prevention and Treatment of Sports Injury

The
Sports Injury
Handbook

Practical Tips for the Prevention
and Treatment of Sports Injury

By
Brad Walker
Exercise Scientist & Sports Trainer

Published: February 2005

Publisher: Walkerbout Health Pty Ltd
PO Box 3063, Robina Town Centre
Queensland 4230 AUSTRALIA

Telephone: +61 (0) 7 5564 5848
Facsimile: +61 (0) 7 5564 5818
Web Site: www.WalkerboutHealth.com

Cover design by; Aritrim Basu
Cover picture supplied by; Getty Images. Walkerbout Health Pty Ltd has purchased the non-exclusive, non-transferable, non-sub licensable right to reproduce the cover picture an unlimited number of times in any and all media for the following purposes:

1. Advertising and promotional materials;
2. Broadcast and theatrical exhibitions;
3. Print publications and physical products; and
4. Electronic publications including website design.

CONTENTS

Welcome & Introduction 6

Part 1 - Sports Injury Prevention

1. Warm up Activities 9
2. Cool Down 14
3. FITT Principle 18
4. Overtraining 24
5. Circuit Training 29
6. Cross Training 36
7. Plyometric Training 42

Part 2 - Stretching & Flexibility

8. Stretching 47
9. Stretching Scientifically 50
10. PNF Stretching 54

Part 3 - Soft Tissue Injury Treatment

11. Diary of a Common Sports Injury 58
12. Soft Tissue Sports Injury Treatment 63
13. Aquatic Therapy 77
14. Massage Therapy 83

Part 4 - Specific Sports Injuries

15.	Heat Injuries	87
16.	Muscle Cramp & Spasm	92
17.	Side Stitch	95
18.	Bursitis	98
19.	Frozen Shoulder & Rotator Cuff Injury	103
20.	Tennis Elbow	107
21.	Golfers Elbow	113
22.	Back Injury & Rehabilitation	118
23.	Groin Pull	128
24.	Patellar Tendonitis	135
25.	Hamstrings	140
26.	Knee Pain & Iliotibial Band Syndrome	144
27.	Shin Splints	149
28.	Achilles Tendonitis	156
29.	Pronation & Supination	170
30.	Ankle Sprain	175
31.	Plantar Fasciitis	191

WELCOME & INTRODUCTION
A personal message from the author

Dear Friend

Thank you for taking a positive step towards staying injury free and on top of your game. The valuable information contained within this book is based on real life practical experience, not just theoretical book knowledge. It comes from top professionals in the health, fitness and sports injury field including sports trainers, physiologists, and exercise rehabilitation specialists.

Within you will find an educational process that gives you the information you need to prevent injuries from occurring, and in the event that an injury does occur, treat it effectively and get you back on the field in as little time as possible.

In part 1 & 2 you will discover some of the most valuable information on preventing sports injury ever published. You will discover tips and strategies that when properly implemented will cut your chance of injury by more than half.

Part 3 outlines one of the most detailed, yet simple, treatment plans for soft tissue sports injury and is guaranteed to cut your recovery time by days, if not weeks.

And in part 4 you will find specific prevention and treatment strategies for over 15 of the most common sports injuries.

This valuable information will save you both time and money by helping you to avoid the mistakes and keeping you on the cutting edge of sports injury prevention, management and treatment.

Thank you once again, and I wish you the greatest success in achieving your health and fitness goals and dreams.

Best wishes

CEO & Managing Director
Walkerbout Health Pty Ltd

Part 1

Sports Injury Prevention

CHAPTER 1
Warm Up Activities

The warm up activities are a crucial part of any exercise or sports training. The importance of a structured warm up routine should not be underestimated when it comes to the prevention of sports injury.

An effective warm up has a number of very important key elements. These elements, or parts, should all work together to minimize the likelihood of sports injury from physical activity.

Warming up prior to any physical activity does a number of beneficial things, but primarily its main purpose is to prepare the body and mind for more strenuous activity. One of the ways it achieves this is by helping to increase the body's core temperature, while also increasing the body's muscle temperature. By increasing muscle temperature you are helping to make the muscles loose, supple and pliable.

An effective warm up also has the effect of increasing both your heart rate and your respiratory rate. This increases blood flow, which in turn increases the delivery of oxygen and nutrients to the working muscles. All this helps to prepare the muscles, tendons and joints for more strenuous activity.

How should the warm up be structured?

Obviously, it is important to start with the easiest and most gentle activity first, building upon each part with more energetic activities, until the body is at a physical and mental peak. This is the state in which the body is most prepared for the physical activity to come,

and where the likelihood of sports injury has been minimized as much as possible. So, how should you structure your warm up to achieve these goals?

There are four key elements, or parts, which should be included to ensure an effective and complete warm up. They are:

1. The general warm up;
2. Static stretching;
3. The sports specific warm up; and
4. Dynamic stretching.

All four parts are equally important and any one part should not be neglected or thought of as unnecessary. All four elements work together to bring the body and mind to a physical peak, ensuring the athlete is prepared for the activity to come. This process will help ensure the athlete has a minimal risk of sports injury.

Let us have a look at each element individually.

1. General warm up

The general warm up should consist of a light physical activity. Both the intensity and duration of the general warm up (or how hard and how long), should be governed by the fitness level of the participating athlete. Although a correct general warm up for the average person should take about five to ten minutes and result in a light sweat.

The aim of the general warm up is to elevate the heart rate and respiratory rate. This in turn increases the blood flow and helps with the transportation of oxygen and nutrients to the working muscles.

This also helps to increase the muscle temperature, allowing for a more effective static stretch.

2. Static stretching

Static stretching is a very safe and effective form of basic stretching. There is a limited threat of injury and it is extremely beneficial for overall flexibility. During this part of the warm up, static stretching should include all the major muscle groups, and this entire part should last for about five to ten minutes.

Static stretching is performed by placing the body into a position whereby the muscle, or group of muscles to be stretched is under tension. Both the opposing muscle group (the muscles behind or in front of the stretched muscle), and the muscles to be stretched are relaxed. Then slowly and cautiously the body is moved to increase the tension of the muscle, or group of muscles to be stretched. At this point the position is held or maintained to allow the muscles and tendons to lengthen.

This second part of an effective warm up is extremely important, as it helps to lengthen both the muscles and tendons which in turn allow your limbs a greater range of movement. This is very important in the prevention of muscle and tendon injuries.

The above two elements form the basis, or foundation for a complete and effective warm up. It is extremely important that these two elements be completed properly before moving onto the next two elements. The proper completion of elements one and two, will now allow for the more specific and vigorous activities necessary for elements three and four.

3. Sport specific warm up

With the first two parts of the warm up carried out thoroughly and correctly, it is now safe to move onto the third part of an effective warm up. In this part, the athlete is specifically preparing their body for the demands of their particular sport. During this part of the warm up, more vigorous activity should be employed. Activities should reflect the type of movements and actions that will be required during the sporting event.

4. Dynamic stretching

Finally, a correct warm up should finish with a series of dynamic stretches. However, this form of stretching carries with it a high risk of injury if used incorrectly. It should really only be used under the supervision of a professional sports coach or trainer. Dynamic stretching is more for muscular conditioning than flexibility and is really only suited for professional, well trained, highly conditioned athletes. Dynamic stretching should only be used after a high level of general flexibility has been established.

Dynamic stretching involves a controlled, soft bounce or swinging motion to force a particular body part past its usual range of movement. The force of the bounce or swing is gradually increased but should never become radical or uncontrolled.

During this last part of an effective warm up it is also important to keep the dynamic stretches specific to the athlete's particular sport. This is the final part of the warm up and should result in the athlete reaching a physical and mental peak. At this point the athlete is most prepared for the rigors of their sport or activity.

The above information forms the basis of a complete and effective warm up. However, I am well aware that this entire process is somewhat of an 'ideal' or 'perfect' warm up. I am also well aware that this is not always possible or convenient in the real world. Therefore, the individual athlete must become responsible for assessing their own goals and adjusting their warm up accordingly.

For instance, the time you commit to your warm up should be relative to your level of involvement in your particular sport. So, for people just looking to increase their general level of health and fitness, a minimum of five to ten minutes would be enough. However, if you are involved in high level competitive sport you need to dedicate adequate time and effort to a complete warm up.

CHAPTER 2
Cool Down

Many people dismiss the cool down as a waste of time, or simply unimportant. In reality the cool down is just as important as the warm up, and if you want to stay injury free, it is vital.

Although the warm up and cool down are just as important as each other, they are important for different reasons. While the main purpose of warming up is to prepare the body and mind for strenuous activity, cooling down plays a different role.

Why Cool Down?

The main aim of the cool down is to promote recovery and return the body to a pre exercise, or pre work out level. During a strenuous work out your body goes through a number of stressful processes. Muscle fibers, tendons and ligaments get damaged, and waste products build up within your body.

The cool down, when performed properly, will assist your body in its repair process, and one area the cool down will help with is "post exercise muscle soreness." This is the soreness that is usually experienced the day after a tough work out. Most people experience this after having a lay-off from exercise, or at the beginning of their sports season. I remember running a half marathon with very little preparation, and finding it difficult to walk down steps the next day because my quadriceps were so sore. That discomfort is "post exercise muscle soreness."

This soreness is caused by a number of things. Firstly, during exercise, tiny tears called micro tears develop within the muscle fibers. These micro tears cause swelling of the muscle tissues which in turn puts pressure on the nerve endings and results in pain.

Secondly, when exercising, your heart is pumping large amount of blood to the working muscles. This blood is carrying both oxygen and nutrients that the working muscles need. When the blood reaches the muscles the oxygen and nutrients are used up. Then the force of the contracting (exercising) muscles pushes the blood back to the heart where it is re-oxygenated.

However, when the exercise stops, so does the force that pushes the blood back to the heart. This blood, as well as waste products like lactic acid, stays in the muscles, which in turn causes swelling and pain. This process is often referred to as "blood pooling."

So, the cool down helps all this by keeping the blood circulating, which in turn helps to prevent blood pooling and also removes waste products from the muscles. This circulating blood also brings with it the oxygen and nutrients needed by the muscles, tendons and ligaments for repair.

The Key Parts of an Effective Cool Down

Now we know what the cool down does and why it is so important, let us have a look at the structure of an effective cool down. There are three key elements, or parts, which should be included to ensure an effective and complete cool down. They are;

1. Gentle exercise;
2. Stretching; and
3. Re-fuel.

All three parts are equally important and any one part should not be neglected or thought of as unnecessary. All three elements work together to repair and replenish the body after exercise.

To follow are two examples of effective cool downs. The first is an example of a cool down used by a professional athlete. The second is typical of someone who simply exercises for general health, fitness and fun.

Cool Down Routines

Example 1: - For the Professional

- 10 to 15 minutes of easy exercise. Be sure that the easy exercise resembles the type of exercise that was done during your work out. For example, if your workout involved a lot of running, cool down with easy jogging or walking.
- Include some deep breathing as part of your easy exercise to help oxygenate your system.
- Follow with about 20 to 30 minutes of stretching. Static stretching and PNF stretching is usually best.
- Re-fuel. Both fluid and food are important. Drink plenty of water, plus a good quality sports drink. The best type of food to eat straight after a work out is that which is easily digestible. Fruit is a good example.

Example 2: - For the Amateur

- 3 to 5 minutes of easy exercise. Be sure that the easy exercise resembles the type of exercise that was done during your work out. For example, if your workout involved a lot of running, cool down with easy jogging or walking.

- Include some deep breathing as part of your easy exercise to help oxygenate your system.
- Follow with about 5 to 10 minutes of stretching. Static stretching and PNF stretching is usually best.
- Re-fuel. Both fluid and food are important. Drink plenty of water, plus a good quality sports drink. The best type of food to eat straight after a work out is that which is easily digestible. Fruit is a good example.

Getting serious about your cool down and following the above examples will make sure you recover quicker from your work outs, and stay injury free

CHAPTER 3
FITT Principle

What is the FITT Principle?

The FITT Principle (or formula) is a great way of monitoring your exercise program. The acronym FITT outlines the key components of an effective exercise program, and the initials F, I, T, T, stand for:

F - Frequency
I - Intensity
T - Time
T - Type

Frequency
...refers to the frequency of exercise undertaken or how often you exercise.

Intensity
...refers to the intensity of exercise undertaken or how hard you exercise.

Time
...refers to the time you spend exercising or how long you exercise for.

Type
...refers to the type of exercise undertaken or what kind of exercise you do.

What is the Mainstream Recommendation?

The FITT Principle is most commonly used in the weight loss industry, although it is also used as part of strength and weight training recommendations. The standard recommendation is as follows.

Frequency -	5 to 6 times per week
Intensity -	Moderate to high
Time -	Anywhere from 15 to 40 minutes
Type -	Just about any old exercise

Let us take a look at each of the components.

Frequency

Frequency is a key component of the FITT Principle. Remember that it is important to know why you are exercising and what you want to achieve before rushing into any exercise program.

Adjust the number of times you exercise per week to reflect your current fitness level; the time you realistically have available; your other commitments like family and work; and the goals you have set for yourself.

Intensity

This is an extremely important aspect of the FITT principle and is probably the hardest factor to monitor. The best way to gauge the intensity of your exercise is to monitor your heart rate.

There are a couple of ways to monitor your heart rate but the best way by far is to purchase an exercise heart rate monitor. These can be purchased at most sports stores and retail from $50 to $400. They consist of an elastic belt that fits around your chest and a wrist watch that displays your exercise heart rate in beats per minute.

If you do not want to spend the money on a heart rate monitor, simply count your heart rate over a 15 second period. All you need is a wrist watch that has a "seconds" display. Feel for your heart beat by either placing your hand over your heart or by feeling for your pulse in your neck or on your wrist. Count the beats over a 15 second period and then multiply by 4. This will give you your exercise heart rate in beats per minute.

Time

The time you spend exercising is also an important part of the FITT Principle. The time dedicated to exercise usually depends on the type of exercise undertaken.

For example, it is recommended that to improve cardio-vascular fitness you will need at least 20 to 30 minutes of non stop exercise. For weight loss, more time is required; at least 40 minutes of moderate weight bearing exercise. However, when talking about the time required for muscular strength improvements, time is often measured as a number of "sets" and "reps." A typical recommendation would be 3 sets of 8 reps.

Type

Like time, the type of exercise you choose will have a big effect on the results you achieve. That is why it is important to know what you want to gain from your efforts.

For example, if you are looking to improve your cardio-vascular fitness, then exercises like walking, jogging, swimming, bike riding, stair climbing, aerobics and rowing are very effective.

For weight loss, any exercise that using a majority of your large muscle groups will be effective. To improve muscular strength the best exercises include the use of free weights, machine weights and body weight exercises like push-ups, chin-ups and dips.

How does all this relate to Injury Prevention?

The two biggest mistakes I see people make when designing an exercise program, is firstly training too hard, and secondly, not including enough variety.

The problem, most commonly, is that people tend to find an exercise they like and very rarely do anything other than that exercise. This can result in long term, repetitive strain to the same muscle groups, and neglect, or weakening of other muscle groups. Leading to a very unbalanced muscular system, which is a sure-fire recipe for injury.

When using the FITT Principle to design your exercise program keep the following in mind.

Frequency

After you finish exercising your body goes through a process of rebuilding and repair. It is during this process that the benefits of your exercise are forthcoming.

However, if you are exercising on a daily basis (5 to 6 times a week) your body never has a decent chance to realize the benefits and gains from the exercise. What usually happens is that you end up getting tired or injured and just quit.

So what is my frequency recommendation? Only exercise 3 to 4 times a week MAXIMUM!

This may sound strange and a little hard to do at first, (because most people have been brainwashed into believing that they have to exercise everyday) but after a while exercising like this becomes very enjoyable and something that you can look forward to. Sure beats dragging yourself out the door everyday because you feel guilty about taking a day off every now and then.

It also dramatically reduces your likelihood of injury because you are giving your body more time to repair and heal. Many elite level athletes have seen big improvements in performance when forced to take an extended break. Most never realize they are training too hard, too often.

Intensity & Time

The key here is variety. Do not let yourself get stuck in an exercise rut. Dedicate some of your workouts to long, easy sessions like long walks or light, repetitive weights. While other sessions can be made up of short, high intensity exercises like stair climbing or interval

training. And remember, if you are not feeling 100%; take the day off or schedule an easy workout.

Type

The type of exercise you do is also very important. Like I said earlier, many people get into a routine of doing the same exercise over and over again. If you really want to lower your risk of injury, do a variety of different exercises. This will help to improve all your major muscle groups and will make you a more versatile, all round athlete.

CHAPTER 4
Overtraining

In this chapter we are going to have a look at the difference between being just a little tired or on a down-cycle, and being legitimately run down or over tired. It is important to be able to tell the difference if you want to stay injury free. Nothing will put a stop to your fitness goals more quickly than not being able to recognize when you are legitimately run down and over tired.

One of the biggest challenges to achieving your fitness goals is consistency. If you are repeatedly getting sick, run down and over trained it becomes very difficult to stay injury free. So, how do you keep the consistency of regular exercise, without over doing it and becoming sick or injured?

Amateur and professional athletes alike are constantly battling with the problem of overtraining. Being able to juggle just the right amount of training, with enough sleep and rest, and the perfect nutritional diet is not an easy act to master. Throw in a career and a family and it becomes near impossible.

So, what is overtraining? Overtraining is the result of giving your body more work or stress than it can handle. Overtraining occurs when a person experiences stress and physical trauma from exercise faster than their body can repair the damage.

Now this does not happen overnight, or as a result of one or two work-outs. In fact, regular exercise is extremely beneficial to your general health and fitness, but you must remember that it is exercise that breaks your body down, while it is the rest and recovery that

makes you stronger and healthier. Improvements only occur during the times of rest.

Remember stress can come from a multitude of sources. It is not just physical stress that causes overtraining. Sure, excessive exercise may lead to overtraining, but do not forget to consider other stresses, such as family or work commitments. Remember, stress is stress, whether it is a physical, mental or emotional stress, it still has the same effect on your health and well-being.

Reading the Signs

At this point in time there are no tests which can be performed to determine whether you are over trained or not. You can not go to your local doctor or even a sports medicine laboratory and ask for a test for overtraining. However, while there are no tests for overtraining, there are a number of signs and symptoms that you should be on the lookout for. These signs and symptoms should act as a warning bell, which will give you advanced notice of possible dangers to come.

There are quite a number of signs and symptoms to be on the lookout for. To make it easier for you to recognize them I have grouped them into either physical or psychological signs and symptoms.

Now, suffering from any one or two of the following signs or symptoms does not automatically mean you are suffering from overtraining. However, if you recognize a number, say 5 or 6 of the following signs and symptoms, then it may be time to take a close look at the volume and intensity of your work load.

Physical Signs & Symptoms

- Elevated resting pulse / heart rate
- Frequent minor infections
- Increased susceptibility to colds and flu's
- Increases in minor injuries
- Chronic muscle soreness or joint pain
- Exhaustion
- Lethargy
- Weight loss
- Appetite loss
- Insatiable thirst or dehydration
- Intolerance to exercise
- Decreased performance
- Delayed recovery from exercise

Psychological Signs & Symptoms

- Fatigued, tired, drained, lack of energy
- Reduced ability to concentrate
- Apathy or no motivation
- Irritability
- Anxiety
- Depression
- Headaches
- Insomnia
- Inability to relax
- Twitchy, fidgety or jittery

As you can see by the number of signs and symptoms there are a lot of things to look out for. Generally the most common signs and symptoms to look for are a total loss of motivation in all areas of

your life (work or career, health and fitness etc.), plus a feeling of exhaustion. If these two warning signs are present, plus a couple of the other listed signs and symptoms, then it may be time to take a short rest before things get out of hand.

The Answer to the Problem

Okay, you feel run down and totally exhausted. You have got no motivation to do anything. You can not get rid of that niggling knee injury. You are irritable, depressed and have totally lost your appetite. Sounds like you are over trained. What do you do now?

As with most things, prevention is by far better than cure, so let us start by having a quick look at a few things you can do to prevent overtraining.

- Only make small and gradual increases to your exercise program over a period of time.
- Eat a well balanced, nutritious diet.
- Ensure adequate relaxation and sleep.
- Be prepared to modify your training to suit environmental conditions. For example, on a very hot day, go to the pool instead of running on the track.
- Be able to monitor other stresses on your life and make adjustments to suit.
- Avoid monotonous training, by varying your exercise as much as possible.
- Not exercising during an illness.
- Be flexible and have some fun with what you do.

While prevention should always be your aim, there will be times when overtraining will occur and you will need to know what to do to get back on track.

Your first priority is to put your feet up and take a rest. Anywhere from 3 to 5 days should do the trick, depending on how severe the overtraining is. During this time forget about exercise, your body needs a rest so give it one. A physical rest, as well as a mental rest. There is no point in beating yourself up mentally over losing a few days exercise.

Try to get as much sleep and relaxation as possible. Go to bed early and catch a nap whenever you can. Make sure you increase your intake of highly nutritious foods and take an extra dose of vitamins and minerals.

After the initial 3 to 5 days rest you can gradually get back into your normal exercise routine, but start off slowly. Most research states that it is okay to start off with the same intensity and time of exercise but cut back on the frequency. So if you would normally exercise 3 or 4 times a week, cut that back to only twice a week for the next week or two. After that you should be right to resume your normal exercise regime.

Sometimes it is a good idea to have a rest, like the one outlined above, whether you are feeling run down or not. It will give both your mind and body a chance to fully recover from any problems that may be building up without you even knowing it. It will also freshen you up, give you a renewed motivation and help you to look forward to your exercise again. Do not underestimate the benefits of a good rest.

CHAPTER 5
Circuit Training

Circuit training routines are one of my favorite training sessions, whether for myself personally, or for clients. I use circuit training as part of injury rehabilitation programs, for conditioning elite level athletes, or to help my clients lose weight. I use circuits for just about everything.

I was introduced to circuit training routines by an exceptional sports coach by the name of Col Stewart. Col is one of those rare coaches who can take just about any sport and devise a specific training program that always produces outstanding improvements for his athletes.

Col's circuit training routines are largely responsible for the success of many of his world champion athletes. Including his son, Miles Stewart (World Champion Triathlete), Mick Doohan (World 500cc Motorcycle Champion), and countless others from sports as diverse as roller-skating, squash, and cycling.

Many other coaches are also impressed by circuit training and use it regularly.

Brian Mackenzie from Sports Coach says, "*Circuit training is an excellent way to simultaneously improve mobility, strength and stamina.*"

Workouts for Women state, "*Circuit training is one of the best methods of exercising as it provides excellent all round fitness, tone, strength, and a reduction of weight and inches. In short, maximum results in minimum time.*"

And another site referred to circuit training as, "*An ideal way to build versatility, overall strength and fitness, as well as to consolidate your mastery of a wide variety of physical skills.*"

So what is Circuit Training?

Circuit training consists of a consecutive series of timed exercises performed one after the other with varying amounts of rest between each exercise.

For example, a simple circuit training routine might consist of push-ups, sit-ups, squats, chin-ups and lunges. The routine might be structured as follows, and could be continually repeated as many times as is necessary.

1. Do as many push-ups as you can in 30 seconds, then rest for 30 seconds.
2. Do as many squats as you can in 30 seconds, then rest for 30 seconds.
3. Do as many sit-ups as you can in 30 seconds, then rest for 30 seconds.
4. Do as many lunges as you can in 30 seconds, then rest for 30 seconds.
5. Do as many chin-ups as you can in 30 seconds, then rest for 30 seconds.

What makes Circuit Training so good?

The quick pace and constant changing nature of circuit training places a unique type of stress on the body, which differs from normal exercise activities, like weight training and aerobics.

The demands of circuit training tend to prepare the body in a very even, all-round manner. I have found circuit training to be an exceptional form of exercise to aid in the prevention of injury. Circuit training is one of the best ways I have found to condition your entire body (and mind).

There are many other reasons why circuit training is a fantastic form of exercise and what most of these reasons come down to is flexibility. In other words, circuit training is totally customizable to your specific requirements.

- Circuit training can be totally personalized. Whether you are a beginner, or an elite athlete, you can modify your circuit training routine to give you the best possible results.
- A circuit training routine can be modified to give you exactly what you want. Whether you want an all-over body workout, or you just want to work on a specific body area, or you need to work on a particular aspect of your sport, this can all be accommodated.
- Also, you can change the focus of your circuit training routine to emphasize strength, endurance, agility, speed, skill development, weight loss, or any other aspect of your fitness that is important to you.
- Circuit training is time efficient. No wasted time in between sets. It is maximum results in minimum time.
- You can do circuit training just about anywhere. One of my favorite places for doing circuit training is at some of the parks and playground areas near where I live.
- Circuit training is a favorite form of exercise for the British Royal Marine Commandos because they tend to spend a lot of time on large ships. The confined spaces means that circuit training is sometimes the only form of exercise available to them.

- You do not need expensive equipment. You do not even need a gym membership. You can just as easily put together a great circuit training routine at home or in a park. By using your imagination, you can devise all sorts of exercises using things like chairs and tables, and even children's outdoor play equipment like swings and monkey bars.
- Another reason why I like circuit training so much is that it is great fun to do in pairs or groups. Half the group performs the exercises, while the other half rests and motivates the exercising members of the group.

The main types of Circuit Training

As mentioned before, circuit training can be totally customized, which means there are an unlimited number of different ways you can structure your circuit training routine. However, here are a few examples to give you some idea of the different types available.

Timed Circuit

This type of circuit involves working to a set time period for both rest and exercise intervals. For example, a typical timed circuit might involve 30 seconds of exercise and 30 seconds of rest in between each exercise.

Competition Circuit

This is similar to a timed circuit but you push yourself to see how many repetitions you can do in the set time period. For example, you may be able to complete 12 push-ups in 30 seconds. The idea is to

keep the time period the same, but try to increase the number of repetitions you can do in the set time period.

Repetition Circuit

This type of circuit is great if you are working with large groups of people who have different levels of fitness and ability. The idea is that the fittest group might do, say 20 repetitions of each exercise, the intermediate group might only do 15 repetitions, while the beginners might only do 10 repetitions of each exercise.

Sport Specific or Running Circuit

This type of circuit is best done outside or in a large, open area. Choose exercises that are specific to your particular sport, or emphasize an aspect of your sport you would like to improve. Then instead of simply resting between exercises, run easy for 200 or 400 meters. You can even use sprints or fast 400 meter runs as part of your choice of exercises.

Some Important Precautions

Circuit training is a fantastic form of exercise, however, the most common problem I find is that people tend to get over excited, because of the timed nature of the exercises, and push themselves harder than they normally would. This tends to result in sore muscles and joints, and an increased likelihood of injury.

Below are two precautions you need to take into consideration.

Firstly, your level of fitness. If you have never done any sort of circuit training before, even if you consider yourself quite fit, start off slowly. The nature of circuit training is quite different to any other form of exercise. It places different demand on the body and mind, and if you are not used to it, it will take a few sessions for your body to adapt to this new form of training. Be patient.

Secondly, your warm-up and cool-down are crucial. Do not ever start a circuit training routine without a thorough warm-up that includes stretching. As I mentioned before, circuit training is very different from other forms of exercise. Your body must be prepared for circuit training before you start your session.

Examples of Circuit Training Routines

It is easy to design your own circuit training routine, and the best routine is usually the one you design yourself. The information in this article, along with the references below, and a little bit of imagination, will help you put together the perfect circuit training routine.

While researching this article I came across some fantastic examples of circuit training routines. To follow is a list of some of the better ones. Feel free to modify them to suit your specific requirements.

This one is great for strength and stamina.
http://www.pponline.co.uk/encyc/0285.htm

This routine is specifically for distance runners.
http://www.brianmac.demon.co.uk/circuit.htm

Good all-over body circuit.
http://www.brianmac.demon.co.uk/exercise.htm

Some examples of circuit exercises you can do at home.
http://www.fitadvisor.com/schwinn/library/index.php?lib_nav=26

CHAPTER 6
Cross Training

I am a big fan of cross training for a number of reasons: it provides variety and a break from regular workouts; it helps to condition other areas of your body that may be neglected by performing only one type of exercise; and most of all, if done correctly, will help you reduce the risk of sports injury.

Cross training does this by preparing and conditioning the joints, muscles and tendons that are neglected by your regular workouts. Thus helping to "even-out" your physical ability and strengthen any weak spots you may have.

This next chapter comes from a great site that I refer to often, called Peak Performance. They have a fantastic searchable library of over 750 sports articles. If you need specific sports information about anything from strength and stamina to motivation or endurance, Peak Performance is one of the first places you should look.

I hope you enjoy the following chapter.

****

Cross training, the use of a different method of training to your normal activity, has been around for years. For example, rowers have not only used weight training as an alternative mode of exercise to improve performances at the regatta but also employ endurance activities off the water, such as running and cycling, to complement their normal program. Similarly, swimmers use land training to help their in-water performance on race day. More

recently, cross training has gathered pace because of the greater interest in multi-disciplinary sports such as quadrathons, triathlons and biathlons. Here you have to train using a variety of exercise modes or you will simply not be training according to the demands of your event.

The whole concept has spread further a field, however, so that you find dedicated runners sometimes cycling in an attempt to run their races faster, or football and rugby players cycling or using rowing machines instead of performing conditioning workouts on the legs that are going to carry them round the field of play, or even non-swimmers donning buoyancy aids and jumping in at the deep end to run through the water.

It is non-specific, say the critics

The main argument against cross training is that the workout does not mimic the demands of the athlete's sport, and one of the golden rules of any training schedule is that the training should be specific. This argument is based on the principle that the training you do will not only condition the appropriate musculature when you go out to compete, in terms of physical and biochemical properties, but will also and equally importantly train the appropriate neuromuscular pathways of the main activity. In other words, there is little transfer in the skill of the activity, whereby messages are sent from the brain via nerves to the muscle fibers.

Well-skilled performances can fire not only the correct muscle units for that performance but can also fire them at the right time in a coordinated fashion enabling more effective muscular contractions. If you cross train, you will not be learning the correct skill patterns for your sport. For example, cycling training will train the muscles to be better at cycling but will not necessarily make them better at

running or swimming. As a running coach once said, "*If it doesn't involve running and it won't make you run faster, then it is not worth doing in my book.*"

This may make sense, but there are many practitioners who argue that it is not necessarily the case. In fact, their arguments are also supported by some of the research literature from the (sometimes conflicting) world of sports science.

The prop forward and the endurance runner

For instance, consider the heavyweight prop forward at the beginning of his pre-season training period. He has a couple of desires: one is to lose a bit of body fat and the other is to increase cardio respiratory fitness (or endurance). He may well need to improve other aspects of fitness such as flexibility, strength, power, speed and so on, but these may be addressed in more detail once a base has been established.

The most specific way for our man to develop endurance will be to perform lots of running, which will help him to lose fat as well. The trouble is that, being heavy, even if he runs on grass (which can be quite hard and unforgiving) and has well-made shoes, there is a fair risk that he will pick up injuries to his muscles and joints if he crashes straight into the sort of running mileage associated with Liz McColgan. It would make sense for him to vary his workouts, with some running, cycling, to give his legs a rest from the pounding, along with some rowing and swimming. All these forms of activity will help him lose body fat and increase cardiovascular endurance, and with a variety of workouts there is less chance of overuse injuries occurring.

In fact, it is this avoidance of overuse injuries that is one of the strongest arguments in favor of cross training. Extra endurance work can be performed, with less strain placed on the same muscles and joints, which may indeed be getting an active rest, while at the same time there is still an adequate workout for the heart and lungs.

The story is similar for the endurance runner. It sometimes happens that an athlete would like to do more training than his or her current level but knows from past experience that once the weekly mileage creeps above a certain point, say, 50 miles a week, the injuries start to come thick and fast. Non-specific training would be a way of increasing the training level with a reduced injury risk. Cycling will help to work on the heart and lungs without pounding the joints. Aqua running would be an even better alternative because it not only eliminates the pounding but has a similar movement to running on land, thus keeping specificity.

But how useful are such methods for running performance itself? Cycling has been shown to be very good for running when controlled studies have taken place. One such study at California State University found that runners who were split into two groups, one group running only and the other cycling only, both at the same intensities, performed just as well in a running test after the nine-week training program regardless of the mode of exercise. The study indicated that for runners tough cycling was a good way of not only maintaining but actually improving fitness. However, running is not necessarily as beneficial for cycling; the increase in cycling fitness in the group who ran only was not nearly as marked as the improvement in running fitness.

Much work has also examined aqua running. The general consensus of recent research is that aqua running will not give the same intensity as normal running but is still a suitable alternative, given its low-impact nature. It is worth noting, however, that water running

without a buoyancy aid is more effective than using one. Similarly, a study from Wisconsin University looked at in-line skating compared to running and cycling and also revealed a difficulty in trying to keep the intensity as high in the less-traditional form of exercise. Heart rates and oxygen consumption at set lactate levels were much lower in skating than in running and cycling.

Watch your heart rate if you cross train

If you do cross train and use heart rate as your guide to intensity, it is important to remember that maximum heart rates, and therefore training ranges, are likely to vary according to your mode of exercise. You can normally expect higher heart rates while you run as opposed to cycling or rowing. The reason is quite simple. When you run, you lug your body mass around with you, while in rowing and cycling you are seated and your body mass is supported. This makes the energy demands of running higher. Although there is enormous individual variation, it is usual for heart rate to be about 10 beats a minute higher in running than in cycling and this should be borne in mind when selecting training intensities.

If you double up training sessions within one day and like to perform both strength and endurance training, the traditional advice would be to perform the strength session first and the endurance session later. This makes sense as you be would fresh for the quality workout, whereas it would not matter so much if you were a bit tired at the start of the endurance workout because that would only add to the endurance aspect.

However, a recent study from Kennesaw State College, Georgia, revealed that there was little difference in the improvement of both strength and endurance when one group performed the strength workout before the endurance while another group did the reverse.

This research suggests that it makes little difference which session comes first. Cross training certainly makes sense for some athletes, and I have given a few examples. If you are an athlete who trains moderately with little risk of injury, then more of what you are already doing is the best approach. However, for the serious athlete who wants to win, cross training could be a way to increase the amount of training without increasing the chance of injury. Apart from that, it might even make training, dare I say it, more enjoyable.

****

Article by Joe Dunbar. Reprinted with permission. Copyright © 2005 Peak Performance

CHAPTER 7
Plyometric Training

During the last two chapters we looked at two very good training techniques to help you develop and condition your athletic ability, which in-turn will help to prevent sports injury. In this chapter, I wanted to build on the last two issues by talking about a slightly more advanced form of athletic conditioning called plyometrics.

What are Plyometric Exercises?

In the simplest of terms, plyometrics are exercises that involve a jumping movement. For example, skipping, bounding, jumping rope, hopping, lunges, jump squats, and clap push-ups are all examples of plyometric exercises.

However, for a more detailed definition we need some back ground information about muscle contractions. Muscles contract in one of three ways:

1. **An Eccentric muscle contraction** occurs when your muscle contracts and lengthens at the same time. An example of an eccentric muscle contraction is lowering yourself from a chin-up position. The bicep (upper arm) muscle contracts and lengthens as you lower yourself from the chin-up bar.

2. **A Concentric muscle contraction** occurs when your muscle contracts and shortens at the same time. An example of a concentric muscle contraction is lifting yourself into a chin-up position. The bicep muscle contracts and shortens as you raise yourself up to the chin-up bar.

3. **An Isometric muscle contraction** occurs when your muscle contracts, but does not change in length. An example of an isometric muscle contraction is hanging from a chin-up bar with your arms bent at 90 degrees. The bicep muscle contracts, but does not change in length because you are not moving up or down.

Getting back to the formal definition, a plyometric exercise is an exercise in which an eccentric muscle contraction is quickly followed by a concentric muscle contraction. In other words, when a muscle is rapidly contracted and lengthened, and then immediately followed with a further contraction and shortening, this is a plyometric exercise. This process of contract-lengthen, contract-shorten is often referred to as the stretch - shortening cycle.

Here is another example of a plyometric exercise. Consider the simple act of jumping off a step, landing on the ground with both feet, and then jumping forward. All done in one swift movement.

When you jump off the step and land on the ground, the muscles in your legs contract eccentrically to slow your body down. Then, when you jump forward your muscles contract concentrically to spring you off the ground. This is a classic example of a plyometric exercise.

Why are Plyometric Exercises Important for Injury Prevention?

Plyometrics are often used by athletes to develop power for their chosen sport, and a lot has been written about how to accomplish this, but few people realize how important plyometrics can be in aiding injury prevention.

Essentially, plyometric exercises force the muscle to contract rapidly from a full stretch position. This is the position in which muscles tend to be at their weakest point. By conditioning the muscle at its weakest point, (full stretch) it is better prepared to handle this type of stress in a real or game environment.

Why are Plyometric Exercises Important for Injury Rehabilitation?

Most injury rehabilitation programs fail to realize that an eccentric muscle contraction can be up to three times more forceful than a concentric muscle contraction. This is why plyometric exercises are important in the final stage of rehabilitation, to condition the muscles to handle the added strain of eccentric contractions.

Neglecting this final stage of the rehabilitation process can often lead to re-injury, because the muscles have not been conditioned to cope with the added force of eccentric muscle contractions.

Caution, Caution, Caution!

Plyometrics are NOT for everyone. Plyometric exercises are not for the amateur and they are not for the weekend warrior. They are an advanced form of athletic conditioning and can place a massive strain on un-conditioned muscles, joints and bones.

Plyometric exercises should only be used by well conditioned athletes and preferably under the supervision of a professional sports coach. If you are thinking about adding plyometrics to your regular training regime, please take careful note of the following precautions.

- Intense, repetitive plyometric exercises should not be used by children or teenagers who are still growing.
- A solid base of muscular strength and endurance should be developed before starting a plyometrics program. In fact Chris from www.better-body.com recommends; "*It is a good rule of thumb that before you start using any plyometric exercises you should be able to squat at least 1.5 times your own body weight, and then focus on developing core strength.*"
- A thorough warm up is essential to ensure you are ready for the intensity of plyometric exercises.
- Do not perform plyometric exercises on concrete, asphalt or other hard surfaces. Grass is one of the best surfaces for plyometric exercises.
- Technique is important. As soon as you feel yourself getting tired or your form starts to deteriorate, back off.
- Do not over do it. Plyometrics are very intense. Give yourself plenty of rest between sessions, and do not do plyometric exercises two days in a row.

Part 2

Stretching & Flexibility

CHAPTER 8
Stretching

If you are involved in the health & fitness industry, whether it be participating in your favorite sport, coaching, training or just keeping fit, you will know how annoying and debilitating a sports injury can be. In reality, when you have a sports injury you are actually losing on two fronts.

Firstly, you are losing simply because your body has been hurt and now needs time and care to repair itself. And on top of this, you are also losing the time you could have been putting into training and improving your sporting ability.

A sports injury is a bit like losing money. Not only do you lose whatever you were going to buy with that money, but you also have to work hard to make up the money you have lost. Take it from me; a sports injury is one of the most frustrating and debilitating occurrences that can happen to anyone who is serious about their health, fitness, sport or exercise.

I recently read an article titled "Managing Sports Injuries" where the author estimated that over 27,000 American's sprain their ankle every day. (And, no, that is not a typo, EVERY DAY) On top of this, Sports Medicine Australia estimates that 1 in every 17 participants of sport and exercise is injured playing their favorite sport. This figure is even higher for contact sports like Football and Gridiron. However, the truly disturbing fact is that up to 50 percent of these injuries may have been prevented.

While there are a number of basic preventative measures that will assist in the prevention of sports injury, there is one technique that is slowly gaining in popularity. It is still not used as often as it should be by the average sports participant, but with the professionals using it more and more, it is only a matter of time before it starts to catch on.

The One Technique to Cut Your Chance of Injury by More than Half

The simple technique of stretching can play an imperative role in helping you to prevent the occurrence of sports injury. Unfortunately stretching is one area of athletic preparation often neglected. Do not underestimate its benefits. Do not make the mistake of thinking that something as simple as stretching will not be effective. Stretching is a vital part of any exercise program and should be looked upon as being as important as any other part of your health and fitness.

In recent time the professionals have been getting more and more serious about stretching and ultimately, their flexibility. The coaches and trainers are just starting to realize how important flexible muscles are to helping prevent sports injury. Flexibility has often been neglected in the overall conditioning of modern athletes. It is only now that its benefits are proving invaluable to all those serious about staying injury free.

How Does Stretching Prevent Injury?

One of the greatest benefits of stretching is that you are able to increase the length of both your muscles and tendons. This leads to an increased range of movement, which means your limbs and joints

can move further before an injury occurs. Let us take a look at a few examples.

If the muscles in your neck are tight and stiff this limits your ability to look behind or turn your head around. If for some reason your head is turned backwards, past its' normal range of movement, in a football scrum or tackle for example, this could result in a muscle tear or strain. You can help to prevent this from happening by increasing the flexibility, and the range of movement, of the muscles and tendons in your neck.

And what about the muscles in the back of your legs? The Hamstring muscles. These muscles are put under a huge strain when doing any sort of sport which involves running and especially for sports which require kicking. Short, tight hamstring muscles can spell disaster for many sports people. By ensuring these muscles are loose and flexible, you will cut your chance of a hamstring injury dramatically.

How else can stretching help? While injuries can occur at any time, they are more likely to occur if the muscles are fatigued, tight and depleted of energy. Fatigued, tight muscles are also less capable of performing the skills required for your particular sport or activity. Stretching can help to prevent an injury by promoting recovery and decreasing soreness. Stretching ensures that your muscles and tendons are in good working order. The more conditioned your muscles and tendons are, the better they can handle the rigors of sport and exercise, and the less likely that they will become injured.

So as you can see, there is more to stretching than most people think. Stretching is a simple and effective activity which will help you to enhance your athletic performance, decrease your likelihood of sports injury and minimize muscle soreness.

CHAPTER 9
Stretching Scientifically

Without a doubt, the most common question I am asked is; "*What's your view on the latest scientific studies and research findings in regards to stretching?*"

The short answer is; "*They all make for interesting reading, but I don't put a huge amount of confidence in them.*" Let me explain why.

Most of the studies I have reviewed attempt to determine the effects of stretching on injury prevention. This is a mistake in itself, and shows a lack of understanding as to how stretching is used as part of an injury prevention program.

Stretching, by itself, will not prevent injury. In fact, stretching can cause injury if certain precautions are not taken.

Plus, it is not just a flexibility problem that can lead to injury. It could be a strength imbalance. It could be a stability or balance problem. It could be a proprioceptive imbalance. It could have to do with postural imbalances. It could have to do with physical imbalances like leg length differences. Or, it could simply be a matter of trying to do too much, too soon.

Stretching is just one very important component that assists in reducing the risk of injury. The best results are achieved when stretching is used in combination with other injury reduction techniques.

Stretching and its effect on physical performance and injury prevention is something that just can not be measured scientifically. The effects of stretching are very hard to measure and all the studies that I have seen are nothing more than anecdotal studies. Meaning the results achieved, or not achieved, are simply that persons perception of what has improved or not improved.

You see, stretching is not a science. It is near impossible to PROVE anything about stretching, scientifically. Sure you can measure the effect of stretching on flexibility with simple tests like the "Site and Reach test" but then to determine how that affects athletic performance or injury susceptibility is near impossible.

I have seen so many people benefit from stretching and increased flexibility, that I am absolutely positive it is beneficial. Most people involved in the "hands-on" side of coaching and sports training are not worried by this type of study. It is mostly the academics that do the majority of there coaching from behind a desk, that are influenced by these studies.

So what can we say about the benefits of stretching

Firstly
Upon undertaking a regular stretching program a number of changes occur within the body. Firstly, by placing particular parts of the body in certain positions, we are able to increase the length of muscles and tendons. As a result of this, a reduction in general muscle tension is achieved and our normal range of movement is increased.

By increasing our range of movement we are increasing the distance our limbs can move before damage occurs to the muscles and

tendons. For example, the muscles and tendons in the back of our legs are put under great strain when kicking a football. Therefore, the more flexible and pliable those muscles are, the further our leg can travel forward before a strain or injury occurs to them.

The benefits of an extended range of movement includes: increased comfort; a greater ability to move freely; and a lessening of our susceptibility to muscle and tendon strain injuries.

Secondly
There is a dangerous stretching myth that says, "*If you stretch too much you will lose both joint stability and muscle power.*" This is totally untrue. By increasing our muscle and tendon length we are increasing the distance over which our muscles are able to contract. This results in a potential increase to our muscles' power and therefore increases our athletic ability, while also leading to an improvement in dynamic balance, or the ability to control our muscles.

Thirdly
We have all experienced what happens when you go for a run or to the gym for the first time in a few months. The following day our muscles are tight, sore, stiff and it is usually hard to even walk down a flight of stairs. This soreness that usually accompanies strenuous physical activity is often referred to as post exercise muscle soreness. This soreness is the result of micro tears, (minute tears within the muscle fibers), blood pooling and accumulated waste products, such as lactic acid. Stretching, as part of an effective cool-down, helps to alleviate this soreness by lengthening the individual muscle fibers, increasing blood circulation and removing waste products.

Fourthly
Fatigue is a major problem for everyone, especially those who exercise. It results in a decrease in both physical and mental performance. Increased flexibility through stretching can help prevent the effects of fatigue by taking pressure off the working muscles. For every muscle in the body has an opposite or opposing muscle and if the opposing muscles are more flexible, the working muscles do not have to exert as much force against the opposing muscles. Therefore each movement of the working muscles actually takes less effort.

And finally
Any person who experiences the benefits of stretching is certainly more likely to feel good about them self. This leads to a confidence and assuredness, which helps to enhance physical performance and motivate the individual to participate in exercise.

CHAPTER 10
PNF Stretching
Proprioceptive Neuromuscular Facilitation

Proprioceptive Neuromuscular Facilitation (PNF) is a more advanced form of flexibility training that involves both the stretching and contraction of the muscle group being targeted. PNF stretching was originally developed as a form of rehabilitation, and to that effect it is very effective. It is also excellent for targeting specific muscle groups, and as well as increasing flexibility, (and range of movement) it also improves muscular strength.

Warning!

Certain precautions need to be taken when performing PNF stretches as they can put added stress on the targeted muscle group, which can increase the risk of soft tissue injury. To help reduce this risk, it is important to include a conditioning phase before a maximum, or intense effort is used.

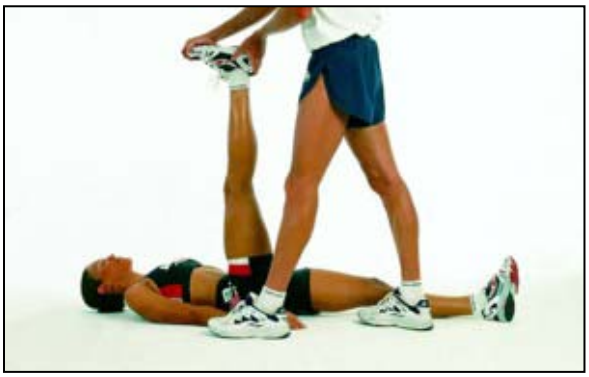
Also, before undertaking any form of stretching it is vitally important that a thorough warm up be completed. Warming up prior to stretching does a number of beneficial things, but primarily its purpose is to prepare the body and mind for more strenuous activity. One of the ways it achieves this is by helping to increase the body's core temperature while also increasing the body's muscle temperature. This is essential to ensure the maximum benefit is gained from your stretching.

How to perform a PNF stretch

The process of performing a PNF stretch involves the following. The muscle group to be stretched is positioned so that the muscles are stretched and under tension. The individual then contracts the stretched muscle group for 5 - 6 seconds while a partner, or immovable object, applies sufficient resistance to inhibit movement. Please note; the effort of contraction should be relevant to the level of conditioning.

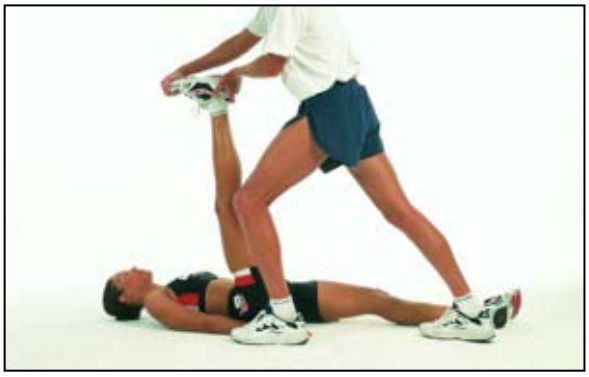
The contracted muscle group is then relaxed and a controlled stretch is applied for about 30 seconds. The muscle group is then allowed 30 seconds to recover and the process is repeated 2 - 4 times. Refer to the diagrams below for a visual example.

The athlete and partner assume the position for the stretch, and then the partner extends the body limb until the muscle is stretched and tension is felt.



The athlete then contracts the stretched muscle for 5 - 6 seconds and the partner must inhibit all movement. (The force of the contraction should be relevant to the condition of the muscle. For example, **if the muscle has been injured, do not apply a maximum contraction**).

The muscle group is relaxed, then immediately and cautiously pushed past its normal range of movement for about 30 seconds. Allow 30 seconds recovery before repeating the procedure 2 - 4 times.



Information differs slightly about timing recommendations for PNF stretching depending on who you are talking to. Although there are conflicting responses to the question of how long should I contract the muscle group for and how long should I rest for between each stretch, I believe (through a study of research literature and personal experience) that the above timing recommendations provide the maximum benefits from PNF stretching.

Part 3

Soft Tissue Injury Treatment

CHAPTER 11
Diary of a common Sports Injury

I thought I would start this section with something a little different and write about my own personal experience with a sports injury I recently suffered, and the process I used to get myself back to 110%. I say 110% because it should always be your goal to rehabilitate the injured area to the point where it is stronger after the injury, than it was before the injury.

Let me paint you a picture. It is Sunday afternoon in late September (spring time in the southern hemisphere). It is a perfect 26 degrees C, clear sky, light breeze and I am enjoying the day with family and friends at a local park by the beach.

After feasting on a barbeque lunch a few us decide to kick the soccer ball around to work off all that food. So here I am; no warm-up, no stretching, and running around in bare feet on very un-even ground. I should have known better, and I bet you can guess what happened next.

So the inevitable happens. I step into a hole and I go over on my left ankle. Nothing too severe. Most likely just some minor stretching of the ligaments. So minor in fact, that I keep playing for another 15 or 20 minutes.

By the time I got home that evening I knew I needed to do something about the ankle. I have never injured it before and I did not want it to turn into one of those nagging, re-occurring injuries, so I thought I would take some of my own advice.

The treatment begins

Sunday evening
I start by getting an ice pack out of the fridge, sticking my ankle up on the coffee table and applying the ice pack directly to the injured area. I keep the ice on for about 15 minutes and then give it a rest for a while. Over the course of the evening I applied the ice another 2 or 3 times for about 15 minutes at a time.

Monday morning
The first thing I notice is that my ankle is very stiff and a little sore. It feels tight and difficult to move. I am not too concerned about it at this point in time, I have had my fair share of sprains and strains, and I know this is all part of the healing process. I keep up with the ice, applying it 5 to 6 times throughout the day. I also try to keep off it as much as I can, not wanting to put too much weight on it.

Tuesday morning
My ankle is still a bit stiff, but most of the soreness has gone. I do my best to stay off it as much as possible and apply ice a couple of times throughout the course of the day.

Wednesday morning
My ankle feels good; still a little stiff but no swelling or pain. It is time to move onto a few easy range-of-movement exercises and apply some light weight to the ankle. I start with a few gentle movements; pushing my foot forward and stretching out the ankle; then pulling my toes back towards my shin; and then move onto some gentle circling motion.

Later in the day I start to apply normal pressure to my ankle by standing with equal weight on both feet, and by the end of the day I am walking without favoring my good ankle.

A quick word of warning! Never, Never, Never do any activity that hurts the injured area. Of course you may feel some discomfort, but NEVER push yourself to the point where you are feeling pain. Listen to your body and do not over do it at this early stage of the recovery.

Thursday morning
My ankle feels fine, ...but it is at this point that most people will make the mistake of thinking that everything is okay and discontinue any further treatment. Just because the injury feels better does not mean it has fully recovered and if you stop treatment now, you are at risk of continual re-injury until the complete rehabilitation has been successful.

To see what is been going on under the surface, let us take a quick look at how damaged ligaments repair.

When any sort of damage occurs to the ligaments, the body immediately goes into a process of repair. Where the individual fibers have been ruptured, or torn, the body begins to bind the damaged fibers together using a fibrous protein called collagen. Or, as it is more commonly known, scar tissue.

You see, when a ligament is torn, you would expect that the body would repair that tear with new ligament. In reality, this does not happen. The tear, or rupture, is repaired with scar tissue.

This might not sound like a big deal, but if you have ever suffered an ankle injury, (or any soft tissue injury) you will know how annoying it is to keep re-injuring that same old injury, over and over again.

Scar tissue is made from a very brittle, inflexible fibrous material. This fibrous material binds itself to the damaged ligaments in an

effort to draw the damaged fibers back together. What results is a bulky mass of fibrous scar tissue completely surrounding the injury site. In some cases it is even possible to see and feel this bulky mass under the skin.

When scar tissue forms around an injury site, it is never as strong as the ligaments it replaces. It also has a tendency to contract and deform the surrounding tissues, so not only is the strength of the tissue diminished, but flexibility of the tissue is also compromised.

So, how do you go about getting rid of that annoying scar tissue?

Heat and Massage

Throughout the day I used a hot water bottle to apply heat to the injured area, which helps by stimulating blood flow. I also started to use light massage on the ankle and specifically at the injury site. Massage is a very important process that helps to breakdown, remove and align the scar tissue. Without massage very few sports injuries will heal completely.

Friday morning
My ankle feels great, so it is time to get into some serious rehabilitation. I start off with some easy mobility exercises and then follow them up with a good massage. I start with light strokes and gradually increase the pressure until I am using firm, deep strokes. I concentrate all the pressure at the direct point of injury, and use my thumbs to get in as deep as possible to break down the scar tissue.

After a 10 minute massage, I continue with a few more mobility exercises, but this time I push them a little bit further and a little bit harder. I then finish off with some very gentle stretching exercises.

Later that evening I give my ankle another massage while sitting in front of the TV, and finish with some more stretches.

Saturday to Monday
Over the course of the next few days I massage my ankle another 2 or 3 times and keep some heat on it whenever I am at home. I constantly stretch my ankle and do my range-of-movement exercises, and I gradually incorporate some weight bearing exercises like balancing on one leg, half squats and half lunges.

The following week
My ankle feels great. I went for an easy walk on Monday morning and included a few stretches for my ankle and lower legs. Throughout the week I continued with my range-of-movement and balancing exercises, and towards the end of the week I started on some very easy plyometric exercises. These are explosive type exercises and include things like jumping, hoping, skipping and bounding.

Over the next month
I continued with all the exercises I have listed above, gave my ankle the occasional massage and kept up with the stretching. I also included a series of more intense exercises to help really strengthen my ankles and lower legs. Exercises like single leg plyometric drills, weight training exercises like squats, lunges, leg press and various forms of calf raises, plus started to run again.

Today, my ankle feels strong and stable, and I know it is in better shape now, than it was before the injury.

CHAPTER 12
Soft Tissue Sports Injury Treatment

A guide to cutting your recovery time by days, if not weeks!

I get a lot of questions from people asking about specific treatments for sports injuries, like running injuries and other common pulled muscle complaints. The unfortunate thing about most of these requests is that the injury occurred some time ago. This time lapse between the injury occurring, and treatment sort, is the biggest stumbling block to a full and complete recovery.

As always, before I sit down to write an article, I like to spend a few hours surfing the net for information that relates to the topic I am going to write about. In most cases, I find a great deal of useful information that relates to what I am looking for; but not this time.

What I did find, was a lot of information that related to treating specific sports injuries long after they had occurred. However, I found very little information relating to the immediate treatment of sports injuries. This was quite disappointing, because if people are only treating injuries long after they have occurred, they are really putting themselves at a great disadvantage.

What follows is the most appropriate initial treatments for all soft tissue, sports injuries. This information will definitely cut your recover time by days, if not weeks.

Before we start!

Let us have a quick look at the type of injuries I am talking about. The type of sports injuries I am referring to here are the soft tissue injuries, which are very common in most, if not all sports. These injuries include sprains, strain, tears and bruises that affect muscles, tendons, ligaments and joints. The soft tissues of the body.

Examples of common soft tissue injuries would include things like hamstring tears, sprained ankles, pulled calf muscles, strained shoulder ligaments, corked thigh, etc. Remember a sprain refers to a tear or rupture of the ligaments, while a strain refers to a tear or rupture of the muscles or tendons.

The sort of injuries I am NOT talking about here, are injuries that affect the head, neck, face or spinal cord. Injuries which involve shock, excessive bleeding, or bone fractures and breaks. The treatment of these types of injuries goes way beyond the relatively simple soft tissue injuries that I am discussing here.

Priority Number 1

The first priority when treating any sports injury is, "**Do No Further Damage.**" So before we get into the treatment of soft tissue injuries, there is one important point that I should discuss first.

Before you start treating any injury, whether to yourself or someone else, first STOP and take account of what has occurred. Consider things like; is the area safe from other dangers? Is there a threat to life? Is the injury serious enough to seek emergency help? Then, using the word STOP as an acronym;

S: (stop) Stop the injured person from moving. Consider stopping the sport or game if necessary.

T: (talk) Ask questions like; what happened? How did it happen? What did it feel like? Where does it hurt? Have you injured this part before?

O: (observe) Look for things like swelling, bruising, deformity and tenderness.

P: (prevent) Remember, do no further damage. Prevent further injury.

Once you have taken a few moments to make sure the injury is not life threatening, it is then time to start treating the injury. Remember, the sooner you start treating a sports injury, the more chance you have of a full and complete recovery. The longer you wait, the worse it is going to be.

R.I.C.E.R.

Without a doubt, the most effective, initial treatment for soft tissue injuries is the R.I.C.E.R. regime. This involves the application of (R) rest, (I) ice, (C) compression, (E) elevation and obtaining a (R) referral for appropriate medical treatment.

Where the R.I.C.E.R. regime has been used immediately after the occurrence of an injury, it has been shown to significantly reduce recovery time. R.I.C.E.R. forms the first, and perhaps most important stage of injury rehabilitation, providing the early base for the complete recovery of injury.

When a soft tissue injury occurs there is a large amount of uncontrolled bleeding around the injury site. This excessive bleeding causes swelling, which puts pressure on nerve endings and results in increased pain. It is exactly this process of bleeding, swelling and pain which the R.I.C.E.R. regime will help to alleviate. This will also limit tissue damage and help the healing process.

The "How To"

R: (rest) It is important that the injured area be kept as still as possible. If necessary support the injured area with a sling or brace. This will help to slow down blood flow to the injured area and prevent any further damage.

I: (ice) By far the most important part. The application of ice will have the greatest effect on reducing bleeding, swelling and pain. Apply ice as soon as possible after the injury has occurred.

How do you apply ice? Crushed ice in a plastic bag is usually best. However, blocks of ice, commercial cold packs and bags of frozen peas will all do fine. Even cold water from a tap is better than nothing at all.

When using ice, be careful not to apply it directly to the skin. This can cause "ice burns" and further skin damage. Wrapping the ice in a damp towel generally provides the best protection for the skin.

How long? How often? This is the point where few people agree. Let me give you some figures to use as a rough guide, and then I will give you some advice from personal experience. The most common recommendation is to apply ice for 20 minutes every 2 hours for the first 48 to 72 hours.

These figures are a good starting point, but remember they are only a guide. You must take into account that some people are more sensitive to cold than others. Also be aware that children and elderly people have a lower tolerance to ice and cold. Finally, people with circulatory problems are also more sensitive to ice. Remember to keep these things in mind when treating yourself or someone else with ice.

Personally, I recommend that people use their own judgment when applying ice to them self. For some people, 20 minutes is way too long. For others, especially well conditioned athletes, they can leave ice on for up to an hour at a time. The individual should make the decision as to how long the ice should stay on.

My personal recommendation is that people should apply ice for as long as it is comfortable. Obviously, there will be a slight discomfort from the cold, but as soon as pain or excessive discomfort is experienced, it is time to remove the ice. It is much better to apply ice for 3 to 5 minutes a couple of time an hour, than not at all.

C: (compression) Compression actually achieves two things. Firstly, it helps to reduce both the bleeding and swelling around the injured area, and secondly, it provides support for the injured area. Simply use a wide, firm, elastic, compression bandage to cover the injured part. Make sure you bandage both above and below the injured area.

E: (elevation) Simply raise the injured area above the level of the heart at all possible times. This will further help to reduce the bleeding and swelling.

R: (referral) If the injury is severe enough, it is important that you consult a professional physical therapist or a qualified sports doctor for an accurate diagnosis of the injury. With an accurate diagnosis,

you can then move onto a specific rehabilitation program to further reduce your injury time.

Things to Avoid

There are a few things which you must avoid during the first 24 to 72 hours after an injury. Be sure to avoid any form of heat at the injury site. This includes heat lamps, heat creams, spas, Jacuzzi's and saunas.

Avoid all movement and massage of the injured area. Also avoid excessive alcohol. All these things will increase the bleeding, swelling and pain of your injury. Avoid them at all costs.

What happens after the first 48 to 72 hours?

Let us take a quick look at how your soft tissue (muscle, tendon, ligament, etc.) repairs itself.

When any sort of damage occurs to the soft tissues, like a strain or sprain, the body immediately goes into a process of repair. Where the individual fibers have been ruptures, or torn, the body begins to bind the damaged fibers together using a fibrous protein called collagen. Or, as it is more commonly known, scar tissue!

You see, when a muscle is torn, you would expect that the body would repair that tear with new muscle. In reality, this does not happen. The tear, or rupture, is repaired with scar tissue.

Now this might not sound like a big deal, but if you have ever suffered a soft tissue injury, you will know how annoying it is to keep re-injuring that same old injury, over and over again. Untreated

scar tissue is the major cause to re-injury, usually months after you thought that injury had fully healed.

Scar tissue is made from a very brittle, inflexible fibrous material. This fibrous material binds itself to the damaged soft tissue fibers in an effort to draw the damaged fibers back together. What results is a bulky mass of fibrous scar tissue completely surrounding the injury site. In some cases it is even possible to see and feel this bulky mass under the skin.

When scar tissue forms around an injury site, it is never as strong as the tissue it replaces. It also has a tendency to contract and deform the surrounding tissues, so not only is the strength of the tissue diminished, but flexibility of the tissue is also compromised.

So what does this mean for the athlete? Firstly, it means a shortening of the soft tissues which results in a loss of flexibility. Secondly, it means a weak spot has formed within the soft tissues that could easily result in further damage.

Lastly, the formation of scar tissue will result in a loss of strength and power. For a muscle to attain full power it must be fully stretched before contraction. Both the shortening effect and weakening of the tissues means that a full stretch and optimum contraction is not possible.

Now, if you have taken the previous advice and used the R.I.C.E.R. regime to treat the initial reaction to a soft tissue injury, you are well on your way to a complete recovery. If however, you did not use the R.I.C.E.R. regime, you are behind the eight-ball, so to speak. Let me explain.

Previously we learnt that when an injury occurs the body responds by sending large amounts of blood to the injury site. If this is not

controlled, with the R.I.C.E.R. regime, it will result in massive bleeding, swelling and pain. More importantly, it will also result in a large formation of bulky, painful scar tissue.

As we already know, the R.I.C.E.R. regime will help to control the bleeding, swelling and pain, but more importantly, it will also control the formation of scar tissue. When the R.I.C.E.R. regime is used correctly, there will only be a minimal formation of scar tissue, which allows for optimal return of flexibility and strength.

So, how do we put the finishing touches on your recovery? How do we get rid of that annoying formation of scar tissue?

Firstly, you must keep active! Do not listen to anyone who tells you to do nothing. Now is the time to start active rehabilitation. Most of the swelling will have subsided after the first 48 to 72 hours and you are now ready to start light activity.

Light activity will not only promote blood circulation, but it will also activate the lymphatic system. The lymphatic system is vital in clearing the body of toxins and waste products, which can accumulate in the body following a sports injury. Activity is the only way to activate the lymphatic system.

Warning!

Before we move on, a quick word of warning. Never, Never, Never do any activity that hurts the injured area. Of course you may feel some discomfort, but NEVER push yourself to the point where you are feeling pain. Listen to your body. Do not over do it at this stage of the recovery, you have come too far to blow it now.

To complete your recovery and remove most of the unwanted scar tissue, you now need to start two vital treatments. The first is commonly used by physical therapists (or physiotherapists), and it primarily involves increasing the blood supply to the injured area. The aim is to increase the amount of oxygen and nutrients to the damaged tissues.

Physical Therapists accomplish this aim by using a number of activities to stimulate the injured area. The most common methods used are ultrasound and heat.

Ultrasound, or TENS (Transcutaneous Electrical Nerve Stimulation) simply uses a light electrical pulse to stimulate the affected area. While heat, in the form of a ray lamp or hot water bottle, is very effective in stimulating blood flow to the damaged tissues.

Secondly, to remove the unwanted scar tissue it is vital that you start a course of deep tissue sports massage. While ultrasound and heat will help the injured area, they will not remove the scar tissue. Only massage will be able to do that.

Either find someone who can massage the effected area for you, or if the injury is accessible, massage the damaged tissues yourself. Doing this yourself has the advantage of knowing just how hard and deep you need to massage.

To start with, the area will be quite tender. Start with a light stroke and gradually increase the pressure until you are able to use deep, firm strokes. The more you massage the effected area the harder and deeper you will be able to push.

Use deep, firm strokes, moving in the direction of the muscle fibers. Concentrate your effort at the direct point of injury, and use your thumbs to get in as deep as possible to break down the scar tissue.

Be sure to drink plenty of fluid during your injury rehabilitation. The extra fluid will help to flush a lot of the waste products from your body.

Also, I recommend you purchase a special ointment to use for your massage called "Arnica". This special ointment is extremely effective in treating soft tissue injuries, like sprains, strains and tears. You can purchase this ointment at most health food shops and pharmacies.

Now, if you have come this far, you have done well. If you have applied the information so far you should be well on your way to a complete recovery. However, there is one final stage of treatment before you are back to 100%.

Active Rehabilitation

Now, we are going to put the finishing touches on your recovery and rehabilitation. We will look at regaining the fitness components that may have been lost during your injury and recovery so far.

By now, you have come over 80% of the way. You may even feel that your injury is fully recovered. Your treatment so far may have stopped the swelling and bleeding, it may have reduced the amount of scar tissue at the injury site, and it may have even started to heal the soft tissues which were injured. But there is still one more important thing to do.

The last 20% can be the most crucial to your complete recovery. If you have ever suffered from a sporting injury in the past, you will know how annoying it is to think you are recovered, and then out-of-the-blue, you are injured again and back to where you started from.

It can be one of the most frustrating and heart-breaking cycles an athlete, or anyone else for that matter, can go through.

Most people will refer to this phase of your recovery as the active rehabilitation phase. Simply because, during this phase you will be responsible for the rehabilitation process. You will be doing the exercises and activities required to speed up your full recovery.

The aim of this phase of your rehabilitation will be to regain all the fitness components that were lost during the injury process. Regaining your flexibility, strength, power, muscular endurance, balance, and co-ordination will be the primary focus.

Without this phase of your rehabilitation, there is no hope of completely and permanently making a full recovery form your injury. A quote from a great book called "Sporting injuries" by Peter Dornan & Richard Dunn will help to reinforce the value of active rehabilitation.

"*The injury symptoms will permanently disappear only after the patient has undergone a very specific exercise program, deliberately designed to stretch and strengthen and regain all parameters of fitness of the damaged structure or structures. Further, it is suggested that when a specific stretching program is followed, thus more permanently reorganizing the scar fibers and allowing the circulation to become normal, the painful symptoms will disappear permanently.*"

The first point to make clear is how important it is to keep active. Often, the advice from doctors and similar medical personnel will simply be; rest. This can be one of the worst things you can do. Without some form of activity the injured area will not receive the blood flow it requires for recovery. An active circulation will provide both the oxygen and nutrients needed for the injury to heal.

Any form of gentle activity not only promotes blood circulation, but it also activates the lymphatic system. The lymphatic system is vital in clearing the body of toxins and waste products, which can accumulate in the body following a serious injury. Activity is the only way to activate the lymphatic system.

A Word of Warning!

Never, Never, Never do any activity that hurts the injured area. Of course you may feel some discomfort, but never push yourself to the point where you are feeling pain. You have come a long way from first being injured; do not take a step backwards now. Be very careful with any activity you do. Pain is the warning sign do not ignore it.

Now it is time to make that injured area strong again. The main areas you are going to be working on are your flexibility, strength and co-ordination. Depending on your background, and what sport you are involved in, these elements should be your first priority. As you start to regain your strength, flexibility and co-ordination, you can then start to work on the more specific areas of your chosen sport. Let us start with flexibility.

Flexibility

When increasing the flexibility of the injured area it is important to increase the flexibility of, not only the damaged muscles and tendons, but also the muscle groups around the injured area.

The best form of stretching to use is a form of stretching called static stretching. Be sure to warm-up with some light activity, and then

place the muscle group into a position where tension is felt. Hold the stretch for an extended period of time, at least 45 seconds.

Strength

When attempting to increase the strength of an injured area, be sure to approach this in a gradual, systematic way of lightly over-loading the muscles and tendons. Be careful not to over do this type of training. Patience is required.

The use of machine weights can be very effective here, as they provide a certain amount of stability to the joints and muscles as you perform your rehabilitation exercises.

Co-Ordination

When a soft tissue injury occurs, there is always a certain amount of damage to the nerves around the injured area. This, of course, leads to a lack of control of the muscles and tendons, and can also affect the stability of joint structures.

To compensate for this lack of co-ordination, specific exercises and drills should be done to help with balance, co-ordination and muscle control. Be sure to keep the activity as specific as possible to the sport you play.

Conclusion

This chapter has been a very comprehensive account of the correct treatment for most soft tissue sports injuries. If followed correctly you will find that most minor injuries, like mild sprains and strains,

will heal within a day or two. While most major soft tissue injuries will heal within a week or two.

As an example, a client of mine recently broke her shoulder and suffered a large amount of soft tissue damage to the muscles, tendons and ligaments around the shoulder. We applied the principles outlined in this chapter and within eight weeks the fracture has healed and most of the scaring has been removed. We are now working towards increasing the strength and flexibility of the shoulder joint and within another 4 weeks the shoulder should be at about 95% of its original condition.

Considering there was a fracture in the head of the humerus, she has recovered extremely well. This type of injury is one of the most extreme soft tissue injuries you are likely to ever come across. Not only has there been damage to the soft tissues, but also to the bones. If this rehabilitation procedure can help the most severe injuries, it will be very effective for many of the most common soft tissue injuries.

CHAPTER 13
Aquatic Therapy

It has been called everything from aerobic water exercise to aquatic therapy and water aerobics. However, it is more than just kicking up and down the local pool or spending some time in a hot, bubbling spa. Used correctly, aquatic therapy is a marvelous tool to complement your regular training.

So what is actually meant when someone talks of aerobic water exercise or aquatic therapy? In its broadest sense, aquatic therapy can be any activity that is performed in water. However, I like to break these activities into two major areas that relate specifically to sport, exercise, fitness and health.

- Firstly, aquatic therapy is any exercises done in water to complement and enhance your regular training and exercise.
- Secondly, aquatic therapy is any activity performed in water to assist in rehabilitation and recovery from hard training or serious injury.

One of the main features of aquatic therapy is that it allows you to exercise without the jarring and jolting experienced when training on land. It is estimated that body weight is compounded up to five times during the heel strike when running or jogging. This does not occur during deep water or aquatic exercise. The buoyant properties of water mean that you are able to perform exercise without any significant impact at all.

This feature alone makes aquatic therapy stand out from a number of other recovery and rehabilitation exercises. When injured it is extremely difficult to find exercises and activities that allow you to

maintain your current level of fitness and do not jeopardize or risk further injury. However, the use of aquatic therapy or deep water exercises puts the body in a near zero gravity environment. Meaning there is virtually no impact or jarring on any of the body's joints, muscles, ligament, tendons or bones.

This is especially important when you have spent time organizing your goals and putting them into a plan of action. The last thing you want to do is have to take time off because of an injury. Even during your normal exercise routine there is always the possibility that small, minute injuries occurred during the session. It is these small, minute injuries which, if left unattended, can build up over time and lead to major, debilitating injuries which can cost you weeks, if not months, in recovery time. This is where aquatic therapy can assist by helping recovery without any loss to your training schedule.

Another important feature of aquatic therapy is that water increases the resistance experienced while training. The great thing about this increased resistance is that it is variable. Meaning, the faster and harder you work against the water, the greater the resistance you encounter and the harder the work out. So, if you are injured or just looking for an easy work out, you can take it slow and gently move your limbs against the water. However, if you want a tough work out, go as hard and as fast as you can, the water will always return an equal resistance.

From the two features mentioned previously, you can see that aquatic therapy is a very safe and beneficial form of exercise. As well as a number of cardiovascular and respiratory benefits, aquatic therapy also helps to:

- Increase and maintain muscular flexibility;
- Improve mobility and range of motion;
- Increase muscular strength; and

- Improve coordination, balance and postural alignment.

Other benefits include:

- A high calorie consumption;
- A massaging effect on your muscles;
- The ability to train during very hot weather, (using an outdoor pool or freshwater lake;
- The ability to train during very cold weather, (using an indoor heated pool);
- A great supplement or alternative to regular training;
- Is usually pleasurable and very relaxing; and
- Because your body is supported by water your heart rate is slightly lower, meaning aquatic therapy is relatively safe for obese individuals, pregnant ladies and those suffering from hypertension and heart disease.

Practical ways to use Aquatic Therapy

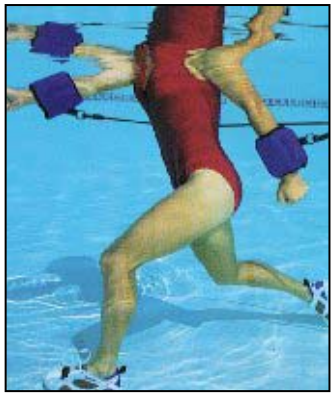
Firstly, what are you going to need? Besides from a pair of bathers and an open expanse of water, the only other thing you need is a float of some sort. There are specially designed float belts and vests that you can buy, but any old life jacket, ski belt or float will do the trick as long as it keeps your head above water. Just make sure it does not interfere with the movement of your arms and legs too much.

To the right are a number of superb examples of professional floatation devices designed specifically for deep water exercise. The first is a floatation

belt which fits around the waist and connects at the front. This will provide ample buoyancy to keep just about anyone afloat.

The second picture, to the right, shows one of the flotation vests that are very similar to a life jacket, except that it provides a greater amount of freedom to move around.

However, if you do not have access to one of these professional devices, do not panic. For years I simply stuck an old swim float down the front of my bathers, it was not pretty, but it did the trick. You can do the same, an old piece of foam or float tied around your waist will keep your head above the water.



Now let us have a look at your body position in the water and a few common mistakes people tend to make. You want to position yourself in a similar posture to that of running on land. Keep your head up and your shoulders back. Your torso should be relatively straight with a slight (very slight) forward lean. Do not bend forward at the waist and alternately do not lean back into a sitting position. Refer to the picture above for a visual example.

In this position you should be free to move your arms and legs in all directions. From this position there are a number of actions you can take. The standard is the running motion. This should be performed as you would run on land. Make sure you have long strides, fully extending your legs, thinking smooth and long. Do not forget your arms, move them back and forth, keeping your shoulders relaxed.

Or, try cross country skiing, keep your arms and legs straight, moving them back and forth like a cross country skier. Or, over

exaggerating your stride, like a runner bounding over hurdlers. The choices are endless, make up some of your own.

A word of caution! Before going straight into a serious work out, spend a couple of sessions just concentrating on your technique and getting comfortable in the water. I can guarantee you that the first time you try this sort of exercise, it will feel very strange and uncomfortable. After a few easy sessions you will start to get the hang of it. Then, once you have mastered this new form of exercise, you can move onto a more structured work out. Try one of the examples below.

Warm Up: Run or stride easy for 10 to 15 minutes, gradually increasing the speed and intensity. Do a few stretches to loosen up the muscles and finish the warm up with a few short, fast sprints.

Main Set: Alternate between running and cross country skiing for 3 minutes at a moderate to hard pace, then 1 minute at an easy pace. Repeat this 5 to 10 times, depending on your fitness and goals.

Or: Run or ski;

- First 2 minutes easy.
- Next 2 minutes moderate.
- Next 2 minutes hard.
- Next 2 minutes moderate.
- Last 2 minutes easy.
- Repeat the above 2 to 4 times.

Or: Simply run or ski at a moderate intensity for 30 to 40 minutes. Remember to keep your heart rate at a steady, consistent level; do not go too hard too soon.

Cool Down: Run easy for 10 minutes gradually decreasing the intensity. Finish with a good stretch and you will feel great.

Next time you are laid up with a minor injury or just looking for something a little different to beat the boredom of your usual workout, remember to give aquatic therapy a try. You will be surprised at the great workout you can get!

CHAPTER 14
Massage Therapy

Massage is one of my all-time favorite injury rehabilitation techniques. I would even go as far as saying; "*It is the most effective form of injury rehabilitation therapy for speeding the healing process and preventing re-injury. Without it, the injured athlete very rarely recovers fully.*"

To follow is a great article by Jon Gestl, publisher of the free fitness and health e-Zine, "*Informed, Inspired, & Inshape*." In the following Jon covers a number of very good reasons why massage should be a priority both for injury prevention and rehabilitation.

I hope you enjoy the following chapter.

****

Ask someone his or her reason for getting a massage and you are likely to hear "*because it feels good*." We all know that a massage can relieve stress, help to make sore muscles feel better and even reduce anxiety, but can it help us achieve our fitness goals? Research shows that the massage you get to relieve stress can also have a positive effect on your muscle-building capabilities and fitness level.

1. Massage improves circulation and general nutrition of muscles. This appears to be the most valuable fitness-related benefit. Massage is accompanied or followed by an increase interchange of substances between the blood and the tissue cells, which increases tissue metabolism. After a muscle is

exercised, vital nutrients must be supplied in order for it to increase in size. Massage maximizes the supply of nutrients and oxygen though increased blood flow, which helps the body rebuild itself.

2. Massage improves the range of motion and muscle flexibility, which results in increased power and performance, which helps you work efficiently and with proper intensity to facilitate the body's muscle-building response.
3. Massage helps to shorten recovery time between workouts. Waste products such as lactic and carbonic acid build up in muscles after exercise. Increased circulation to these muscles helps to eliminate toxic debris and shorten recovery time.
4. Massage can help prevent over-training. Massage has a relaxing effect on the muscles, as well as a sedative effect on the nervous system. This can prevent over-training syndrome, which has a limiting effect on muscle building.
5. Massage may aid in fat loss. According to some research, massage may burst the fat capsule in subcutaneous tissue so that the fat exudes and becomes absorbed. In this way, combined with proper nutrition, massage may help in weight loss.
6. Massage helps prevent and even heal injuries. By stretching connective tissue, massage improves circulation to help prevent or break down adhesions. Massage also influences the excretion of certain fluids (nitrogen, phosphorous, sulfur) necessary for tissue repair.

While a massage will not build muscle directly, it helps to facilitate the body's rebuilding phase following a workout and influences muscular growth. Getting a massage is just as important as regular workouts and supportive nutrition for a comprehensive fitness program. Great news for those of us who thought building a great body was all hard work!

Before making an appointment with the first massage therapist you encounter, be sure they are a qualified bodywork practitioner. Ask for referrals, professional training information, and certification credentials from a reputable agency, such as the National Certification Board for Therapeutic Massage and Bodywork (NCBTMB).

****

Jon Gestl, CSCS is personal fitness trainer and instructor in Chicago specializing in on-site personal fitness coaching. He is a U.S. National Sport Aerobic Champion Silver and Bronze medalist. Publisher of the free fitness and health e-Zine, "Informed, Inspired, & Inshape," he can be contacted through his website at www.jongestl.com.

Part 4

Specific Sports Injuries

CHAPTER 15
Heat Injuries

Tips for Training & Playing in the Heat

Although heat injuries are one of the most common forms of sports injuries to effect athletes, they are totally preventable.

Heat injuries occur when your body temperature rises above normal, or when your body is no longer able to regulate heat loss. Heat injuries are generally defined in three stages.

- **Dehydration**: This is the first stage of a heat injury. It is the mildest form of heat injury in which your body simply suffers from a lack of fluid.
- **Heat Exhaustion**: This is the next step beyond dehydration. If not treated immediately, serious injury and even death can result.
- **Heat Stroke**: This is the worst stage of a heat injury. Without proper medical attention a victim can die within minutes.

What Causes Heat Injuries?

There are a number of contributing factors that increase your chances of suffering a heat injury. Some of them are obvious, like high temperatures, others are less obvious. To follow is a list of factors to be aware of when training and playing in the heat.

- High temperatures
- High humidity
- Sun exposure

- Excessive activity and exertion
- Coffee and alcohol
- Medications, especially diuretics
- Illness, especially vomiting and diarrhea

What are the Signs & Symptoms?

There are plenty of warning signs that will notify you and other around you, that dehydration is setting in. The major problem with the following signs and symptoms is that most people tend to ignore them until it is too late. Catch these signs early enough and you will not have any problems, but ignore them, and you could pay dearly.

The following signs and symptoms have been arranged so as to begin with the mildest warning signs first. By the time you start to suffer the signs from half way down the list, you are in big trouble. Remember; catch heat injuries early by looking out for the warning signs at the top of the list.

- Thirst
- Headache
- Nausea
- Cramps
- Dizziness
- Weak, no energy
- Confusion
- Hot, dry skin
- Weak, but rapid heart rate
- Low blood pressure
- Rapid breathing
- Unconscious

There is one other sign that is often over looked, and I feel it is one of the best indicators of dehydration. It is simple to check and very reliable as an indicator of possible heat injury.

The color of your urine will tell you a great deal about your body's level of hydration. When your body is depleted of fluid and dehydrated, your urine becomes very dark in color. In severe cases it can be a dark brown color. However, when your body is fully hydrated, your urine is a very light color, even clear.

My recommendation; drink fluid until you pee clear. This way you will always know that your body is fully hydrated.

How do you Prevent Heat Injuries?

As with all sports injuries, it is far better to prevent them from occurring, than to treat them after it becomes too late. Prevention is even more important with heat injuries, because if you leave it too late, you may not get a second chance. To follow is a list of things you can do, to prevent heat injuries.

- Drink, and drink often. Before, during and after any training or competing. Do not wait to become thirsty. Remember drink fluid until you pee clear. Water is usually best, although a good quality sports drink will also help to replace salts and minerals lost through sweat.
- In Australia, we have a saying called; "Slip, Slop, Slap!" Slip on a shirt, Slop on some sunscreen, and Slap on a hat. It is good advice whenever you go out in the sun.
- Wear loose fitting clothing that does not restrict your movement and also allows for a good circulation of air.
- Avoid the extreme heat of the middle of the day. If possible schedule your training and playing times around the cooler

parts of the day. Maybe even opt for a workout in the pool instead of the running track.

- Avoid sunburn at all costs. Sunburn will draw fluid from all areas of your body in an effort to replenish moisture in the skin. Remember, Slip, Slop, Slap.
- Schedule plenty of rest time in cool, shaded areas, as part of your training and playing.
- If at all possible, acclimatize to your current training and playing environment.
- Avoid caffeine, alcohol and sugary drinks like soda, cola and fizzy drinks.
- Lastly, use a bit common sense and do not ignore the warning signs.

How do you Treat Heat Injuries?

Generally speaking, the treatment for dehydration, heat exhaustion and heat stroke are very similar. However, whenever dealing with a victim of heat stroke, the patient must be referred to professional medical assistance. Remember, heat stroke is life threatening, do not take any chances, call for professional medical help immediately.

To follow are a few guidelines for treating heat injuries.

- Have the patient lie or sit down in a cool, shaded area with good air circulation.
- Elevate the feet.
- Start to replace both fluid and salt loss. Give both water and sports drink if available.
- Loosen any clothing.
- Saturate clothing in cool water. If necessary remove outer clothing and wrap patient in a wet sheet or towel.

- Use fans or other cooling devices to help reduce body temperature.
- Immerse in cool (not cold) water. (Bath, swimming pool, river, lake, etc.)

Remember; if the patient is suffering from any of the serious warning signs like confusion, a weak, rapid heart rate or becomes unconscious, seek medical help immediately.

CHAPTER 16
Muscle Cramp & Spasm

Muscle cramp and spasm are an annoying condition that involves a sudden, involuntary contraction and tightening of a muscle that will not immediately relax.

Muscle cramps and spasms can involve part or all of a muscle, or a number of muscles within a muscle group and although a spasm or cramp can occur in just about any muscle, the most commonly affected muscle groups are:

- The lower leg and calf muscles.
- The upper leg, including both the hamstrings and quadriceps.
- The feet and hands.

Muscle cramps and spasms can range in intensity from a slight twitch to a severe, agonizing contraction. They can last anywhere from a few seconds to over 15 minutes and can usually be seen visibly by the way the muscle twitches and moves under the skin.

People who are at the greatest risk of muscle cramps and spasms are those who ill, overweight or unfit. Those who take drugs or certain medication, and those who live or work in excessive heat and humidity are also prone to cramping. Muscle cramps are also common among endurance athletes and people over 65 years of age who perform strenuous physical activity.

What Causes Muscle Cramps and Spasms?

There are a number of factors that contribute to muscle cramps and spasms, the main ones being:

- Poor flexibility and tight muscles;
- Muscle fatigue and overuse;
- Dehydration; and
- Electrolyte and mineral depletion.

A number of other factors include working or exercising in high heat and humidity, inadequate blood supply, injury or muscle strain and excessive use of alcohol, drugs and medication.

Treating Muscle Cramps and Spasms

Muscle cramps and spasms will usually go away on their own but there are a few important steps you can take to decrease the severity and duration of them.

1. Stop the activity that triggered the cramp in the first place.
2. Gently stretch the effected muscle or muscle group.
3. Keep the effected areas moving with light activity and gentle massage.
4. Continue to apply heat and massage to help promote blood flow.

Preventing Muscle Cramps and Spasms

One of the most useful things you can do to help prevent muscle cramps and spasms is to work on improving your overall general health and fitness. Improving your cardiovascular fitness will

improve the delivery of blood to your muscles, which will ensure that they have adequate amounts of oxygen and nutrients to function properly.

Another key activity that will help to prevent cramps and spasms is stretching. Keeping your muscles loose and flexible will help to stop them from tightening up and cramping. Be sure to stretch the muscles groups that are most prone to cramping before, during and after exercise or strenuous physical activity.

The other important activity that is very effective in helping to prevent cramp is ensuring adequate hydration and electrolyte replenishment. In general you should be consuming at least 8 to 10 glasses of filtered water a day and more if you are involved in strenuous physical activity or live and work in high heat and humidity.

If you seem to be prone to muscle cramps and spasms you should also look at increasing your intake of minerals and electrolytes. The minerals that are most important are Potassium, Calcium and Magnesium. Simply adding a small amount of mineral salt to your cooking, (such as sea salt or Celtic salt) will help to increase your intake of these important minerals.

CHAPTER 17
Side Stitch

A side stitch, also known as exercise related transient abdominal pain (ETAP), is one of the most annoying and painful conditions suffered by participants of sport and exercise. Although not considered a true sports injury, it has been estimated that 70% of regular runners suffered from a side stitch in the last 12 months.

A side stitch causes an intense, stabbing pain under the lower edge of the ribcage and although it can occur on both sides of the abdomen, research has found that it occurs more frequently on the right side.

The pain is usually brought on by vigorous exercise and activity. Side stitches occur more frequently in sports that require a lot of up and down movement, like running, jumping and horse riding. They also occur more frequently in novice or amateur athletes.

What Causes a Side Stitch?

The pain is caused by a spasm of the diaphragm muscle. The diaphragm is a dome shaped muscle that separates the thoracic (lung) cavity from the abdominal cavity and moves up and down when you inhale and exhale. To understand why the diaphragm muscle spasms, we need to understand what is happening during exercise: Let us use the sport of running as an example.

It is interesting to note that more than 70% of humans exhale when their left foot strikes the ground, while less than 30% exhale when their right foot hits the ground.

When you inhale, your lungs fill with air and force your diaphragm downward. Conversely, when you exhale your lungs contract and your diaphragm rises. This pattern of rising and falling occurs quite rapidly when you are running and as most side stitches occur on the right hand side, consider what happens to your diaphragm when your right foot strikes the ground.

As your right foot strikes the ground, gravity forces your internal organs downward. Some of these organs are attached to the diaphragm, which in turn pulls the diaphragm downward. Now if you are also exhaling at the same time as your right foot hits the ground, your diaphragm is being pulled upward as your lungs contract. This creates a stretching of the diaphragm muscle and the ligaments that are attached to your internal organs, which in turn causes the pain.

Treating a Side Stitch

Like any other muscle spasm, when a side stitch occurs it is important to stop the activity that brought the stitch on in the first place, or at the very least reduce the intensity of the activity.

Another effective treatment for a side stitch is to alter your breathing pattern. First concentrate on taking full, deep breathes and avoid shallow breathing. Then, if you are one of those people who exhale when your right foot hits the ground, try instead to exhale when your left foot hits the ground.

Preventing a Side Stitch

There are a number of measures that help to prevent side stitch, the main ones being:

- Improve your cardiovascular fitness;
- Concentrate on breathing deeply during exercise;
- Warm up properly before exercising;
- Gradually increase exercise intensity;
- Strengthen your core muscles (lower back, abdominal and oblique muscles);
- Stretch more, especially your lower back and abdominal muscles;
- Avoid eating before exercising; and
- Drink more fluids.

CHAPTER 18
Bursitis

What is a bursa?

Bursae are tiny fluid filled sacs located in areas of the body where bones, ligaments and tendons connect. There are more than 150 bursae in the human body and they act as cushions for joints. The bursae help to decrease friction between moving parts and without them movement would be painful.

What is bursitis?

Put simply, bursitis is inflammation of the bursa. When inflammation occurs, any movement or stress on the bursa causes pain and prevents the bursa from working properly.

Some common signs of bursitis are a dull ache or stiffness in the affected area; increased pain with movement; tenderness; swelling; redness; and heat.

Although there are many bursae located throughout the body, the most common areas of complaint are the shoulders, elbows, hips and knees.

What causes bursitis?

The main causes of bursitis can be broken into two major areas: chronic bursitis, which is caused by overuse or repetition, and acute bursitis, which is caused by traumatic injury.

In the first instance, any prolonged, repetitive movement of a joint will place strain on the bursa, which over time can cause inflammation and tenderness and result in bursitis. For example, prolonged hammering or vacuuming can place strain on the bursae in the elbow and wrist, and result in bursitis.

The other major cause of bursitis is traumatic injury, which can include an impact or twisting injury to one of the joints. Car crashes and falls commonly result in damage to the bursae.

Bursitis Treatment

One of the most common treatments for bursitis is anti-inflammatory drugs, although quite effective, there are many other useful treatments. Follow the advice below and you should see a big improvement with 7 to 10 days.

Rest and Immobilize
Once bursitis is diagnosed it is important that the affected area be rested as soon as possible. Any further movement or stress will only aggravate the condition and prolong recovery. It is also important to keep the injured area as still as possible. If necessary, support the injured area with a sling or brace.

Ice
It is important to apply ice as soon as possible as this will help to lay the foundation for a complete and speedy recovery. The application of ice will also have the greatest effect on reducing swelling and pain.

How do you apply ice? Crushed ice in a plastic bag is usually best. However, blocks of ice, commercial cold packs and bags of frozen peas will all do fine.

When using ice, be careful not to apply it directly to the skin. This can cause "ice burns" and further skin damage. Wrapping the ice in a damp towel generally provides the best protection for the skin.

How long? How often? This is the point where few people agree. Let me give you some figures to use as a rough guide, and then I will give you some advice from personal experience. The most common recommendation is to apply ice for 20 minutes every 2 hours for the first 48 to 72 hours.

These figures are a good starting point, but remember they are only a guide. You must take into account that some people are more sensitive to cold than others are. Also, be aware that children and elderly people have a lower tolerance to ice and cold. Finally, people with circulatory problems are also more sensitive to ice. Remember to keep these things in mind when treating yourself or someone else with ice.

Personally, I recommend that people use their own judgment when applying ice to them self. For some people, 20 minutes is too long. For others, especially well conditioned athletes, they can leave ice on for up to an hour at a time. The individual should make the decision as to how long the ice should stay on.

My personal recommendation is that people should apply ice for as long as it is comfortable. Obviously, there will be a slight discomfort from the cold, but as soon as pain or excessive discomfort is experienced, it is time to remove the ice. It is much better to apply ice for 3 to 5 minutes a couple of time an hour, than not at all.

Bursitis Prevention

To follow are a number of useful strategies that will help to prevent bursitis and other joint pain.

Firstly, learn to identify the activities that cause bursitis and either avoid those activities or modify them to reduce the pressure and stress on your joints. For example, if kneeling causes discomfort and bursitis in your knee joints, use a cushion or kneepads, or maybe you could use a small stool to sit on instead of kneeling.

Secondly, take adequate breaks, ensure sufficient rest periods when working out or performing repetitive tasks, and do not perform the same activity continuously for hours at a time.

Lastly, stretch and strengthen! The aim here is to gradually improve the strength and flexibility of the muscles, ligaments and tendons around the injured area.

When attempting to increase the strength of surrounding muscles, be sure to approach this in a gradual, systematic way of lightly over-loading the muscles and tendons. Be careful not to over-do this type of training. Patience is required.

An affective and relatively safe way to start is to begin with isometric exercises. These are exercise where the effected joint itself does not move, yet force is applied and the muscles are contracted.

For example, imagine sitting in a chair while facing a wall and then placing the ball of your foot against the wall. In this position, you can push against the wall with your foot and at the same time keep your ankle and knee joint from moving. The muscles contract but the ankle and knee joint does not move. This is an isometric exercise.

It is also important at this stage to introduce some gentle stretching exercise. These will help to further increase your range of motion and take pressure off the effected joint. While working on increasing your flexibility it is important to remember all the muscle groups around the injured area.

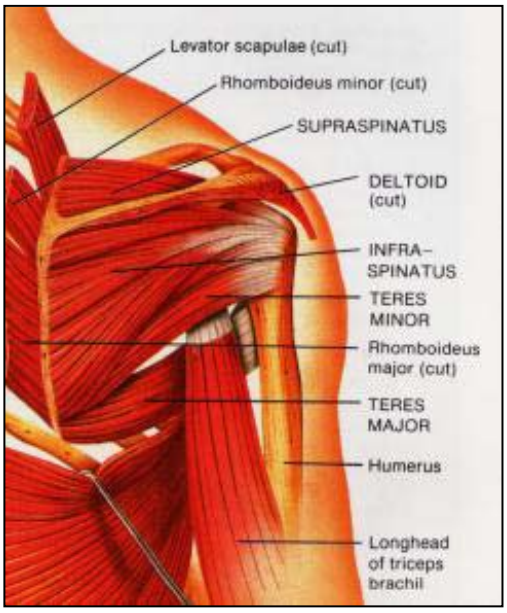
CHAPTER 19
Frozen Shoulder & Rotator Cuff Injury

Have you ever been working out at the gym, pushing a heavy weight and heard a popping sound in your shoulder; or what about skiing down the slopes, and landing shoulder first in the snow at the bottom; or maybe just having a friendly game of tennis, when all of a sudden there is a sharp pain in your shoulder.

These are all signs of the same thing; a shoulder injury. Whether you want to call it a frozen shoulder, a rotator cuff tear or tendonitis shoulder, it is really all the same. A tear or strain in the rotator cuff muscles and tendons.

The shoulder joint is a truly remarkable creation. It is quite a complex formation of bones, muscles and tendons and provides a great range of motion for your arm. The only downside to this extensive range of motion is a lack of stability, which can make the shoulder joint vulnerable to injury.

Let us have a quick look at the shoulder joint in a little more detail. The shoulder is made up of three bones, and the tendons of four muscles. (Remember, tendons attach muscle to bone.) The bones are called the "Scapula," the "Humerus" and the "Clavicle." Or, in layman's terms, the shoulder blade, the upper arm bone and the collarbone, respectively.



The four muscles that make up the

shoulder joint are called, the "Supraspinatus," the "Infraspinatus," the "Teres Minor" and the "Subscapularis." It is the tendons of these muscles, which connect to the bones that help to move your arm.

In the picture above, three of the four muscles are visible, the Supraspinatus, the Infraspinatus and the Teres Minor. These are the muscles which are viewed from the rear, or posterior. The Subscapularis is not visible because it can only be viewed from the front, or anterior and this particular view only shows the muscles from the rear, is if looking at someone's back.

Causes

There are two major causes of most shoulder injuries. The first being degeneration, or general wear and tear. Unfortunately, the shoulder is a tendinous area that receives very little blood supply. The tendons of the rotator cuff muscles receive very little oxygen and nutrients from blood supply and as a result are especially vulnerable to degeneration with aging. This is why shoulder problems in the elderly are common. This lack of blood supply is also the reason why a shoulder injury can take quite a lot of time to heal.

The second cause of most shoulder injuries is due to excessive force, or simply putting too much strain on the tendons of the shoulder muscles. This usually occurs when you try to lift something that is too heavy or when a force is applied to the arm while it is in an unusual or awkward position.

Symptoms

There are two common symptoms of a shoulder injury, pain and weakness. Pain is not always felt when a shoulder injury occurs,

however most people who do feel pain, report that it is a vague pain which can be hard to pinpoint.

Weakness, on the other hand, seems to be the most reliable symptom of a shoulder injury. Common complaints include an inability to raise your arm above your head or to extend your arm directly to the side or in front. In most cases, the larger the tear or damage to the tendons, the harder it is to move your arm and the injured area.

Treatment

The earlier a shoulder injury is treated, the better. The first 48 to 72 hours are crucial to a complete and speedy recovery. The first and most important course of action is the R.I.C.E.R. regime. Rest, Ice, Compression, Elevation and Referral.

After the initial injury has been treated with the R.I.C.E.R. regime, (for at least 48 to 72 hours) it is time to move onto the next stage of treatment. As mentioned before, the shoulder joint receives very little blood supply. So, what can you do to increase blood flow, and oxygen and nutrients to the injured area?

Firstly, heat! Heat is extremely good for increasing blood flow to a particular area. Heat lamps are the most effective way to increase blood flow while heat based creams are probably a distant second choice.

Secondly, massage! Massage is one of the best ways to increase blood flow to an injured area, and of course the oxygen and nutrients that go with it. The other benefit of massage is that it helps to reduce the amount of scar tissue which is associated with all muscle and tendon, strains and tears.

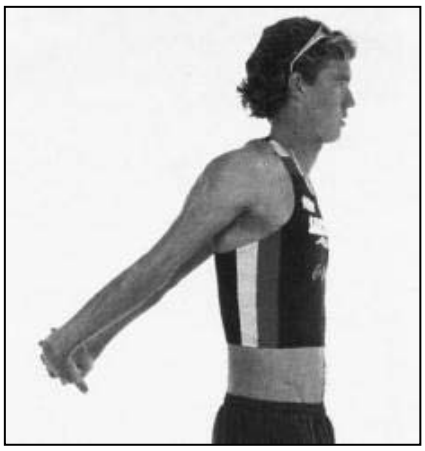
Lastly, do not stop moving. Some doctors will often tell patients to keep the injured area still, and this is not always the best advice. Gentle movement will help to keep the blood flowing to the injured area. Of course, if pain is present, limit the amount of moving you do, but do not stop moving all together.

Prevention

Mark my words, "Prevention is much better than Cure." Anything you can do to prevent an injury from occurring is worth it. The prevention of shoulder injuries comes down the conditioning of the shoulder muscles and tendons, which ultimately involves both stretching and strengthening of the shoulder joint.

Also, do not forget the common injury prevention techniques like, warming up properly and using a bit of old-fashioned common-sense. However, for the most part, stretching and strengthening are going to be your best defense against shoulder problems. Even if you do not have a shoulder problem now, the following stretching and strengthening exercises could save you from a major headache in the future.

Firstly, below you will find two good stretches for the shoulder area. The first is quite a basic stretch, while the second is a more advanced stretch, specifically for the rotator cuff muscles and tendons. Please be careful, if you have not been stretching your shoulder joint, the second stretch will put quite a lot of stress on the rotator cuff tendons. Warm-up first, then gently and slowly is the best way to proceed.



In the stretch to the left, simply stand upright and clasp you hands behind your back. Keep your arms straight and slowly lift your hands upwards. Hold this stretch for about 15 to 20 seconds and then repeat it 3 to 4 times.

In the stretch to the right, stand with your arm out and your forearm pointing upwards at 90 degrees. Place a broom stick or pole in your hand and let it fall behind your elbow. With your other hand, pull the bottom of the stick forward.

Be especially careful with this stretch, it will put a large strain on the rotator cuff muscles and tendons. As above hold this stretch for about 15 to 20 seconds and then repeat it 3 to 4 times.

Secondly, the strengthening exercises. Instead of me trying to explain these, I simply found a great web site that has clear pictures and a good description of the four most common shoulder exercises. These four exercises help to strengthen all of the muscles and tendons located in the shoulder joint. You can find these exercises at http://familydoctor.org/handouts/265.html

CHAPTER 20
Tennis Elbow

Tennis Elbow is currently one of the most diagnosed conditions in the western world. It is extremely common, and can be excruciatingly painful.

There are a number of conditions that affect the elbow area. The three most common conditions are "Lateral Epicondylitis" (tennis elbow), "Medial Epicondylitis" (golfers elbow), and medial collateral ligament sprain (throwers elbow).

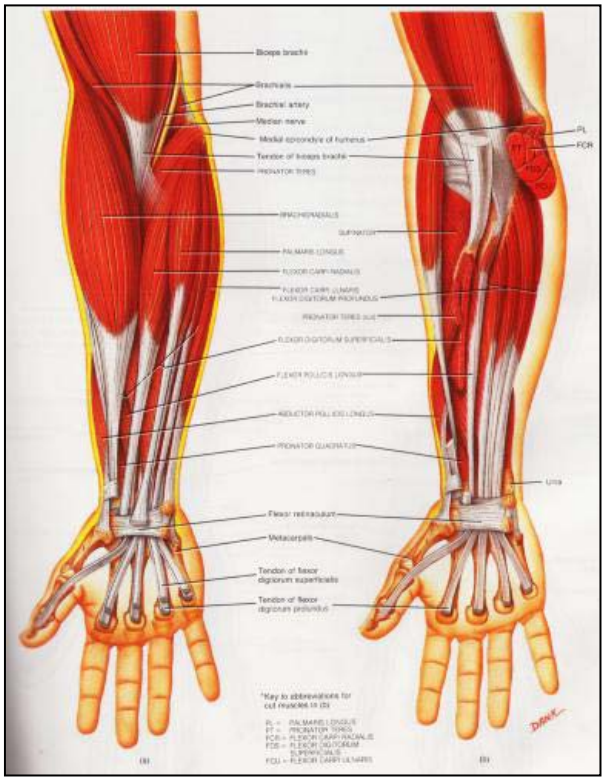
The first two conditions are very similar, however the first affects the outside of the elbow (lateral), and the second effects the inside of the elbow (medial). For the purpose of this chapter we will stick with the treatment of Lateral Epicondylitis, or as it is more commonly known, tennis elbow.

What is Tennis Elbow?

Before we can understand just what tennis elbow is, it is important to have a general understanding of the structure of the elbow joint, and how the muscles, tendons, ligaments and bones help the elbow joint to function.

As you can see from the diagram to below, there are many muscles and tendons that make up the elbow joint and forearm. The diagram shows the anterior (or front) view of the forearm. The left picture shows the muscles and tendons closest to the surface of the skin, while the picture on the right shows some of the muscles and tendons deeper within the forearm.

There are also three bones which make up the elbow joint. They are the "Humerus," the "Ulna" and the "Radius."



Now that we can see how the elbow functions, lets look at what exactly tennis elbow is.

Tennis elbow occurs when there is damage to the muscles, tendons and ligaments around the elbow joint and forearm. Small tears, called micro tears, form in the tendons and muscles which control the movement of the forearm. They cause a restriction of movement, inflammation and pain. These micro tears eventually lead to the formation of scar tissue and calcium deposits. If untreated, this scar tissue and calcium deposits can put so much pressure on the muscles and nerves that they can cut off the blood flow and pinch the nerves responsible for controlling the muscles in the forearm.

Causes!

By far the most common cause of tennis elbow is overuse. Any action that places a repetitive and prolonged strain on the forearm muscles, coupled with inadequate rest, will tend to strain and overwork those muscles.

There are also many other causes, like a direct injury, such as a bump or fall onto the elbow. Poor technique will contribute to the condition, such as using ill-fitted equipment, like tennis racquets,

golf clubs, work tools, etc. While poor levels of general fitness and conditioning will also contribute.

Symptoms!

Pain is the most common and obvious symptom associated with tennis elbow. Pain is most often experienced on the outside of the upper forearm, but can also be experienced anywhere from the elbow joint to the wrist.

Weakness, stiffness and a general restriction of movement are also quite common in sufferers of tennis elbow. Even tingling and numbness can be experienced.

Prevention!

There are a number of preventative techniques that will help to prevent tennis elbow, including bracing and strapping, modifying equipment, taking extended rests and even learning new routines for repetitive activities. However, there are three preventative measures that I feel are far more important, and effective, than any of these.

Firstly, a thorough and correct warm up will help to prepare the muscles and tendons for any activity to come. Without a proper warm up the muscles and tendons will be tight and stiff. There will be limited blood flow to the forearm area, which will result in a lack of oxygen and nutrients for the muscles. This is a sure-fire recipe for a muscle or tendon injury.

Before any activity be sure to thoroughly warm up all the muscles and tendons that will be used during your sport or activity.

Secondly, flexible muscles and tendons are extremely important in the prevention of most strain or sprain injuries. When muscles and tendons are flexible and supple, they are able to move and perform without being over stretched. If however, your muscles and tendons are tight and stiff, it is quite easy for those muscles and tendons to be pushed beyond their natural range of movement. When this happens, strains, sprains, and pulled muscles occur.

And thirdly, strengthening and conditioning the muscles of the forearm and wrist will also help to prevent tennis elbow. There are a number of specific strengthening exercises you can do for these muscles, but instead of me going into the details here, I have simply found another web site that has already done all the hard work. It explains a number of exercises you can do, both with, and without weights, and also includes diagrams and comprehensive explanations of each exercise. You can find these strengthening exercises by going to;
http://www.physsportsmed.com/issues/may_96/nirscpa.htm

Treatment!

Tennis elbow is a soft tissue injury of the muscles and tendons around the elbow joint, and therefore should be treated like any other soft tissue injury. Immediately following an injury, or at the onset of pain, the R.I.C.E.R. regime should be employed. This involves Rest, Ice, Compression, Elevation, and Referral to an appropriate professional for an accurate diagnosis.

It is critical that the R.I.C.E.R. regime be implemented for at least the first 48 to 72 hours. Doing this will give you the best possible chance of a complete and full recovery.

The next phase of treatment (after the first 48 to 72 hours) involves a number of physiotherapy techniques. The application of heat and massage is one of the most effective treatments for removing scar tissue and speeding up the healing process of the muscles and tendons.

Once most of the pain has been reduced, it is time to move onto the rehabilitation phase of your treatment. The main aims of this phase are to regain the strength, power, endurance and flexibility of the muscle and tendons that have been injured.

For complete and comprehensive information on the treatment of soft tissue injuries, please read chapter 12.

CHAPTER 21
Golfers Elbow

There are a number of conditions that affect the elbow area. The three most common conditions are "Lateral Epicondylitis" (tennis elbow), "Medial Epicondylitis" (golfers elbow), and medial collateral ligament sprain (throwers elbow).

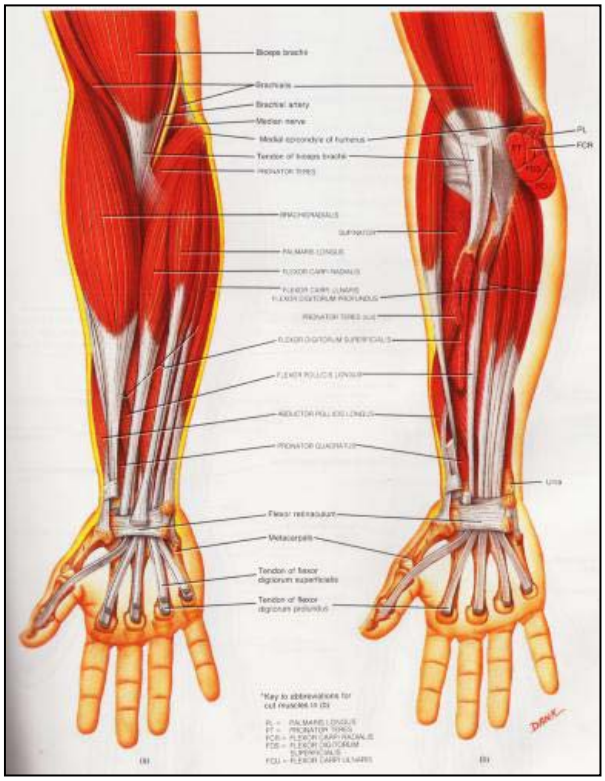
The first two conditions are very similar, however the first affects the outside of the elbow (lateral), and the second affects the inside of the elbow (medial). For the purpose of this chapter we will stick with the treatment of Medial Epicondylitis, or as it is more commonly known, golfers elbow.

What is Golfers Elbow?

Before we can understand just what golfers elbow is, it is important to have a general understanding of the structure of the elbow joint, and how the muscles, tendons, ligaments and bones help the elbow joint to function.

As you can see from the diagram to below, there are many muscles and tendons that make up the elbow joint and forearm. The diagram shows the anterior (or front) view of the forearm. The left picture shows the muscles and tendons closest to the surface of the skin, while the picture on the right shows some of the muscles and tendons deeper within the forearm.

There are also three bones which make up the elbow joint. They are the "Humerus," the "Ulna" and the "Radius."



Now that we can see how the elbow functions, let us look at what exactly golfers elbow is.

Golfers elbow occurs when there is damage to the muscles, tendons and ligaments around the elbow joint and forearm. Small tears, called micro tears, form in the tendons and muscles which control the movement of the forearm. They cause a restriction of movement, inflammation and pain. These micro tears eventually lead to the formation of scar tissue and calcium deposits. If untreated, this scar tissue and calcium deposits can put so much pressure on the muscles and nerves that they can cut off the blood flow and pinch the nerves responsible for controlling the muscles in the forearm.

Causes!

By far the most common cause of golfers elbow is overuse. Any action which places a repetitive and prolonged strain on the forearm muscles, coupled with inadequate rest, will tend to strain and overwork those muscles.

There are also many other causes, like a direct injury, such as a bump or fall onto the elbow. Poor technique will contribute to the condition, such as using ill-fitted equipment, like golf clubs, tennis racquets, work tools, etc. While poor levels of general fitness and conditioning will also contribute.

Symptoms!

Pain is the most common and obvious symptom associated with golfers elbow. Pain is most often experienced on the inside of the upper forearm, but can also be experienced anywhere from the elbow joint to the wrist.

Weakness, stiffness and a general restriction of movement are also quite common in sufferers of golfers elbow. Even tingling and numbness can be experienced.

Prevention!

There are a number of preventative techniques that will help to prevent golfers elbow, including bracing and strapping, modifying equipment, taking extended rests and even learning new routines for repetitive activities. However, there are three preventative measures that I feel are far more important, and effective, than any of these.

Firstly, a thorough and correct warm up will help to prepare the muscles and tendons for any activity to come. Without a proper warm up the muscles and tendons will be tight and stiff. There will be limited blood flow to the forearm area, which will result in a lack of oxygen and nutrients for the muscles. This is a sure-fire recipe for a muscle or tendon injury.

Before any activity be sure to thoroughly warm up all the muscles and tendons that will be used during your sport or activity.

Secondly, flexible muscles and tendons are extremely important in the prevention of most strain or sprain injuries. When muscles and tendons are flexible and supple, they are able to move and perform without being over stretched. If however, your muscles and tendons

are tight and stiff, it is quite easy for those muscles and tendons to be pushed beyond their natural range of movement. When this happens, strains, sprains, and pulled muscles occur.

And thirdly, strengthening and conditioning the muscles of the forearm and wrist will also help to prevent golfers elbow. There are a number of specific strengthening exercises you can do for these muscles, but instead of me going into the details here, I have simply found another web site that has already done all the hard work.

The following site explains a number of exercises you can do, both with, and without weights, and also includes diagrams and comprehensive explanations of each exercise. Although the site is specifically about tennis elbow, the exercises also relate very well to golfers elbow. You can find these strengthening exercises by going to; http://www.physsportsmed.com/issues/may_96/nirscpa.htm

Treatment!

Golfers elbow is a soft tissue injury of the muscles and tendons around the elbow joint, and therefore should be treated like any other soft tissue injury. Immediately following an injury, or at the onset of pain, the R.I.C.E.R. regime should be employed. This involves Rest, Ice, Compression, Elevation, and Referral to an appropriate professional for an accurate diagnosis.

It is critical that the R.I.C.E.R. regime be implemented for at least the first 48 to 72 hours. Doing this will give you the best possible chance of a complete and full recovery.

The next phase of treatment (after the first 48 to 72 hours) involves a number of physiotherapy techniques. The application of heat and massage is one of the most effective treatments for removing scar

tissue and speeding up the healing process of the muscles and tendons.

Once most of the pain has been reduced, it is time to move onto the rehabilitation phase of your treatment. The main aims of this phase are to regain the strength, power, endurance and flexibility of the muscle and tendons that have been injured.

For complete and comprehensive information on the treatment of soft tissue injuries, please read chapter 12.

CHAPTER 22
Back Injury & Rehabilitation

The following chapter comes from a well-respected web site called, Spine-Health.Com. Spine-Health has been developed by a multi-specialty group of medical professionals, and their goal is to provide their visitors with a comprehensive, highly informative and useful resource for understanding, preventing, and seeking appropriate treatment for back & neck pain and related conditions.

If back pain has caused you problems, either now or in the past, I highly recommend you visit Spine-Health. Their extensive range of back care information and articles is second to none.

****

People who suffer from lower back pain are often encouraged to participate in their own recovery, but they are seldom given the knowledge and tools needed to accomplish this. This discussion will help you acquire a basic understanding of the reasons for lower back pain, and take charge of your own health by taking the appropriate steps to rehabilitate your back.

Of course, getting better is only the beginning, since further episodes of back pain are quite common as time passes. Fortunately, you can improve your chances of avoiding recurrences by rehabilitating your back, whether you are experiencing your first bout with low back pain or have had extensive treatments or even surgery.

Causes of back pain

There are several structures in the back that can cause and/or contribute to low back pain.

Although the intervertebral disc is a remarkably versatile and strong structure, essentially acting as a shock absorber as we go about our activities, sometimes the disc fails when there is a sudden, unexpected force (such as a fall, lifting or other trauma). And when the disc does get injured it cannot repair itself very well, which is one of the major reasons recurrent back pain is so common.

Making matters worse, the pain often prevents us from getting enough exercise, which adversely affects disc nutrition. Nutrition for the disc is achieved when physical activities cause the disc to swell up with water and then squeeze it out - much like a sponge. When pain affects our physical activity, the injured disc is deprived of its nutrition and begins to degenerate.

Activity is also needed to maintain the exchange of fluids in spinal structures and reduce swelling that naturally occurs in the tissues surrounding an injured disc. This swelling can further irritate nerves that are already affected by herniated disc material.

The muscles, ligaments and tendons in the back are also very important in maintaining proper spinal balance and strength. With decreased activity, the connective fibers of ligaments and tendons can begin to adhere to each other and lose resilience and may tear when sudden overload occurs. Unlike discs or connective tissue, however, when muscles are injured, they can quickly repair themselves.

However, muscles contribute to chronic back pain. When nerves are cut or pinched, the muscles they control cannot work, as sometimes

happens when a herniated disc presses on a nerve. Also, since muscles are in constant communication with the central nervous system, anger or anxiety can tense the muscles and cause muscle spasms. Ongoing tension inhibits normal muscle function and leads to muscle wasting and further stability problems, which in turn can lead to chronic lower back pain.

Acute vs. chronic back pain

It is important to note that acute pain is different from chronic pain. We have all experienced acute pain from a sudden soft tissue injury, such as a sprained ankle, or even just a simple paper cut. The pain is immediate, but gradually resolves as the injured part heals.

Unlike acute pain, chronic pain comprises a constant low level of stimulation to the nervous system that eventually becomes a pattern. It may even persist as a "neural memory" after the initial source of irritation has resolved. The adaptation of our nervous system to this chronic stimulation creates an environment in which events that previously caused no pain become a source of pain. Pain may even progress to uninjured areas.

Emotional distress and certain medications can exacerbate this phenomenon. An effective solution is to distract the nervous system by means of active exercise in a controlled, non-destructive manner. This also helps to create the physiological conditions that allow the injured structures to heal.

Rehabilitation exercises

One of the keys to recovering from an episode of back pain or surgery, and to help avoid future recurrences of back pain, is to

undergo proper rehabilitation in terms of stretching, strengthening and aerobic conditioning of the back and body. This requires a basic understanding of the types of muscles that need to be conditioned.

There are three types of muscles that support the spine:

- Extensors (back and gluteal muscles): used to straighten the back (stand), lift and extend, and move the thighs out away from the body.
- Flexors (abdominal and iliopsoas muscles): used to bend and support the spine from the front, they also control the arch of the lumbar (lower) spine and flex and move the thigh in toward the body.
- Oblique or Rotators (side muscles): used to stabilize the spine when upright, they rotate the spine and help maintain proper posture and spinal curvature.

While some of these muscles are used in everyday life, most do not get adequate exercise from daily activities and tend to weaken with age unless they are specifically exercised.

For all forms of exercise, it is advisable to see a trained and licensed physical therapist, occupational therapist, chiropractic physician or physical medicine and rehabilitation physician (also called a physiatrist). Depending on your specific diagnosis and level of pain, the rehabilitation program will be very different, and these specialists are trained to develop an appropriate rehabilitation program and provide instruction on correct form and technique.

Stretching

Any form of inactivity, especially where an injured back is involved, is usually associated with some progressive stiffness. Therefore, it is

necessary to push the range of motion as far as can be tolerated (in a controlled manner). Patients with chronic pain may find it takes weeks or months of stretching to mobilize the spine and soft tissues, but will find that the increase in motion provides meaningful and sustained relief of their back pain.

Stretching exercises should focus on achieving flexibility and elasticity in the disc, muscles, ligaments, and tendons. Additionally, it is important to activate and strengthen muscles not directly involved with the injured area, such as the arms and legs. For example, the hamstring muscles play a role in lower back pain, as it is clear that hamstring tightness limits motion in the pelvis and can place it in a position that increases stress across the low back.

Specialized equipment is available that helps repetitions to be done in the same manner so that progress can be identified and the level of exercise regulated.

Strengthening

It is thought that re-injury is less likely to occur if back strengthening is accomplished than if mere pain relief is achieved with just stretching. An episode of back pain that lasts for more than two weeks should be treated with proper strengthening exercises to prevent a recurring cycle of pain and weakness.

There are two primary forms of exercise for strengthening and/or pain relief that tend to be used for specific conditions. When appropriate, the two forms of physical therapy may also be combined.

- **McKenzie exercises** in general focuses on extending the spine to reduce pain generated from the disc space. Theoretically,

extension may also help reduce a herniated disc and reduce pressure on a nerve root. For patients who are suffering from leg pain due to a herniated disc (e.g. sciatica), extending the spine may help reduce the leg pain by "centralizing" the pain (moving the pain from the leg to the lower back). For most people, back pain is usually more tolerable than leg pain. Sometimes, based on the structured evaluation, flexion exercises are appropriate.

- **Lumbar stabilization exercises** focus on finding the patient's "neutral" spine, or the position that allows the patient to feel most comfortable. The back muscles are then exercised to teach the spine how to stay in this position. Performed on an ongoing basis, these exercises can help keep the back strong and well positioned. Special attention is paid to the extensor muscles of the lower back with resistance exercises.

Additionally, a strengthening program that involves progressive loading and unloading of the lumbar spine by means of flexion/extension exercises can reduce pain and increase the perception of improved back strength. This training, called facilitation, is best accomplished when the muscles to be facilitated are isolated in some way so that other muscles cannot take over the job. Often specific equipment is required to achieve that goal.

Low-impact aerobic conditioning

Finally, conditioning through low-impact aerobic exercise is very important for both rehabilitation and maintenance of the lower back. Aerobically fit patients will have fewer episodes of low back pain, and will experience less pain when an episode occurs. Well-conditioned patients are also more likely to maintain their regular routine, whereas patients with chronic low back pain who do not

work on aerobic conditioning are likely to gradually lose their ability to perform everyday activities.

Examples of low impact aerobic exercises that many people with back pain can tolerate include:

- **Water therapy** (also called pool therapy or hydrotherapy). For people with a great deal of pain, water therapy provides a gentle form of conditioning as the water alleviates gravity and provides buoyancy as well as mild resistance.
- **Walking.** Many people think that walking as part of their daily routine (e.g. at work or while shopping) is enough. However, this stop-and-start type of walking is not adequate for aerobic conditioning. Instead, continuous walking at a sustained pace for a minimum of twenty to thirty minutes is required to provide aerobic conditioning.
- **Stationary biking.** Riding a stationary bicycle provides aerobic conditioning with minimal impact on the spine. This is also a good exercise option for people who are more comfortable positioned leaning forward.

Depending on your injury and exercise preferences, you may prefer a different form of exercise. It may be helpful to discuss your options with your physical therapist, or physician to identify an appropriate form of aerobic exercise for you and incorporate it into your exercise routine.

Guidelines for successful recovery

In addition to stretching, strengthening and aerobic exercises, there are several basic guidelines that can help you in your healing and rehabilitation process. These guidelines include:

Manage anxiety

Controlling anxiety and fear of re-injury is very important to regain normal muscle function. The basis for these psychological reactions to low back pain lies in the central nervous system, which responds to pain by instructing the muscles near the affected part to protect against further injury. Only appropriate physical training that specifically tells the muscles to improve their function can overcome this neurological barrier to normal muscle function.

Eat properly

The healing process can be aided with appropriate nutrition, which includes adequate calorie intake in a balanced manner. If all calories consumed are in the form of sugars (such as breads, pasta, and sweets), any calories not immediately needed for energy are converted into fat. You do not need extra weight while you are in the healing process. Your diet should include adequate protein as a source of the building blocks of soft tissue healing. Additionally, fresh fruit and vegetables supply the vitamins and trace elements necessary for effective healing. A vitamin supplement may also be helpful.

Get adequate sleep

One of the best ways to encourage sleep is to induce physical weariness through active exercise. Chronic inactivity does not create a need for the deep sleep that is so helpful for physical and emotional healing. Clearly, stimulants such as caffeine or nicotine should be avoided at bedtime. Smoking should also be avoided because it diminishes the available blood supply and makes the nervous system more sensitive.

Control medication use

While medications are often important for pain relief, one should also be careful about the use of medications. For example, use of narcotic medications and muscle relaxants over time may cause depression and should be used as little as possible. Also, while anti-inflammatory medications may provide pain relief, there is no evidence that they do anything to speed the process of healing. The use of heat or cold, or liniment or massage, as a mechanism for pain control is a very safe and positive alternative for pain management.

Exercise properly

Exercise in a controlled, gradual, and progressive manner is the only way we can tell our body to heal. Injections and medications can provide pain relief but cannot stimulate the healing process. If a pain problem has persisted for many weeks, the body is demonstrating that there are barriers to the healing process that need to be eliminated. The natural stimulus for the healing process is active exercise. Active exercise means we use our nervous system to tell the muscles what to do, and includes dedication to an appropriate, comprehensive exercise and rehabilitation program.

Finally, an important guideline is to seek the assistance of an appropriately trained and licensed health professional for your rehabilitation. And it is always important to see a physician if your lower back pain lasts for more than a few weeks or a month or if you have any symptoms that cause you concern, as the continued pain and/or symptoms may signify a serious medical condition. Ultimately, participating in developing and maintaining an active rehabilitation program for back pain should help you heal faster and have fewer recurrences of pain.

****

Article by Vert Mooney, MD. Doctor Mooney is the Medical Director of US Sport & Spinal and a Clinical Professor of Orthopedics at the University of California at San Diego.

CHAPTER 23
Groin Pull

Groin pain; Groin strain; Groin pull injury; or Adductor strain. Call it what you want, the fact is, it is a very common muscle strain injury that currently plagues sports like soccer, basketball, football, hockey, track & field and racquet sports.

The groin, described as the junction between the lower limbs and torso, is vulnerable to a lot of different injuries. Hernias, stress fractures, and avulsion fractures are all common injuries that affect the groin, but for this chapter we will be focusing on one of the most common groin injuries; groin pull or groin strain.

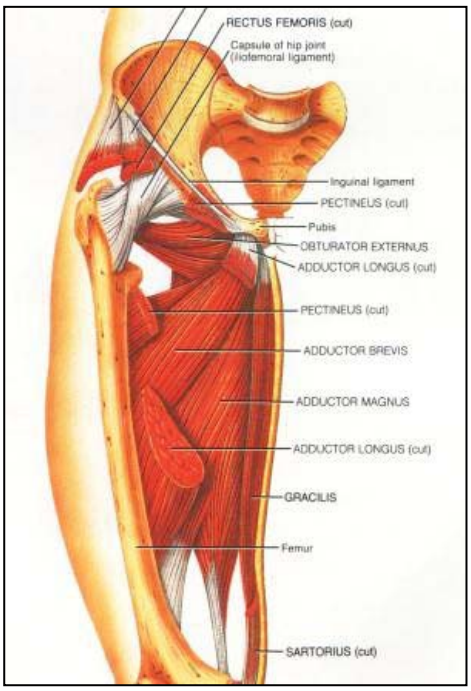
Firstly, I am going to talk briefly about what a groin pull is, what causes a groin pull and what to do to prevent a groin pull. Then I am going to reproduce a detailed management plan for the correct treatment and complete rehabilitation of a groin strain.

This detailed management plan comes from one of my old university text books, called Modern Principles of Athletic Training by Daniel D. Arnheim. It is one of those 900 page door-stoppers, but it is the book I refer to most for information on sports injury prevention and rehabilitation. It is extremely detailed and a valuable resource for anyone who works in the health and fitness industry.

What is a Groin Pull?

Depending on the severity, a groin pull can range from a slight stretching, to a complete rupture of the muscles that attach the pubic (pelvis) bone to the thigh (femur) bone.

A groin pull or strain specifically affects the "Adductor" muscles. (Adductor; meaning, moves part closer to the midline, or middle of the body) These muscles are located on the inside of the thigh and help to bring the legs together.



The adductor muscles consist of "Adductor Brevis", "Adductor Magnus" and "Adductor Longus," all of which are displayed in the picture to the right. Adductor Longus has been cut to display the muscles underneath.

Of these three, it is Adductor Longus that is most susceptible to injury, and the most common place of injury on Adductor Longus is the point at which the muscle and tendon attach to the femur (thigh) bone.

What Causes a Groin Pull?

Competitors that participate in sports that require a lot of running or rapid change in direction are most susceptible to groin injuries. Other activities like kicking, jumping and rapid acceleration or deceleration also place a lot of strain on the groin muscles.

Another activity that puts a lot of strain on the groin is any movement that results in a sudden pressure being applied. Such as a fall, landing awkwardly, twisting, or bending while stress is applied to the groin muscles.

How to Prevent a Groin Pull?

The basis of prevention comes down to two simple factors. A thorough warm-up and physical conditioning, ie: flexibility & strength.

Firstly, a thorough and correct warm up will help to prepare the muscles and tendons for any activity to come.

Secondly, flexible muscles and tendons are extremely important in the prevention of most strain or sprain injuries. When muscles and tendons are tight and stiff, it is quite easy for those muscles and tendons to be pushed beyond their natural range of movement, which can cause strains, sprains, and pulled muscles.

And thirdly, strengthening and conditioning the muscles of the groin will also help to prevent groin strain. There are a number of specific strengthening exercises you can do for these muscles, like cable adductions and machine adductions.

A Complete Treatment and Management Plan for Groin Strain

The following is a very thorough and detailed management plan for the full recovery and rehabilitation of a groin strain. As mentioned earlier, it is taken directly from Modern Principles of Athletic Training by Daniel D. Arnheim.

Considering this management plan was written over ten years ago, my only addition would be the reduction of ice therapy and the addition of massage and heat therapy during the 2nd, 3rd, and 4th phase. Regardless of my suggestions, the following will be

extremely useful for anyone who is, or has suffered from a groin strain.

Injury Situation:
A women varsity basketball player had a history of tightness in her groin. During a game she suddenly rotated her trunk while also stretching to the right side. There was a sudden sharp pain and a sense of "giving way" in the left side of the groin that caused the athlete to immediately stop play and limp to the sidelines.

Symptoms & Signs:
As the athlete described it to the athletic trainer, there was severe pain when rotating her trunk to the right and flexing her left hip. Inspection revealed the following:

1. There was major point tenderness in the groin, especially in the region of the Adductor Magnus muscle.
2. There was no pain during passive movement of the hip, but severe pain did occur during both active and resistive motion.
3. When the groin and hip were tested for injury, the hip joint, Illiopsoas, and Rectus Femoris muscles were ruled out as having been injured; however, when the athlete adducted the hip from a stretch position, it caused here extreme discomfort.

Management Plan:
Based on the athletic trainer's inspection, with findings confirmed by the physician, it was determined that the athlete had sustained a second-degree strain of the groin, particularly to the Adductor Magnus muscle.

Phase 1

Management Phase
Goals: To control hemorrhage, pain and spasms. Estimated length of time (ELT): 2 to 3 days.
Therapy
Immediate Care: ICE-R (20 min) intermittently, six to eight times daily. The athlete wears a 6-inch elastic hip spica.
Exercise Rehabilitation:
No Exercise - as complete rest as possible.

Phase 2

Management Phase
Goals: To reduce pain, spasm and restore full ability to contract without stretching the muscle. ELT: 4 to 6 days.
Therapy
Follow up care: Ice massage (1 min) three to four times daily, plus bipolar muscle stimulation above and below the pain site (7 min).
Exercise Rehabilitation
PNF for hip rehabilitation three to four times daily (beginning approx. 6 days after injury) Optional: Jogging in chest level water (10 to 20 min) one or two times daily. All exercises must be done within pain free limits. General body maintenance exercises are conducted three times a week as long as they do not aggravate the injury.

Phase 3

Management Phase
Goals: To reduce inflammation and return strength and flexibility.

Therapy
Muscle stimulation using the surge current at 7 or 8, depending on athlete's tolerance, together with ultrasound once daily and cold therapy in the form of ice massage or ice packs (7 min) followed by light exercise, two to three times daily.
Exercise Rehabilitation
PNF hip patterns two to three times daily following cold applications, progressing to progressive-resistance exercise using pulley, isokinetic, or free weight (10 reps, 3 sets) once daily. Optional: Flutter kick swimming once daily. General body maintenance exercises are conducted three times a week as long as they do not aggravate the injury.

Phase 4

Management Phase
Goals: To restore full power, endurance, speed and extensibility.
Therapy
If symptom free, precede exercise with ice massage (7 min) or ice pack.
Exercise Rehabilitation
Added to phase 3 program, jogging on flat course slowly progressing to a 3-mile run once daily and then progressing to figure-8s, starting with obstacles 10 feet apart and gradually shortening distance to 5 feet, at full speed.

Phase 5

Management Phase
Goals: To return to sport competition.

Exercise Rehabilitation
Athlete gradually returns to pre-competition exercise and a gradual return to competition while wearing a figure-8 elastic hip spica bandage for protection.

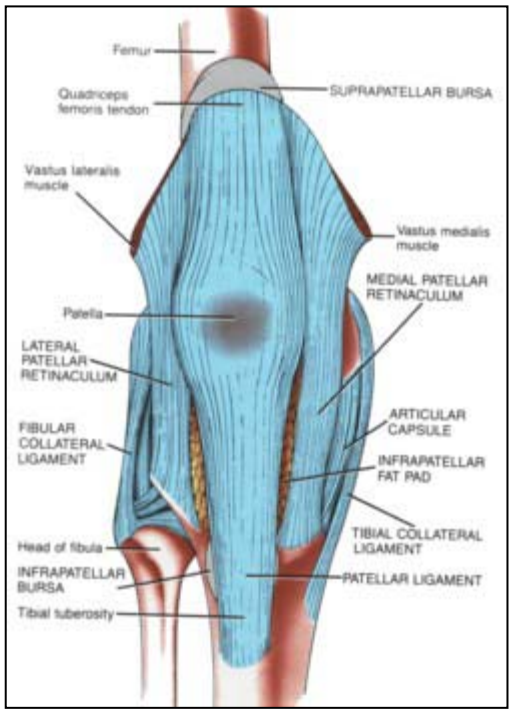
Criteria for Returning to Competitive Basketball:

1. As measured by an isokinetic dynamometer, the athlete's injured hip should have equal strength to that of the uninjured hip.
2. Hip has full range of motion.
3. The athlete is able to run figure-8s around obstacles set 5 feet apart at full speed.

CHAPTER 24
Patellar Tendonitis

Anatomy of the Knee

Before we discuss what patellar tendonitis is, it is important to have a general understanding of the structures that make up the knee joint.



The picture to the right is a front-on view of the bones, tendons and ligaments that make up the knee joint. In the very center of the picture is the patella, or kneecap. The blue structure that runs downward from the patella to the tibia (shinbone) is the patella ligament.

On occasion you may hear of this structure being referred to as the patellar tendon, but for the purposes of anatomy and physiology this structure is a ligament, as it attaches the patella (knee cap) to the tibia (shin bone). Ligaments attach bone to bone, while tendons attach muscle to bone.

What is Patellar Tendonitis?

As with all cases of tendonitis, patella tendonitis is simply the inflammation, degeneration or rupture of the patellar ligament and

the tissue that surround it, leading to pain and discomfort in the area just below the knee cap.

What causes Patellar Tendonitis?

Overuse is the major cause of patellar tendonitis. Activities that involve a lot of jumping or rapid change of direction are particularly stressful to the patellar ligament. Participants of basketball, volleyball, soccer, and other running related sports are particularly vulnerable to patellar tendonitis.

Patellar tendonitis can also be caused by a sudden, unexpected injury like a fall. Landing heavily on your knees can damage the patellar ligament, which can lead to patellar tendonitis.

What are the Signs & Symptoms of Patellar Tendonitis?

The major symptom of patellar tendonitis is pain in the area just below the kneecap. Activities like walking, running and especially squatting, kneeling or jumping will cause increased pain and discomfort. Swelling is also commonly associated with patellar tendonitis.

Patellar Tendonitis Treatment

Patellar tendonitis is just like any other soft tissue injury and should be treated accordingly. This involves the application of R.I.C.E.R. (R) rest, (I) ice, (C) compression, (E) elevation and obtaining a (R) referral for appropriate medical treatment. The following two points are of most importance.

1. **Rest & Immobilization**
   Once patellar tendonitis is diagnosed it is important that the affected area be rested immediately. Any further movement or stress will only aggravate the condition and prolong recovery. It is also important to keep the injured area as still as possible.

2. **Ice**
   By far the most important part. The application of ice will have the greatest effect on reducing bleeding, swelling and pain. Apply ice as soon as possible after the injury has occurred or been diagnosed.

How do you apply ice? Crushed ice in a plastic bag is usually best. However, blocks of ice, commercial cold packs and bags of frozen peas will all do fine. Even cold water from a tap is better than nothing at all.

When using ice, be careful not to apply it directly to the skin. This can cause "ice burns" and further skin damage. Wrapping the ice in a damp towel generally provides the best protection for the skin.

How long, how often? This is the point where few people agree. Let me give you some figures to use, as a rough guide, and then I will give you some advice from personal experience. The most common recommendation is to apply ice for 20 minutes every 2 hours for the first 48 to 72 hours.

These figures are a good starting point, but remember they are only a guide. You must take into account that some people are more sensitive to cold than others are. Also, be aware that children and elderly people have a lower tolerance to ice and cold. Finally, people with circulatory problems are also more sensitive to ice. Remember to keep these things in mind when treating yourself or someone else with ice.

Personally, I recommend that people use their own judgment when applying ice to them self. For some people, 20 minutes is too much. For others, especially well conditioned athletes, they can leave ice on for up to an hour at a time. The individual should make the decision as to how long the ice should stay on.

My personal recommendation is that people should apply ice for as long as it is comfortable. Obviously, there will be a slight discomfort from the cold, but as soon as pain or excessive discomfort is experienced, it is time to remove the ice. It is much better to apply ice for 3 to 5 minutes a couple of time an hour, than not at all.

During the first 24 to 72 hours after an injury, be sure to avoid any form of heat at the injury site. This includes heat lamps, heat creams, spas, Jacuzzi's and saunas. Avoid all movement and massage of the injured area. Also, avoid excessive alcohol. All these things will increase the bleeding, swelling and pain of your injury. Avoid them at all costs.

Patellar Tendonitis Prevention

Although it is important to be able to treat patellar tendonitis, prevention should be your first priority. So what are some of the things you can do to help prevent patellar tendonitis?

1. **Warm Up properly**
   A good warm up is essential in getting the body ready for any activity. A well-structured warm up will prepare your heart, lungs, muscles, joints and your mind for strenuous activity.

2. **Avoid activities that cause pain**
   This is self-explanatory, but try to be aware of activities that

cause pain or discomfort, and either avoid them or modify them.

3. **Rest and Recovery**
   Rest is very important in helping the soft tissues of the body recover from strenuous activity. Be sure to allow adequate recovery time between workouts or training sessions.

4. **Balancing Exercises**
   Any activity that challenges your ability to balance, and keep your balance, will help what is called, proprioception: - your body's ability to know where its limbs are at any given time.

5. **Stretch and Strengthen**
   To prevent patellar tendonitis, it is important that the muscles around the knee be in top condition. Be sure to work on the strength and flexibility of all the muscle groups in the leg.

6. **Footwear**
   Be aware of the importance of good footwear. A good pair of shoes will help to keep your knees stable, provide adequate cushioning, and support your knees and lower leg during the running or walking motion.

7. **Strapping**
   Strapping, or taping can provide an added level of support and stability to weak or injured knees.

CHAPTER 25
Hamstring Injury

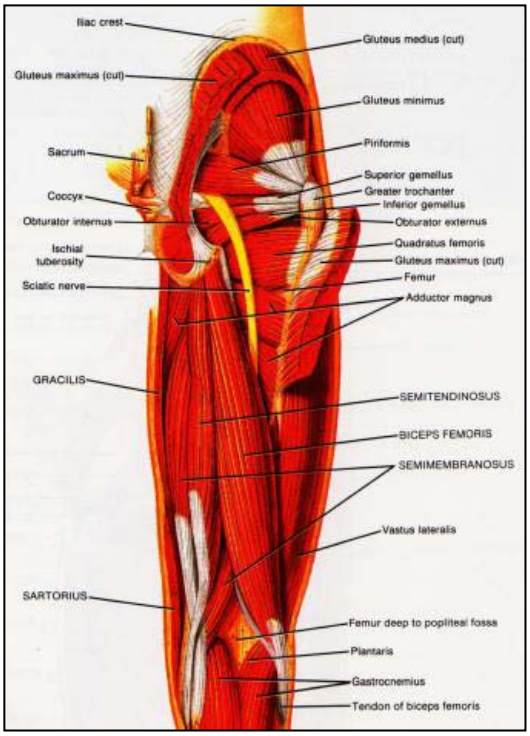
The hamstring muscles are very susceptible to tears, strains and other common sporting injuries. Effective hamstring injury treatment & hamstring stretching exercises are vital to the overall health and condition of the hamstring muscles.

Those athletes particularly vulnerable are competitors involved in sports which require a high degree of speed, power and agility. Sports such as Track & Field (especially the sprinting events) and other sports such as soccer, basketball, tennis and football seem to have more than their fair share of hamstring injuries.

Let us start by having a quick look at the particular muscles which make up the hamstrings and where exactly they are located. We will then move onto some common causes of hamstring injuries and finally look at some preventative measures and treatments.

The hamstring group of muscles, located at the back of the upper leg, is actually a group of three separate muscles. The top of these muscles are attached to the lower part of the pelvis and the bottom of the hamstring muscles is attached to the lower leg bone just below the knee joint. The technical or anatomical names for the three hamstring muscles are Semimembranosus, Semitendinosus and Biceps Femoris.

The picture below shows the muscles located at the rear of the upper right leg. The three specific hamstring muscles can be seen on the picture, by looking for the anatomical names located half way down the right hand side.



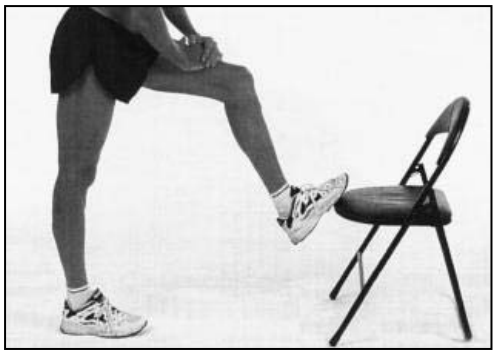
Now that we know exactly what and where the hamstrings are, let us take a look at some of the most common causes for hamstring injuries. By far the most common cause of hamstring injuries originates from an imbalance between the quadriceps muscles (located at the front of the upper leg) and the hamstring muscles. The quadriceps is a very large, strong group of muscles which help to extend the leg. These muscles can become so strong that they overpower the hamstrings, putting a massive amount of tension on the hamstring muscles. Combine strong quadriceps with weak hamstrings and you have a hamstring injury waiting to happen.

Other factors which contribute to hamstring injuries are a lack of flexibility and poor strength of the hamstring muscles. Also, when the hamstrings become fatigued or tired they are more susceptible to injuries.

Prevention

The best preventative measures involve a consistent program of both stretching and strengthening exercises. Increased flexibility will contribute greatly to the ability of the hamstring muscles to resist strains and injury. To follow are two very effective and very safe hamstring stretches.

In the stretch to the left, simply kneel down on one knee and place your other leg straight out in front with your heal on the ground. Keep your back straight. Make sure your toes are pointing straight up and gently reach towards your toes with one hand. Use your other arm for balance. Hold this stretch for about 20 to 30 seconds and repeat at least 2 to 3 times.



In the stretch to the right, stand with one foot raised onto a chair, fence railing or similar object. Keep your raised leg slightly bent, with your toes on the edge of the chair. Let your heal drop off the edge of the chair. Keep your back straight and gently move your chest towards your raised leg. As above, hold this stretch for about 20 to 30 seconds and repeat at least 2 to 3 times.

Warming up correctly will also contribute greatly to reducing the likelihood of a hamstring injury, and do not just stretch before you exercise. Make sure you stretch both before and after any physical activity. Dedicate time to your entire flexibility, this will not only help you avoid injury, it will also make you a better athlete.

Treatment

If you do happen to suffer from a hamstring injury, it is important that correct first aid principles are applied immediately. The RICER regime explains the correct treatment for all muscle strain injuries.

RICER stands for Rest, Ice, Compression, Elevation, and then obtaining a Referral from a qualified sports doctor or physiotherapist. So, as soon as a hamstring injury occurs, rest the injured limb, apply ice to the effected area, apply a compression bandage and elevate the limb if possible. This treatment needs to continue for at least 48 to 72 hours. This is the most critical time for the injured area. Correct treatment now can mean the difference between an annoying injury and a permanent, re-occurring, debilitating injury.

After the first 72 hours obtain a referral from a qualified professional and start a comprehensive rehabilitation program. This should include a great deal of strength and stretching exercises, as well as other rehabilitation activities such as massage and ultra-sound.

For complete and comprehensive information on the treatment of soft tissue injuries, please read chapter 12.

CHAPTER 26
Knee Pain & Iliotibial Band Syndrome

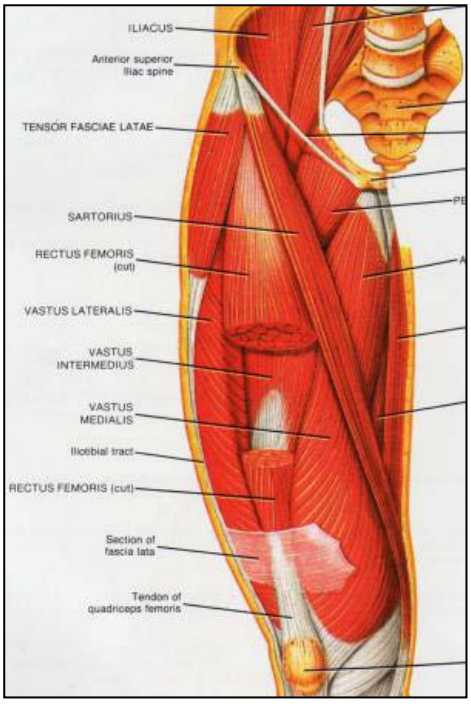
Knee pain and knee injuries, as a result of Iliotibial Band Syndrome (ITB), can be an extremely painful and frustrating injury that puts a big strain on both the knee and hip joints.

Knee injuries are very common among runners and cyclists. However, they do not usually occur in an instant, like a hamstring strain or groin pull, but commonly start off as a twinge and progress quickly to a debilitating sports injury that can sideline the best of us for weeks.

For those who are not familiar with Iliotibial Band Syndrome or ITB, let us start by having a look at the muscle responsible for the problem.

The iliotibial band is actually a thick tendon-like portion of another muscle called the tensor fasciae latae. This band passes down the outside of the thigh and inserts just below the knee.

The diagram to the right shows the anterior (front) view of the right thigh muscles. If you look towards the top left of the diagram, you will see the tensor fasciae latae muscle. Follow the tendon of this muscle down and you will see that it runs all the way to the knee. This thick band of tendon is the iliotibial band. Or iliotibial tract, as it is labeled in the diagram.



The main problem occurs when the tensor fasciae latae muscle and iliotibial band become tight. This causes the tendon to pull the knee joint out of alignment and rub against the outside of the knee, which results in inflammation and pain.

Causes

There are two main causes of knee pain associated with iliotibial band syndrome. The first is "overload" and the second is "biomechanical errors."

Overload is common with sports that require a lot of running or weight bearing activity. This is why ITB is commonly a runner's injury. When the tensor fasciae latae muscle and iliotibial band become fatigued and overloaded, they lose their ability to adequately stabilize the entire leg. This in-turn places stress on the knee joint, which results in pain and damage to the structures that make up the knee joint.

Overload on the ITB can be caused by a number of things. They include:

- Exercising on hard surfaces, like concrete;
- Exercising on uneven ground;
- Beginning an exercise program after a long lay-off period;
- Increasing exercise intensity or duration too quickly;
- Exercising in worn out or ill fitting shoes; and
- Excessive uphill or downhill running.

Biomechanical errors include:

- Leg length differences;
- Tight, stiff muscles in the leg;

- Muscle imbalances;
- Foot structure problems such as flat feet; and
- Gait or running style problems such as pronation.

Immediate Treatment

Firstly, be sure to remove the cause of the problem. Whether it is an overload problem, or a biomechanical problem, make sure steps are taken to remove the cause.

The basic treatment for knee pain that results from ITB Syndrome is no different to most other soft tissue injuries. Immediately following the onset of any knee pain, the R.I.C.E.R. regime should be applied. This involves Rest, Ice, Compression, Elevation, and Referral to an appropriate professional for an accurate diagnosis. It is critical that the R.I.C.E.R. regime be implemented for at least the first 48 to 72 hours. Doing this will give you the best possible chance of a complete and full recovery.

Ongoing Treatment and Prevention

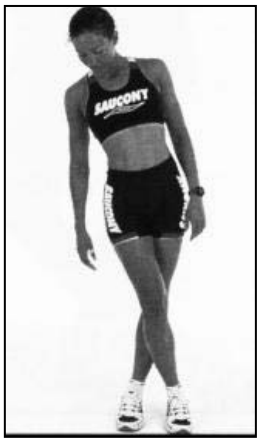
Although the pain may be felt mainly in the knee, the problem is actually caused by the muscles that support the knee. Namely, the tensor fasciae latae and the large muscle at the rear of your upper leg, called the gluteus maximus.

Other muscles in the lower back, hip, backside and upper leg also affect the function of the knee, so it is important to pay attention to all these muscles. After the first 48 to 72 hours, consider a good deep tissue massage. It may be just what you need to help loosen up those tight muscles.

Firstly, do not forget a thorough and correct warm up will help to prepare the muscles and tendons for any activity to come. Without a proper warm up the muscles and tendons will be tight and stiff. There will be limited blood flow to the leg muscles, which will result in a lack of oxygen and nutrients for those muscles.

Before any activity be sure to thoroughly warm up all the muscles and tendons that will be used during your sport or activity.

Secondly, flexible muscles are extremely important in the prevention of most leg injuries. When muscles and tendons are flexible and supple, they are able to move and perform without being over stretched. If however, your muscles and tendons are tight and stiff, it is quite easy for those muscles and tendons to be pushed beyond their natural range of movement.



The stretch to the left is one of the best stretches for the tensor fasciae latae. Stand upright and cross one foot behind the other. Then lean towards the foot that is behind the other. Hold this stretch for about 15 to 20 seconds, and then repeat it 3 to 4 times on each leg.

And thirdly, strengthening and conditioning the muscles around your knee and upper leg will help greatly to reduce the chance of knee injury and knee pain.

If you are in too much pain to resume normal exercise, consider swimming, deep water exercise, or maybe cycling. Otherwise, the following web site, http://www.thewalkingsite.com/knee_exercises.html, has a list of simple, easy strengthening exercises for the muscles of the upper leg

and knee. To keep your knees in tip-top condition practice these regularly.

CHAPTER 27
Shin Splints

Shin splints are a term commonly used to describe lower leg pain. However, shin splints are only one of several conditions that affect the lower leg. The most common causes of lower leg pain are: general shin soreness; shin splints; and stress fractures. For the purpose of this chapter, I will only be addressing the first two.

Before I move on to shin splints, I want to quickly cover the topic of general shin soreness. Shin soreness is simply a muscular overuse problem. By using the R.I.C.E.R. regime outlined in chapter 12, you will be able to overcome 95 percent of all general shin soreness within about 72 hours.

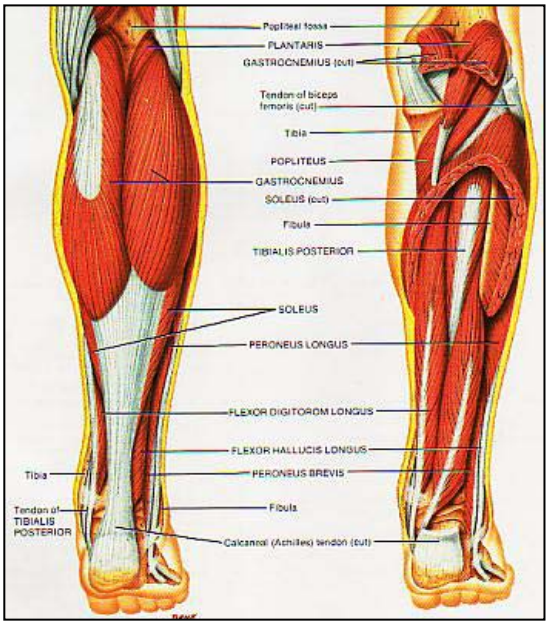
For lower leg pain that goes beyond general shin soreness, a more aggressive approach must be taken. Let us now have a look at shin splints in a little more detail.

What are Shin Splints?

Although the term shin splints are often used to describe a variety of lower leg problems, it actually refers specifically to a condition called Medial Tibial Stress Syndrome (MTSS). To better understand shin splints, or MTSS, let us have a look at the muscles, tendons and bones involved.

As you can see from the diagram below, there are many muscles and tendons that make up the lower leg, or calf region. It is quite a complex formation of inter-weaving and over-crossing muscles and tendons.

The main components of the lower leg that are affected by the pain associated with shin splints are:



- The Tibia and Fibula. These are the two bones in the lower leg. The tibia is situated on the medial, or inside of the lower leg. While the fibula is situated on the lateral, or outside of the lower leg.
- There are also a large number of the muscles that attach to the tibia and fibula. It is these muscles, when overworked, that pulls on the tibia and fibula and cause the pain associated with shin splints.

Specifically, the pain associated with shin splints is a result of fatigue and trauma to the muscle's tendons where they attach themselves to the tibia. In an effort to keep the foot, ankle and lower leg stable, the muscles exert a great force on the tibia. This excessive force can result in the tendons being partially torn away from the bone.

What Causes Shin Splints?

While there are many causes of shin splints, they can all be categorized into two main groups; overload, or training errors, and Biomechanical Inefficiencies.

Overload (or training errors)

Shin splints are commonly associated with sports that require a lot of running or weight bearing activity. However, it is not necessarily the added weight or force applied to the muscles and tendons of the lower leg, but rather the impact force associated with running and weight bearing activities.

In other words, it is not the running itself, but the sudden shock force of repeated landings and change of direction that causes the problem. When the muscles and tendons become fatigued and overloaded, they lose their ability to adequately absorb the damaging shock force.

Other overload causes include:

- Exercising on hard surfaces, like concrete;
- Exercising on uneven ground;
- Beginning an exercise program after a long lay-off period;
- Increasing exercise intensity or duration too quickly;
- Exercising in worn out or ill fitting shoes; and
- Excessive uphill or downhill running.

Biomechanical Inefficiencies:

The major biomechanical inefficiency contributing to shin splints is that of flat feet. Flat feet lead to a second biomechanical inefficiency called over-pronation. Pronation occurs just after the heal strikes the ground. The foot flattens out, and then continues to roll inward.

Over-pronation occurs when the foot and ankle continue to roll excessively inward. This excessive inward rolling causes the tibia to twist, which in-turn, over stretches the muscles of the lower leg.

Other biomechanical causes include:

- Poor running mechanics;
- Tight, stiff muscles in the lower leg;
- Running with excessive forward lean;
- Running with excessive backwards lean;
- Landing on the balls of your foot; and
- Running with your toes pointed outwards.

How to Prevent Shin Splints!

Prevention, rather than cure, should always be your first aim. I was very surprised when researching this topic at the number of articles that totally neglected any mention of preventative measures. They all talked of treatment and cure, but only one out of twenty took the time to address the issue of prevention in any detail.

Even before any sign of shin soreness appears there are a number of simple preventative measures that can be easily implemented.

Since about half of all lower leg problems are caused by biomechanics inefficiencies, it makes sense to get the right advice on footwear. Your feet are the one area you should not "skimp" on. The best advice I can give you concerning footwear is to go and see a qualified podiatrist for a complete foot-strike, or gait analysis. They will be able to tell you if there are any concerns regarding the way your foot-strike or gait is functioning.

After your foot-strike has been analyzed, have your podiatrist, or competent sports footwear sales person recommend a number of shoes that suit your requirements. Good quality footwear will go a long way in helping to prevent many lower leg problems.

Apart from good footwear, what else can you do? I believe the following three preventative measures are not only very effective, but crucial.

Firstly, a thorough and correct warm up will help to prepare the muscles and tendons for any activity to come. Without a proper warm up the muscles and tendons will be tight and stiff. There will be limited blood flow to the lower legs, which will result in a lack of oxygen and nutrients for those muscles.

Before any activity be sure to thoroughly warm up all the muscles and tendons that will be used during your sport or activity.

Secondly, flexible muscles are extremely important in the prevention of lower leg injuries. When muscles and tendons are flexible and supple, they are able to move and perform without being over stretched. If however, your muscles and tendons are tight and stiff, it is quite easy for those muscles and tendons to be pushed beyond their natural range of movement.

And thirdly, strengthening and conditioning the muscles of the lower leg will also help to prevent shin splints. There are a number of specific strengthening exercises you can do for these muscles, but instead of me going into the details here, I have simply found another web site that has already done all the hard work. It explains a number of exercises you can do for preventing shin splints. You can find these strengthening exercises by going to;
http://www.watfxc.com/TF/TF%20Education/shin_splints.htm

The above-mentioned article is the only other article I found which included a comprehensive section on shin splint prevention. If you are only interested in the strengthening exercises, you will find them towards the end of the article. If however, you suffer from shin

splints or you are looking for more information on shin splints, I recommend you read the entire article.

How to Treat Shin Splints!

Firstly, be sure to remove the cause of the problem. Whether it is a biomechanical problem, or an overload problem, make sure steps are taken to remove the cause.

The basic treatment for shin splints is no different to most other soft tissue injuries. Immediately following the onset of any shin pain, the R.I.C.E.R. regime should be applied. This involves Rest, Ice, Compression, Elevation, and Referral to an appropriate professional for an accurate diagnosis. It is critical that the R.I.C.E.R. regime be implemented for at least the first 48 to 72 hours. Doing this will give you the best possible chance of a complete and full recovery.

The next phase of treatment (after the first 48 to 72 hours) involves a number of physiotherapy techniques. The application of heat and massage is one of the most effective treatments for speeding up the healing process of the muscles and tendons.

I have found both from personal experience and from working with many clients, that this form of treatment is the most effective. The application of heat and deep tissue massage on the effected area seems to bring the best results. If you suffer from shin splints, be sure to spend at least a few minutes massaging the effected area both before and after you exercise.

Once most of the pain has been reduced, it is time to move onto the next rehabilitation phase of your treatment. The main aims of this phase are to regain the strength, power, endurance and flexibility of the muscle and tendons that have been injured.

For complete and comprehensive information on the treatment of soft tissue injuries, please read chapter 12.

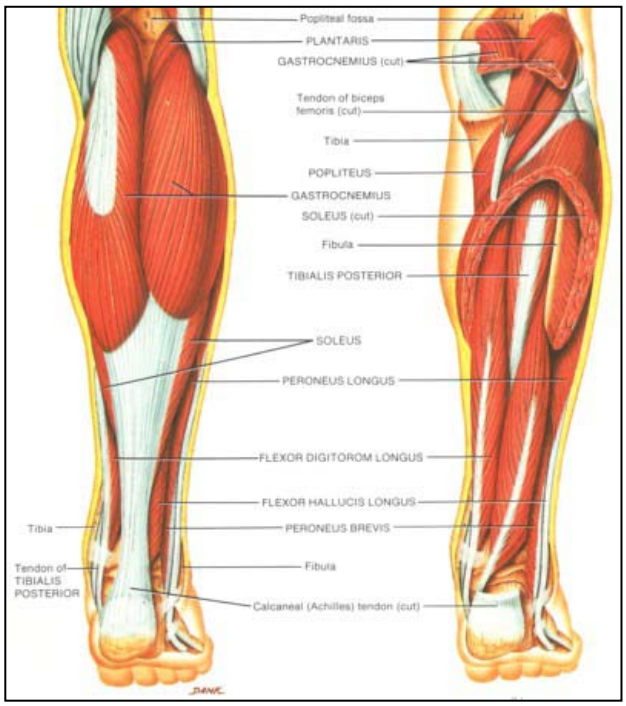
CHAPTER 28
Achilles Tendonitis

Achilles injuries are commonly associated with sports that require a lot of running, jumping and change of direction. Excessive twisting or turning of the ankle and foot can result in a rupture or strain. The sports that are most susceptible to Achilles injury include running, walking, cycling, football, basketball and tennis.

What is an Achilles tendon Injury?

Firstly, let us take a look at where the Achilles tendon is located and what it does.

As you can see from the diagram to the right, the Achilles tendon is located at the rear (posterior) of the bottom half of the lower leg. In the diagram it is represented by the thick band of connective fiber that runs from bottom of the Gastrocnemius muscle to the heel bone.



The Achilles tendon is used to plantar flex the foot, or point the foot downward. This allows a person the run, jump and stand on one's toes.

The Achilles tendon is the strongest tendon of the body, and able to withstand a 1000 pound force without tearing. Despite this, the Achilles ruptures more frequently than any other tendon because of the tremendous pressures placed on it during competitive sports.

There are two main types of injuries that affect the Achilles tendon; Achilles Tendonitis and Achilles Tendon Rupture.

Achilles Tendonitis is simply an inflammation of the tendon and in most cases is caused by excessive training over an extended period of time.

Achilles Tendon Rupture, on the other hand, is a tear (or complete snapping) of the tendon and usually occurs as the result of a sudden or unexpected force. In the case of a complete rupture, the only treatment available is to place the lower leg in a plaster cast for 6 to 8 weeks, or surgery. As both of these treatments are beyond the scope of this chapter, we will be focusing the rest of this article on Achilles Tendonitis.

Causes and Risk Factors

There are a number of causes and risk factors associated with Achilles Tendonitis. One of the most common causes is simply a lack of conditioning. If the tendon, and muscles that connect to the tendon, have not been trained or conditioned, this can lead to a weakness that may result in an Achilles injury.

Overtraining is also associated with Achilles Tendonitis. Doing too much, too soon places excessive strain on the Achilles tendon and does not allow the tendon enough time to recovery properly. Over time small tears and general degeneration result in a weakening of the tendon, which leads to inflammation and pain.

Other causes of Achilles injury include a lack of warming up and stretching. Wearing inadequate footwear, running or training on uneven ground, and simply standing on, or in something you are not meant to. Biomechanical problems such as high arched feet or flat feet can also lead to Achilles injuries.

So what are some of the things you can do to help prevent Achilles Tendonitis?

Warm Up properly
A thorough warm up is essential to get the body ready for any activity. A well structured warm up will prepare your heart, lungs, muscles, joints and your mind for strenuous activity.

Plyometric Training
Plyometric drills include jumping, skipping, bounding, and hopping type activities. These explosive types of exercises help to condition and prepare the muscles, tendons and ligaments in the lower leg and ankle joint.

Balancing Exercises
Any activity that challenges your ability to balance, and keep your balance, will help what is called proprioception: - your body's ability to know where its limbs are at any given time.

Stretch and Strengthen
I will cover these in a lot more detail a little later on when I discuss rehabilitation and conditioning exercises.

Footwear
Be aware of the importance of good footwear. A good pair of shoes will help to keep your ankles stable, provide adequate cushioning, and support your foot and lower leg during the running or walking motion.

Immediate Treatment

The immediate treatment of any soft tissue injury is vital. Proper care and treatment now will go a long way towards a full recovery later.

Without a doubt, the most effective, initial treatment for Achilles tendonitis is the R.I.C.E.R. regime. This involves the application of (R) rest, (I) ice, (C) compression, (E) elevation and obtaining a (R) referral for appropriate medical treatment.

Where the R.I.C.E.R. regime has been used immediately after the occurrence of an injury, it has been shown to significantly reduce recovery time. R.I.C.E.R. forms the first, and perhaps most important stage of injury rehabilitation, providing the early base for the complete recovery of injury.

When an Achilles injury occurs and the tendon has been damaged there is a large amount of uncontrolled bleeding around the injury site. This excessive bleeding cause swelling that puts pressure on nerve endings and results in increased pain. It is exactly this process of bleeding, swelling and pain that the R.I.C.E.R. regime will help to alleviate.

R.I.C.E.R.

R: (rest) It is important that the Achilles and lower leg be kept as still as possible. This will help to slow down blood flow to the tendon and prevent any further damage.

I: (ice) By far the most important part. The application of ice will have the greatest effect on reducing bleeding, swelling and pain. Apply ice as soon as possible after the injury has occurred.

How do you apply ice? Crushed ice in a plastic bag is usually best. Although blocks of ice, commercial cold packs and bags of frozen peas will all do fine. Even cold water from a tap is better than nothing at all.

When using ice, be careful not to apply it directly to the skin. This can cause "ice burns" and skin damage. Wrapping the ice in a damp towel generally provides the best protection for the skin.

How long? How often? This is the point where few people agree. Let me give you some figures to use as a rough guide, and then I will give you some advice from personal experience. The most common recommendation is to apply ice for 20 minutes every 2 hours for the first 48 to 72 hours.

These figures are a good starting point, but remember, they are only a guide. You must take into account that some people are more sensitive to cold than others. Also be aware that children and elderly people have a lower tolerance to ice and cold. Finally, people with circulatory problems are also more sensitive to ice. Remember to keep these things in mind when treating yourself or someone else with ice.

Personally, I recommend that people use their own judgment when applying ice to them self. For some people, 20 minutes is way too much. For others, especially well conditioned athletes, they can leave ice on for much longer. The individual should make the decision as to how long the ice should stay on.

My personal recommendation is that people should apply ice for as long as it is comfortable. Obviously, there will be a slight discomfort from the cold, but as soon as pain or excessive discomfort is experienced, it is time to remove the ice. It is much better to apply ice for 3 to 5 minutes a couple of time an hour, than not at all.

C: (compression) Compression actually achieves two things. Firstly, it helps to reduce both the bleeding and swelling around the Achilles, and secondly, it provides support for the ankle and lower leg. Use a wide, firm, elastic, compression bandage to cover the entire ankle and lower leg.

E: (elevation) Raise the injured leg above the level of the heart at all possible times. This will further help to reduce the bleeding and swelling.

R: (referral) If the injury is severe enough, it is important that you consult a professional physical therapist or a qualified sports doctor for an accurate diagnosis. They will be able to tell you the full extent of the injury.

Before we finish with the initial treatment and move onto the next phase of the rehabilitation process, there are a few things that you must avoid during the first 72 hours.

Be sure to avoid any form of heat at the injury site. This includes heat lamps, heat creams, spas, Jacuzzi's and saunas. Avoid all movement and massage of the injured area. Also avoid excessive alcohol. All these things will increase the bleeding, swelling and pain of your injury. Avoid them at all costs.

After the first 48 to 72 hours?

So what happens after the first 48 to 72 hours? Let us first take a quick look at how damaged tendons repair themselves.

When any damage occurs to the soft tissue (muscles, tendons, ligaments), the body immediately goes into a process of repair. Where the individual fibers have been ruptures, or torn, the body

begins to bind the damaged fibers together using a fibrous protein called collagen. Or, as it is more commonly known, scar tissue!

When a tendon is torn or strained, you would expect that the body would repair that damage with new tendon. In reality, this does not happen. The tear or rupture, is repaired with scar tissue.

Now this might not sound like a big deal, but if you have ever suffered an Achilles injury, (or any soft tissue injury) you will know how annoying it is to keep re-injuring that same old injury, over and over again.

Scar tissue is made from a very brittle, inflexible fibrous material. This fibrous material binds itself to the damaged tendon in an effort to draw the damaged fibers back together. What results is a bulky mass of fibrous scar tissue completely surrounding the injury site. In some cases it is even possible to see and feel this bulky mass under the skin.

When scar tissue forms around an injury site, it is never as strong as the tissue it replaces. It also has a tendency to contract and deform the surrounding tissues, so not only is the strength of the tissue diminished, but flexibility of the tissue is also compromised.

So, how do we get rid of that annoying formation of scar tissue?

Firstly, you must keep active! Do not listen to anyone who tells you to do nothing. Now is the time to start active rehabilitation. Most of the swelling will have subsided after the first 48 to 72 hours and you are now ready to start light activity.

Light activity will not only promote blood circulation, but it will also activate the lymphatic system. The lymphatic system is vital in clearing the body of toxins and waste products, which can

accumulate in the body following a sports injury. Activity is the only way to activate the lymphatic system.

Before we move on, a quick word of warning. Never, Never, Never do any activity that hurts the injured area. Of course you may feel some discomfort, but NEVER push yourself to the point where you are feeling pain. Listen to your body. Do not over do it at this stage of the recovery, you have come too far to blow it now.

To remove most of the unwanted scar tissue, you now need to start two vital treatments. The first is commonly used by physical therapists (or physiotherapists), and primarily involves increasing the blood supply to the injured area. The aim is to increase the amount of oxygen and nutrients to the damaged tissues.

You see, the Achilles tendon receive very little blood supply, as compared to a muscle for example. So it is vitally important to increase the blood flow to the injured area. This will help supply the tendon with the oxygen and nutrients they need for a speedy recovery.

Physical Therapists accomplish this aim by using a number of activities to stimulate the injured area. The most common methods used are ultrasound and heat.

Ultrasound, or TENS (Transcutaneous Electrical Nerve Stimulation) simply uses a light electrical pulse to stimulate the affected area. While heat, in the form of a ray lamp or hot water bottle, is very effective in stimulating blood flow to the damaged tissues.

Secondly, to remove the unwanted scar tissue it is vital that you start to massage the injured tendon and connecting muscles. While ultrasound and heat will help the injured area, they will not remove

the scar tissue. Only massage will be able to do that.

To start with, the Achilles tendon may be quite tender. So start with a light stroke and gradually increase the pressure until you are able to use firm strokes.

Concentrate your effort at the direct point of injury, and use your thumbs to get in as deep as possible to break down the scar tissue.

Just a few final points before we move on. Be sure to drink plenty of fluid during your injury rehabilitation. The extra fluid will help to flush a lot of the waste products from your body.

Also, I recommend you purchase a special ointment to use for your massage called "Arnica". This special ointment is extremely effective in treating soft tissue injuries, like sprains and tears. You can purchase this ointment at most health food shops and pharmacies.

Active Rehabilitation

By now, you have come over 80% of the way. You may even feel that your Achilles is fully recovered. Your treatment so far may have stopped the swelling and bleeding, and it may have reduced the amount of scar tissue in the Achilles and calf muscles. But there is still one more important thing to do.

The last 20% can be the most crucial to your complete recovery. If you have ever suffered from a sporting injury in the past, you will know how annoying it is to think you are recovered, and then out-of-the-blue, you are injured again and back to where you started. It can be one of the most frustrating and heart-breaking cycles an athlete, or anyone else for that matter, can go through.

Most people will refer to this phase of your recovery as the active rehabilitation phase, because during this phase you will be responsible for the rehabilitation process. You will be doing the exercises and activities required to speed up your full recovery.

The aim of this phase of your rehabilitation will be to regain all the fitness components that were lost because of the injury. Regaining your flexibility, strength, power, muscular endurance, balance, and co-ordination will be the primary focus. Without this phase of your rehabilitation there is no hope of completely and permanently making a full recovery.

The first point to make clear is how important it is to keep active. Often, the advice from doctors and similar medical personnel will simply be; rest. This can be one of the worst things you can do. Without some form of activity the injured area will not receive the blood flow it requires for recovery. An active circulation will provide both the oxygen and nutrients needed for the injury to heal.

Warning! Never, never, never do any activity that hurts your Achilles. Of course you may feel some discomfort, but never push yourself to the point where you are feeling pain. Be very careful with any activity you do. Pain is the warning sign; do not ignore it.

Range of Motion

Regaining a full range of motion of your Achilles and ankle joint is the first priority in this phase of the rehabilitation process. A full range of motion is extremely important, as it lays the foundation for more intense and challenging exercises later in the active rehabilitation process.

As you work through the initial stages of recovery and your Achilles begins to heal, start to introduce some very gentle movements. First bending and straightening your ankle, then as you get more comfortable with this simple movement, start to incorporate some rotation exercises. Turn your ankle from side to side, and rotate clockwise and anti-clockwise.

When you feel comfortable with this range of motion exercises and can perform them relatively pain free, it is time to move onto the next phase of the active rehabilitation process.

Stretch and Strengthen

Now it is time to add some intensity to the range of motion exercises. The aim here is to gradually re-introduce some strength back into the injured muscles, ligaments and tendons.

When attempting to increase the strength of your Achilles, be sure to approach this in a gradual, systematic way of lightly over-loading the muscles and tendons. Be careful not to over-do this type of training. Patience is required.

An effective and relatively safe way to start is to begin with isometric exercises. These are exercise where the ankle joint itself does not move, yet force is applied and the calf muscles and Achilles are contracted.

For example: imagine sitting in a chair while facing a wall and then placing the ball of your foot against the wall. In this position you can push against the wall with your foot and at the same time keep your ankle joint from moving. The muscles contract but the ankle joint does not move. This is an isometric exercise.

The above example can be used to strengthen the Achilles and ankle joint in all directions. Pushing your foot to the left or right against something immoveable, and pushing down (as above) and pulling up.

It is also important at this stage to introduce some gentle stretching exercise. These will help to further increase your range of motion and prepare your Achilles for more strenuous activity to come. While working on increasing the flexibility of your Achilles, it is also important to increase the flexibility of the muscle groups around the injured area. These include the calf muscles, and the anterior muscles of your shin.

Balance and Proprioception

This phase of the rehabilitation process is often overlooked and is one of the main reasons why old injuries keep re-occurring. Once you feel some strength returning to your Achilles it is time to incorporate some balancing drills and exercises.

When muscles and tendons are torn, nerves are also damaged. These nerves send vital information to the brain about the specific position and location of the Achilles tendon and ankle joint in relation to the rest of your body.

Without this information the muscles, tendons and ligaments are constantly second-guessing the position of the Achilles and ankle joint. This lack of awareness about the position of the lower leg can lead to a re-occurrence of the same injury long after you thought it had completely healed.

Balancing exercises are important to help re-train the damaged nerves around your lower leg and ankle joint. Start with simple

balancing exercises like walking along a straight line, or balancing on a beam. Progress to one-leg exercises like balancing on one foot, and then try the same exercises with your eyes closed.

When you are comfortable with the above activities, try some of the more advanced exercises like wobble or rocker boards, Swiss balls, stability cushions and foam rollers.

Plyometrics and Sports Specific Exercises

This last part of the rehabilitation process will aim to return your Achilles to a pre-injury state. By the end of this process your Achilles should be as strong, if not stronger, than it was before you injured it.

This is the time to incorporate some dynamic or explosive exercises to really strengthen up your Achilles tendon and improve your proprioception. Start by working through all the exercises you did above, but with more intensity.

For example, if you were using light isometric exercises to help strengthen your Achilles and calf muscles, start to apply more force, or start to use some weighted exercises.

From here, gradually incorporate some more intense exercises. Exercises that relate specifically to your chosen sport are a good place to start. Things like skill drills and training exercises are a great way to gauge your fitness level and the strength of your Achilles and lower leg.

To put the finishing touches on your Achilles recovery, I always like to do a few plyometric drills. Plyometric exercises are explosive exercises that both lengthen and contract a muscle at the same time.

These are called eccentric muscle contractions and involve activities like jumping, hoping, skipping and bounding.

These activities are quite intense, so remember to always start off easy and gradually apply more and more force. Do not get too excited and over-do-it, you have come too far to do something silly and re-injure your Achilles.

CHAPTER 29
Pronation & Supination
...and choosing the right footwear

The two conditions we are going to concentrate on in this chapter are pronation and supination. These two terms refer to the foot's natural rolling movement while walking or running. This motion is sometimes called the running gait, and is described at the New Balance web site as...

"*A unique set of actions and reactions that your foot performs while in motion to support, cushion and balance your body.*"

What is Pronation?

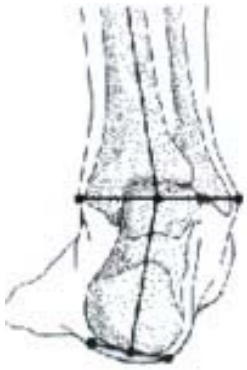
Pronation refers to the inward roll of the foot during normal motion and occurs as the outer edge of the heel strikes the ground and the foot rolls inward and flattens out. A moderate amount of Pronation is required for the foot to function properly, however damage and injury can occur during excessive Pronation. When excessive Pronation does occur the foot arch flattens out and stretches the muscles, tendons and ligaments underneath the foot.

The picture on the right (used from the steenwyk.com web site) shows a view of the right foot as if looking at it from behind. As you can see in the picture the ankle is over pronating or rolling inwardly.

What is Supination?

Supination is the opposite of Pronation and refers to the outward roll of the foot during normal motion. A natural amount of Supination occurs during the push-off phase of the running gait as the heel lifts off the ground and the forefoot and toes are used to propel the body forward. However, excessive Supination (outward rolling) places a large strain on the muscles and tendons that stabilize the ankle, and can lead to the ankle rolling completely over, resulting in an ankle sprain or total ligament rupture.

This time, in the second picture to the right (used from the steenwyk.com web site), the foot is over supinating or rolling outwardly.



Symptoms

Excessive Pronation and Supination can cause a number of ailments that affect the foot, ankle, knees, hips and back. Some of the more common symptoms of excessive Pronation and Supination are listed below.

- Arch pain
- Heel pain
- Flat feet
- Corns and calluses
- Ankle sprains
- Shin Splints
- Achilles tendonitis

- Knee pain
- Hip pain
- Back pain

Prevention & Treatment

Pronation and Supination are bio-mechanical problems, and are best treated and prevented with orthotic inserts. But before you run out to buy orthotics it makes sense to get the right advice on footwear, and the best advice I can give you, is to go and see a qualified podiatrist for a complete foot-strike and running gait analysis. They will be able to tell you if there are any concerns regarding the way your running gait is functioning.

After your running gait has been analyzed, have your podiatrist, or competent sports footwear sales person recommend a number of shoes that suit your requirements. Good quality footwear will go a long way in helping to prevent Pronation and Supination. And, if needed, invest in a pair of orthotic inserts to further prevent excessive Pronation or Supination.

Choosing the right footwear

That brings us to the next point. What should you be looking for when purchasing a new pair of shoes?

- Choose a shoe that suites your running gait and foot type. Money spent at the podiatrist now, for a complete foot-strike and running gait analysis, will save you much heart-ache and discomfort later. Having a shoe that suits your foot type is the best prevention for injury and pain.

- When having your shoes fitted have both feet measured to ensure you get the most appropriate size, and remember, your feet are three dimensional. The length of your foot is only one part of a proper fitting, measure your feet for width and depth to get a better fit.
- When purchasing footwear make your purchase in the latter half of the day. Your feet will swell during the normal course of a day, so avoid making a purchase in the morning as you may find that your new shoes are half a size too small by the afternoon.
- When trying on new shoes always wear the socks that you will be using with your new shoes.
- Never purchase tight fitting shoes in the hope that they will stretch or wear-in over time.

Apart from good footwear and orthotic inserts, what else can you do?

Firstly, a thorough and correct warm up will help to prepare the muscles and tendons for any activity or sport. Without a proper warm up the muscles and tendons around your feet, ankles and lower legs will be tight and stiff. There will be limited blood flow to the lower legs, which will result in a lack of oxygen and nutrients for those muscles.

Secondly, flexible muscles are extremely important in the prevention of most ankle and lower leg injuries. When muscles and tendons are flexible and supple, they are able to move and perform without being over stretched. If however, your muscles and tendons are tight and stiff, it is quite easy for those muscles and tendons to be pushed beyond their natural range of movement. To keep your muscles and tendons flexible and supple, it is important to undertake a structured stretching routine.

And thirdly, strengthening and conditioning the muscles of the lower leg will also help to prevent ankle and lower leg injuries.

CHAPTER 30
Ankle Sprain

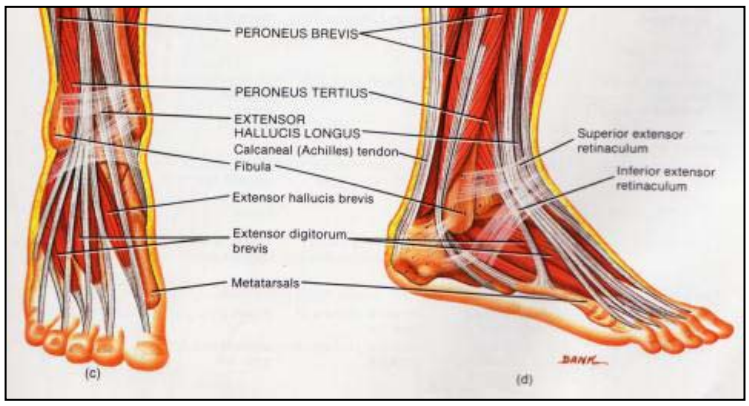
Ankle Injuries are one of the most common injuries faced by anyone who participates in sport or exercise. As a matter of fact, you do not even have to be engaged in any exercise to suffer from a sprained ankle. It seems that even while minding your own business, an ankle injury can occur.

Ankle injuries are commonly associated with sports that require a lot of running, jumping and change of direction. Excessive twisting or turning of the ankle joint results in a rupture of the ligaments that hold the ankle in place.

What is an Ankle Sprain?

An ankle sprain is an injury that results from a twisting action, which stretches or tears the ligaments of the ankle joint. (The term sPrain refers to an injury of the ligaments, as opposed to a sTrain, which refers to an injury of the muscle or tendon.) Remember; ligaments attach bone to bone, were as tendons attach muscle to bone.

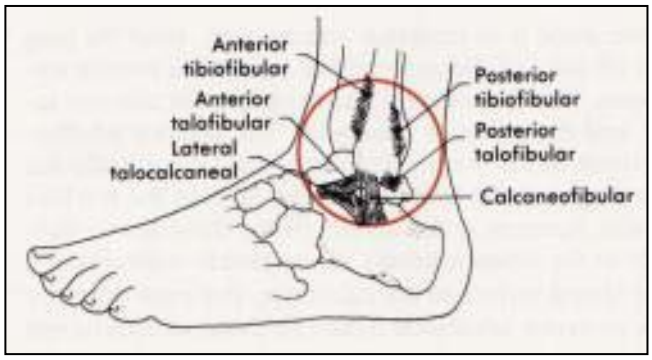
The foot and ankle joint is a very complex structure, made up of many bones, ligaments, muscles and tendons. As you can see from the diagram below there are many opportunities for an injury to occur at the ankle.



When an ankle injury does occur it usually affects one or more of the ligaments that help to hold the ankle joint in place. However, if the injury is severe enough damage may also occur to the tendons that attach the muscles to the bones.

There are a number of ligaments that keep the ankle joint in place and prevent a loss of stability. The ligaments that are commonly affected by an ankle sprain are the ones located on the lateral side (or outside) of the ankle.

The three major ligaments that help to stop the ankle from rolling forward and outward are the Anterior Talofibular Ligament, the Posterior Talofibular Ligament and the Calcaneofibular Ligament.



These ligaments can be seen in the diagram to the right, and are located at the bottom edge of the circle.

Injuries to the ligaments of the ankle are usually graded into three categories, and these injuries are referred to as: first; second; or third degree sprains.

A **first degree sprain** is the least severe. It is the result of some minor stretching of the ligaments, and is accompanied by mild pain, some swelling and joint stiffness. There is usually very little loss of joint stability as a result of a first degree sprain.

A **second degree sprain** is the result of both stretching and some tearing of the ligaments. There is increased swelling and pain associated with a second degree sprain, and a moderate loss of stability at the ankle joint.

A **third degree sprain** is the most severe of the three. A third degree sprain is the result of a complete tear or rupture of one or more of the ligaments that make up the ankle joint. A third degree sprain will result in massive swelling, severe pain and gross instability.

One interesting point to note with a third degree sprain is that shortly after the injury, most of the localized pain will disappear. This is a result of the nerve endings being severed, which causes a lack of feeling at the injury site.

From the explanations above you can see that pain and swelling are the two most common symptoms associated with an ankle sprain. You can also expect some bruising to occur at the injury site. The associated swelling and bruising is the result of ruptured blood vessels.

Causes and Risk Factors

There are a number of causes and risk factors associated with an ankle sprain. One of the most common causes is simply a lack of conditioning. If the muscles, tendons and ligaments around the ankle joint have not been trained or conditioned, this can lead to a weakness that may result in an ankle sprain.

A simple conditioning program that helps to even out any imbalances at the ankle will help considerably. For example, the calf muscles may be much stronger than the muscles in the front of the

leg. This would lead to a strength imbalance. Or, maybe the Achilles is very tight while the anterior muscles are very flexible. This would lead to a flexibility imbalance.

A lack of warming up and stretching is another major cause of ankle injuries. In an article titled, "Ankle Injuries in Basketball: injury rate and risk factors," by McKay, Goldie, Payne & Oaks, in the British Journal of Sports Medicine; the article states that "*Basketball players who did not stretch during the warm up were 2.7 times more likely to injure their ankle than players who performed stretches.*"

There are also a number of other less common causes of an ankle sprain. They include things like wearing inadequate footwear, running or training on uneven ground, and simply standing on, or in something you are not meant to.

However, the most common risk factor associated with ankle sprains is a previous history of ankle sprains. In other words, if you have had an ankle injury in the past, chances are you are going to suffer another one if you do not take some precautions and do some conditioning exercises to strengthen your ankle.

Gail McKay, in a recent Sport Health article titled "Risk Factors for Ankle Injuries" stated; "*The most common risk factor identified was a history of ankle injury. Therefore, ankle-injured athletes tend to face the downward spiral of recurrent ankle injuries. Hence, ankle injured athletes should be encouraged to undertake comprehensive ankle rehabilitation programs.*"

Prevention should be your First Priority!

So what are some of the things you can do to help prevent an ankle sprain?

1. Warm Up properly
A good warm up is essential in getting the body ready for any activity. A well structured warm up will prepare your heart, lungs, muscles, joints and your mind for strenuous activity.

2. Plyometric Training
Plyometric drills include jumping, skipping, bounding, and hopping type activities. These explosive types of exercises help to condition and prepare the muscles, tendons and ligaments at the ankle joint.

3. Balancing Exercises
Any activity that challenges your ability to balance, and keep your balance, will help what is called proprioception: - your body's ability to know where its limbs are at any given time.

4. Stretch and Strengthen
I will cover these in a lot more detail a little later on when I discuss rehabilitation and conditioning exercises.

5. Footwear
Be aware of the importance of good footwear. A good pair of shoes will help to keep your ankle stable, provide adequate cushioning, and support your foot and lower leg during the running or walking motion.

6. Strapping
Strapping or taping can provide an added level of support and stability to weak or injured ankles. For a detailed description of how to strap an ankle properly, visit
http://www.smartplay.net/ouch/injury_manage/taping.html

Immediate Treatment

The immediate treatment of any soft tissue injury is vital. Proper care and treatment now will go a long way towards a full recovery later.

Without a doubt, the most effective, initial treatment for ankle sprains is the R.I.C.E.R. regime. This involves the application of (R) rest, (I) ice, (C) compression, (E) elevation and obtaining a (R) referral for appropriate medical treatment.

Where the R.I.C.E.R. regime has been used immediately after the occurrence of an injury, it has been shown to significantly reduce recovery time. R.I.C.E.R. forms the first, and perhaps most important stage of injury rehabilitation, providing the early base for the complete recovery of injury.

When an ankle injury occurs and the ligaments have been damaged there is a large amount of uncontrolled bleeding around the injury site. This excessive bleeding cause swelling that puts pressure on nerve endings and results in increased pain. It is exactly this process of bleeding, swelling and pain that the R.I.C.E.R. regime will help to alleviate.

R.I.C.E.R.

R: (rest) It is important that the injured ankle be kept as still as possible. This will help to slow down blood flow to the ankle and prevent any further damage.

I: (ice) By far the most important part. The application of ice will have the greatest effect on reducing bleeding, swelling and pain. Apply ice as soon as possible after the injury has occurred.

How do you apply ice? Crushed ice in a plastic bag is usually best. However, blocks of ice, commercial cold packs and bags of frozen peas will all do fine. Even cold water from a tap is better than nothing at all.

When using ice, be careful not to apply it directly to the skin. This can cause "ice burns" and skin damage. Wrapping the ice in a damp towel generally provides the best protection for the skin.

How long? How often? This is the point where few people agree. Let me give you some figures to use as a rough guide, and then I will give you some advice from personal experience. The most common recommendation is to apply ice for 20 minutes every 2 hours for the first 48 to 72 hours.

These figures are a good starting point, but remember, they are only a guide. You must take into account that some people are more sensitive to cold than others. Also be aware that children and elderly people have a lower tolerance to ice and cold. Finally, people with circulatory problems are also more sensitive to ice. Remember to keep these things in mind when treating yourself or someone else with ice.

Personally, I recommend that people use their own judgment when applying ice to them self. For some people, 20 minutes is way too much. For others, especially well conditioned athletes, they can leave ice on for much longer. The individual should make the decision as to how long the ice should stay on.

My personal recommendation is that people should apply ice for as long as it is comfortable. Obviously, there will be a slight discomfort from the cold, but as soon as pain or excessive discomfort is experienced, it is time to remove the ice. It is much better to apply ice for 3 to 5 minutes a couple of time an hour, than not at all.

C: (compression) Compression actually achieves two things. Firstly, it helps to reduce both the bleeding and swelling around the ankle joint, and secondly, it provides support for the ankle. Simply use a wide, firm, elastic, compression bandage to cover the entire ankle and lower leg.

E: (elevation) Simply raise the injured ankle above the level of the heart at all possible times. This will further help to reduce the bleeding and swelling.

R: (referral) If the injury is severe enough, it is important that you consult a professional physical therapist or a qualified sports doctor for an accurate diagnosis. They will be able to tell you the full extent of the injury.

Before we finish with the initial treatment and move onto the next phase of the rehabilitation process, there are a few things that you must avoid during the first 72 hours.

Be sure to avoid any form of heat at the injury site. This includes heat lamps, heat creams, spas, Jacuzzi's and saunas. Avoid all movement and massage of the injured area. Also avoid excessive alcohol. All these things will increase the bleeding, swelling and pain of your injury. Avoid them at all costs.

After the first 48 to 72 hours?

So what happens after the first 48 to 72 hours? Let us first take a quick look at how damaged ligaments repair themselves.

When any sort of damage occurs to the ligaments, the body immediately goes into a process of repair. Where the individual fibers have been ruptures, or torn, the body begins to bind the

damaged fibers together using a fibrous protein called collagen. Or, as it is more commonly known, scar tissue!

You see, when a ligament is torn, you would expect that the body would repair that tear with new ligament. In reality, this does not happen. The tear, or rupture, is repaired with scar tissue.

Now this might not sound like a big deal, but if you have ever suffered an ankle injury, (or any soft tissue injury) you will know how annoying it is to keep re-injuring that same old injury, over and over again.

Scar tissue is made from a very brittle, inflexible fibrous material. This fibrous material binds itself to the damaged ligaments in an effort to draw the damaged fibers back together. What results is a bulky mass of fibrous scar tissue completely surrounding the injury site. In some cases it is even possible to see and feel this bulky mass under the skin.

When scar tissue forms around an injury site, it is never as strong as the ligaments it replaces. It also has a tendency to contract and deform the surrounding tissues, so not only is the strength of the tissue diminished, but flexibility of the tissue is also compromised.

So, how do we get rid of that annoying formation of scar tissue?

Firstly, you must keep active! Do not listen to anyone who tells you to do nothing. Now is the time to start active rehabilitation. Most of the swelling will have subsided after the first 48 to 72 hours and you are now ready to start light activity.

Light activity will not only promote blood circulation, but it will also activate the lymphatic system. The lymphatic system is vital in clearing the body of toxins and waste products, which can

accumulate in the body following a sports injury. Activity is the only way to activate the lymphatic system.

Before we move on, a quick word of warning. Never, Never, Never do any activity that hurts the injured area. Of course you may feel some discomfort, but NEVER push yourself to the point where you are feeling pain. Listen to your body. Do not over do it at this stage of the recovery, you have come too far to blow it now.

To remove most of the unwanted scar tissue, you now need to start two vital treatments. The first is commonly used by physical therapists (or physiotherapists), and primarily involves increasing the blood supply to the injured area. The aim is to increase the amount of oxygen and nutrients to the damaged tissues.

You see, ligaments receive very little blood supply, as compared to a muscle for example. So it is vitally important to increase the blood flow to the injured ligaments. This will help supply the ligaments with the oxygen and nutrients they need for a speedy recovery.

Physical Therapists accomplish this aim by using a number of activities to stimulate the injured area. The most common methods used are ultrasound and heat.

Ultrasound, or TENS (Transcutaneous Electrical Nerve Stimulation) simply uses a light electrical pulse to stimulate the affected area. While heat, in the form of a ray lamp or hot water bottle, is very effective in stimulating blood flow to the damaged tissues.

Secondly, to remove the unwanted scar tissue it is vital that you start to massage the injured ankle ligaments. While ultrasound and heat will help the injured area, they will not remove the scar tissue. Only massage will be able to do that.

To start with, the ankle will be quite tender. So start with a light stroke and gradually increase the pressure until you are able to use firm strokes.

Concentrate your effort at the direct point of injury, and use your thumbs to get in as deep as possible to break down the scar tissue.

Just a few final points before we move on. Be sure to drink plenty of fluid during your injury rehabilitation. The extra fluid will help to flush a lot of the waste products from your body.

Also, I recommend you purchase a special ointment to use for your massage called "Arnica". This special ointment is extremely effective in treating soft tissue injuries, like ligament sprains and tears. You can purchase this ointment at most health food shops and pharmacies.

Active Rehabilitation

By now, you have come over 80% of the way. You may even feel that your ankle is fully recovered. Your treatment so far may have stopped the swelling and bleeding, it may have reduced the amount of scar tissue at the ankle, and it may have even started to heal the ligaments that were injured. But there is still one more important thing to do.

The last 20% can be the most crucial to your complete recovery. If you have ever suffered from a sporting injury in the past, you will know how annoying it is to think you are recovered, and then out-of-the-blue, you are injured again and back to where you started. It can be one of the most frustrating and heart-breaking cycles an athlete, or anyone else for that matter, can go through.

Most people will refer to this phase of your recovery as the active rehabilitation phase, because, during this phase you will be responsible for the rehabilitation process. You will be doing the exercises and activities required to speed up your full recovery.

The aim of this phase of your rehabilitation will be to regain all the fitness components that were lost because of the injury. Regaining your flexibility, strength, power, muscular endurance, balance, and co-ordination will be the primary focus. Without this phase of your rehabilitation, there is no hope of completely and permanently making a full recovery.

The first point to make clear is how important it is to keep active. Often, the advice from doctors and similar medical personnel will simply be; rest. This can be one of the worst things you can do. Without some form of activity the injured area will not receive the blood flow it requires for recovery. An active circulation will provide both the oxygen and nutrients needed for the injury to heal.

A Word Of Warning! Never, never, never do any activity that hurts your ankle. Of course you may feel some discomfort, but never push yourself to the point where you are feeling pain. Be very careful with any activity you do. Pain is the warning sign; do not ignore it.

Range of Motion

Regaining a full range of motion of the ankle joint is the first priority in this phase of the rehabilitation process. A full range of motion is extremely important, as it lays the foundation for more intense and challenging exercises later in the active rehabilitation process.

For those suffering a first degree sprain, range of motion may not have been affected, however, second and third degree sprains will almost always limit range of motion.

As you work through the initial stages of recovery, and your ankle begins to heal, start to introduce some very gentle movements. First bending and straightening your ankle, then as you get more comfortable with this simple movement, start to incorporate some rotation exercises. Turn your ankle from side to side, and rotate clockwise and anti-clockwise.

When you feel comfortable with this range of motion exercises, and can perform them relatively pain free, it is time to move onto the next phase of the active rehabilitation process.

Stretch and Strengthen

Now it is time to add some intensity to the range of motion exercises. The aim here is to gradually re-introduce some strength back into the injured muscles, ligaments and tendons.

When attempting to increase the strength of your ankle, be sure to approach this in a gradual, systematic way of lightly over-loading the muscles and tendons. Be careful not to over-do this type of training. Patience is required.

An effective and relatively safe way to start is to begin with isometric exercises. These are exercise where the ankle joint itself does not move, yet force is applied and the muscles are contracted.

For example: imagine sitting in a chair while facing a wall, and then placing the ball of your foot against the wall. In this position you can push against the wall with your foot and at the same time keep your

ankle joint from moving. The muscles contract but the ankle joint does not move. This is an isometric exercise.

The above example can be used to strengthen the ankle in all directions. Pushing your foot to the left or right against something immoveable, and pushing down (as above) and pulling up.

It is also important at this stage to introduce some gentle stretching exercise. These will help to further increase your range of motion and prepare your ankle for more strenuous activity to come.

While working on increasing the flexibility of your ankle, it is also important to increase the flexibility of the muscle groups around the injured area. These include the calf muscles, and the anterior muscles of your shin.

Balance and Proprioception

Once you feel some strength returning to your ankle it is time to incorporate some balancing drills and exercises.

This phase of the rehabilitation process is often overlooked, and is one of the main reasons why old injuries keep re-occurring.

When ligaments are torn as with a second or third degree ankle sprain, nerves are also damaged. These nerves send vital information to the brain about the specific position and location of the ankle joint in relation to the rest of your body.

Without this information the muscles, tendons and ligaments are constantly second-guessing the position of the ankle joint. This lack of awareness about the position of the ankle joint can lead to a re-

occurrence of the same injury long after you thought it had completely healed.

Balancing exercises are important to help re-train the damaged nerves around your ankle joint. Start with simple balancing exercises like walking along a straight line, or balancing on a beam. Progress to one-leg exercises like balancing on one foot, and then try the same exercises with your eyes closed.

When you are comfortable with the above activities, try some of the more advanced exercises like wobble or rocker boards, Swiss balls, stability cushions and foam rollers.

Plyometrics and Sports Specific Exercises

This last part of the rehabilitation process will aim to return your ankle to a pre-injury state. By the end of this process your ankle should be as strong, if not stronger, than it was before you injured it.

This is the time to incorporate some dynamic or explosive exercises to really strengthen up your ankle and improve your proprioception. Start by working through all the exercises you did above, but with more intensity.

For example, if you were using light isometric exercises to help strengthen your ankle, start to apply more force to your ankle joint, or start to use some weighted exercises.

From here, gradually incorporate some more intense exercises. Exercises that relate specifically to your chosen sport are a good place to start. Things like skill drills and training exercises are a great way to gauge your fitness level and the strength of your ankle.

To put the finishing touches on your ankle recovery, I always like to do a few plyometric drills. Plyometric exercises are explosive exercises that both lengthen and contract a muscle at the same time. These are called eccentric muscle contractions, and involve activities like jumping, hoping, skipping and bounding.

These activities are quite intense, so remember to always start off easy, and gradually apply more and more force. Do not get too excited and over-do-it, you have come too far to do something silly and re-injure your ankle.

CHAPTER 31
Plantar Fasciitis

Coming Soon!