A Squash Player's Training Handbook

For All Players

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Introduction

This book is for the purpose of educating an athlete on the basics of proper training with a distinct focus on squash related movements. Increased emphasis on individual needs, deficiencies, and conditions should be considered while training, especially since squash is predominantly an individual sport. This manual provides proper evaluation techniques and general recommendations that are a great starting point. Since no two people are the same we advise that each athlete see a trainer specializing in squash conditioning. It is important to research your trainer and to not assume that because they work in a club or reputable gym that they are an expert. Unfortunately, many trainers are not well-educated in exercise physiology and sport-specific functional training. Educate yourself so that uneducated trainers will not put you at a physical disadvantage.

CHAPTER 1

Squash Basics

Squash Program

Training squash players requires a multidimensional approach that includes strength and conditioning training as well as principles related to injury prevention. Squash is a sport that requires repetitive movements and full range of motion in every joint. The goal of this program is to discuss proper biomechanics, importance of flexibility, outline proper training techniques, and how nutrition affects performance.

Biomechanical Evaluation

It is important to evaluate the body as a whole to detect weakness and joint dysfunction. To avoid overuse injuries screening for muscle imbalances is an extremely important part of any training program. The rationale being that there are detectable and correctable abnormalities of muscle strength and length. These imbalances can affect basic movement patterns such as running or swinging a racket and lead to unexplained musculoskeletal pain and dysfunction. Once detected, a specific functional rehabilitation program can be implemented. This can include but is not limited to soft tissue release, corrective exercises, core strengthening through tri-planar movements, balance and flexibility training. Our focus is on restoring function and stability by correcting irregular muscle patterns and treating the body as a whole.

Flexibility

Flexibility and balance are the two most important concepts to build a solid musculoskeletal foundation. Moving incorrectly will hinder the body's ability to create maximal force which will negatively affect your performance. Repetitive incorrect movements restrict muscles from properly firing. As a result synergistic dominance, reciprocal inhibition, and altered neurological pathways will greatly inhibit your form. Proprioceptive Neuromuscular Facilitation (PNF) along with active and dynamic stretching should be part of your program. We find that most athletes move incorrectly due to poor flexibility and balance. Most squash players have decreased hip, shoulder, and pectoralis flexibility. You need to stretch every day especially after a match or practice. If you do not stretch you will have a short lived career due to injury. Do not stretch a cold muscle however. Be sure to do a warm up before entering into your flexibility routine.

Core Training

Core training needs to be specific to squash and should include balance and proprioceptive exercises. Sit ups, bicycles and leg raises should be eliminated totally from a squash program. According to research these types of exercises further tighten the hips which are already prone to tightness. These floor exercises also put tremendous torque on the spine irritating discs and will not recruit as many abdominal muscles as you might think. Athletes do not play squash lying down on their back, so why train that way.

Training should include core stabilization and tri-planar exercises that mimic movements specific to squash. Training with medicine balls and using chopping motions with balance devices are a good idea. The core is the center of all movement so it should be trained in a way that is optimal for each individual. Building a strong core creates a solid

base for supporting your body through specific movements and posture. A weak core will increase the risk of injury and can lead to loss of power on the court. You need to set a training environment that challenges balance and proprioception specific for squash movements. Implementing cuing exercises will improve motor skills and promote proper movement patterns. Poor balance and flexibility create wasted movements and will inhibit the body's ability to decelerate properly and change direction explosively.

Strength and Power Training

All athletes can benefit from strength training and should do at least 2 days a week especially during the season. The exercises should relate directly to squash and incorporate full body movements targeting weak links. You should be training using multi sets mixing resistance with endurance training. It is crucial to train at a high velocity since squash is a fast sport. You need to establish core strength and proper movement patterns before moving onto plyometrics and explosive exercises. Plyometrics should be added only after a full body movement analysis is performed. Too often athletes perform plyometrics without being able to move properly.

Endurance training

All cardio and endurance training should be on court since that is where you perform. Running 5 miles regularly is of little use to a squash player since the court is only **32x21.** Interval training should be the staple of your program. For example, set up cones on a squash court or measured area and have athletes run to the cones and explosively change direction while rotating. It would not be a bad idea to do a 30-40 minute weight training session and then play a practice game. This method can be effective for endurance strength because in a real game you are never doing prior weight training. This method is called pre-exhaustion. Riding an exercise bike doesn't make you better on court either. It is recommended for a cool down or an infrequent change of pace but should by no means be substituted for court work. You stand during squash so why sit when you train? You should not even sit between points. You should be training according to time. The average match is about 45minutes to 1 hour but can be up to 90 minutes with short rests of 10-15 seconds between points and 90 seconds between games. Mens rally is about 30-50 seconds and a female rally is about 20-30 seconds. If you play multiple opponents you have about 90-120 minute rest. It is important to train in the same time frames that the game demands. Would it make sense for a boxer to train 2 minute rounds and 1 minute rest, when a round is 3 minutes with 1 minute rests or to only do 2 or 3 rounds in training sessions? You need to predominately exhaust the anaerobic and alactic energy systems. Running and most cardio is aerobic so training that way limits carryover greatly. Research proves that too much aerobic activity is actually detrimental to sports training.

Nutrition

This is the absolute most important aspect to any training program. Poor nutrition will hinder performance no matter what sport you play.

- Water
- Calcium/Potassium/Magnesium
- Pre workout carbohydrates loading
- Pre game carbohydrates loading
- Restoring glycogen stores after a match or workout
- Importance of multiple meals
- Use of supplements
- Use of BCAAs during long matches

Recovery between multiple games

You will usually get roughly two hours rest. During this time you need to stretch and rehydrate with carbohydrates to replenish glycogen stores and some protein (BCAA). Gatorade in any form is not recommended; drink something with natural electrolytes and carbohydrates. Zico makes coconut water which has more potassium than 10 Gatorades or Pedialyte. An organic protein bar or some type of easily digested form and fruit is a good idea for long days.

Rest

Working out every day is not good for you regardless of how proper your workouts are. The body needs to recover. Over doing things leads to injury and only hampers results.

CHAPTER 2

THE ENERGY SYSTEMS

The Energy Systems

Bioenergetics, or the "energy systems," refers to the metabolic pathways from which energy is made available for muscular contraction or work. Biological organisms, such as the human body, use chemical energy to power all the living systems. A suitable fuel is needed to create the chemical energy that allows the systems to carry out their normal functions and reach their main goal of energy production. Food sources can be broken down into three main components: carbohydrates, fats, and proteins. Carbohydrates are converted into glucose – an extremely powerful energy source within the biological system. When in excess, glucose is stored as glycogen in the liver and muscle tissue, or as body fat. During exercise, it is broken down so that it can be delivered to working muscle cells. Fats, or lipids, contain the most energy of the food sources. This is due to their chemical structure. Fat reserves are very high in relation to carbohydrates, which provides for a high energy capacity in the presence of low intensity exercise. We are concerned with the fats which are stored in the muscle as triglycerides. Protein, made up of amino acids, is broken down during digestion, and can also be used as a low power source when needed. Protein offers a much lower contribution in terms of energy than carbohydrates and fats, but holds more importance with muscle growth and cellular repair. Of these three sources of energy, only carbohydrates can be metabolized for energy without the direct involvement of oxygen.

In order to understand the bio-energy systems, one needs to have an understanding of the fundamental components of raw energy utilized by the musculoskeletal system. In the living cell, the main high-energy compound is adenosine triphosphate, or ATP. ATP is a complex compound stored in all cells, particularly muscle cells. It is required for the biochemical reactions of muscle contraction to take place. It is comprised of adenosine bonded to three phosphates. During muscular contraction, ATP is broken down on the chemical level. This results in the release of free energy, the presence of adenosine diphosphate (ADP), and a free inorganic phosphate. These are generated from the breaking of a phosphate bond to the ATP structure. The greater the demand placed on a muscle, the faster this breakdown of ATP will occur to create energy. During intense exercise, the ATP stored within the muscle cells is quickly depleted, and for continued muscular contractions to occur, this must be quickly replenished through some chemical means. The energy systems responsible for these chemical processes will further be discussed.

Creatine phosphate (CP) is a chemical compound stored in muscle and is important for replenishing ATP after the initial stores are exhausted. In this process, CP donates its phosphate to ADP in order to create ATP. In this way, the CP serves as an immediate source of high energy phosphate which can be used to replenish ATP. Because of its limited quantity, CP only contributes to ATP replenishment for the first few seconds of high intensity exercise.

Glycogen is considered to be the principal storage form of glucose and is mainly found in the liver and muscular tissues.

Now that the terminology has been covered, we can begin to examine the energy systems individually. Remember that ATP is necessary for all muscular contractions, and that during exercise, the ATP stored within the muscle is quickly depleted. There are three major sources of

high energy phosphate (ATP) that take part in the conservation, capture, and expenditure of free energy. These three major chemical pathways, with their common names, are:

1. The phosphagen, anaerobic, anaerobic alactic, or ATP-CP system
2. Glycolysis, anaerobic lactate, or embden-meyerhof-parnas pathway. This can be broken down into two sub-categories:
    A. Anaerobic glycolysis, fast glycolysis, lactic acid, or anaerobic lactate pathway
    B. Aerobic glycolysis, or slow glycolysis pathway
3. The oxidative, aerobic, or aerobic respiration system.

The phosphagen system is an anaerobic process, in which no oxygen is present. Glycolysis is the sequence of reactions that converts one molecule of glucose into pyruvate, with the concomitant production of a relatively small amount of ATP. The oxidative system, which takes place in the cell mitochondria, is the most productive source of ATP, but only functions when the body is abundant in oxygen.

As these three major pathways are explored, it should be noted that these systems all co-exist, and are active in overlapping energy expenditures. But the quality and quantity of their usage primarily depends on the intensity and duration of the demand put on the individual's musculoskeletal system. The energy systems help to replenish the depleted ATP as muscular demands develop during exercise. There is a direct relationship between the exercise intensity and duration, and the energy system that the body uses to supply energy. The following is a detailed description of each of the energy systems.

The Phosphagen System

The **Phosphagen System** is active from rest to the beginning of all exercise, and is an instant source of ATP. This system provides energy at a very high rate, but only for a minimal duration of time. The main regulatory chemical reactions of the phosphagen system involve ATP and CP. Even though this system is very efficient when working; its duration limits its potential. There are very low amounts of ATP and CP stored within muscle tissues and cells. So continuous, long-duration activities are not sustainable before these stores are depleted, and in order to provide for the energy demands the phosphagen system needs to be supplemented by glycolysis or the oxidative systems. It has been estimated that approximately 5 millimoles (mmoles) of ATP and 16 mmols of CP are stored in each kilogram of muscle. When training the phosphagen system, one should understand that type II (fast twitch) muscle fibers contain greater concentrations of phosphagens than type I (slow twitch) fibers. As a strength and conditioning professional, this fact would lead us to understand that, for certain exercises or sports, we should be specifically training this system. For example, if we are training a power lifter who has major demands on type II muscle fibers, and needs the explosive power and strength for a short duration of time, the phosphagen system is a major contributor to this athlete's performance.

The steps of the phosphagen system begin at the start of exercise when ATP is hydrolyzed by the enzyme myosin ATPase to ADP, organic phosphate and energy. This immediate energy is released for muscular contraction, although an increased ADP concentration activates creatine kinase, catalyzing the formation of ATP from the breakdown of CP. As exercise continues at high intensity, creatine kinase activity remains elevated, and leads us into

the next system of anaerobic glycolysis. As exercise intensity decreases, and depending on the level of oxygen in the muscle cells, aerobic glycolysis, or oxidative systems take over.

This system can fully recover ATP in three to five minutes, and it takes about eight minutes for complete CP resynthesis. Aerobic metabolism is largely responsible for the recovery of phosphagens.

Glycolysis

Glycolysis is a system that focuses on the breakdown of carbohydrates to create the high energy phosphate ATP. The sarcoplasm (cytoplasm of muscle cell) is where the steps and reactions of glycolysis take place. This pathway is composed of ten reactions, ending with pyruvate, which can be used within the oxidative (aerobic) system, or lactate which can be used in the lactic acid (anaerobic) system. This metabolic pathway transforms glucose to pyruvic or lactic acid, and yields two molecules of ATP. Glycolysis enhances and supplements the phosphagen system, and also acts as a pre-cursor to the oxidative (aerobic) and lactic acid (anaerobic glycolysis) systems.

Due to the ability to perform with or without the use of oxygen, glycolysis can be broken down into two distinct directions of the pathway. The two separate directions lead to slow and fast glycolysis. Aerobic glycolysis, or “slow glycolysis,” is the process where pyruvate is transported to the mitochondria for use in the oxidative system. This branch of the glycolysis pathway is primarily used when there are adequate amounts of oxygen present within the mitochondria, and the individual’s energy demands are moderate to high. When muscle tension, or contraction occurs with brief periods of relaxation, oxygen uptake from outside the cell can be used to assist pyruvate in producing more ATP. This process is only used after the phosphagen system has depleted its ATP stores, the intensity is minimal to moderate, and the duration is long. For this system to take effect, there also has to be an adequate level of oxygen within the mitochondria. Anaerobic glycolysis, or “fast glycolysis,” uses pyruvate, and converts it to lactic acid. The end product is ATP at a higher rate. This branch of the glycolysis pathway primarily functions when there is an intense demand, although sub-maximal, and high energy is needed, and there is a limited or reduced level of oxygen in the cells.

Muscle glycogen can be replenished within 24 hours of exercise. This greatly depends on post exercise meals. It is suggested that carbohydrates be ingested every two hours after exercise for up to six hours.

The Oxidative System (Aerobic)

Fats and carbohydrates are the main power source in the **oxidative system**. Protein is another source of energy, although its use is limited to when the musculoskeletal system has been completely depleted of fat and carbohydrate stores, and the body is at its limit of starvation in the muscle tissue. If this occurs, protein is used when the energy system is pushed past a threshold of greater than 90 minutes. The duration and intensity of the exercise determines which source is used. Fats are primarily used at the starting phase of the oxidative system. As the intensity increases, a switch to carbohydrates takes place. Finally, during long term maximal exercise, the system switches back over to fats, and possibly protein, as the primary energy.

Again, protein will only be used at the level of complete muscular starvation and depletion. At the end stages of glycolysis, the final product of pyruvate is taken to the mitochondria, and when there are sufficient levels of oxygen in the cells, begins the Kreb's cycle (Citric Acid Cycle, or tricarboxylic acid cycle).

The Krebs cycle (also known as the citric acid cycle, tricarboxylic acid cycle or TCA cycle) is a crucial component of the oxidative system. It is a portion of the oxidative pathway in which a series of chemical reactions in the presence of oxygen produce energy in the musculoskeletal system. This cycle does not actually use oxygen *per se*. The end products are extracted in the presence of oxygen by oxidative phosphorylation in order to access the potential energy in storage within the cycle. As we have previously mentioned aerobic glycolysis breaks down carbohydrates in the form of glucose into pyruvate, which, to enter the Krebs cycle, must move into the mitochondria where it is then converted into acetyl-CoA. A series of reactions occurs through the Krebs cycle, and 12 high energy phosphate bonds are produced. The phosphorylation of one glucose molecule results in the creation of 38 ATP units. The Krebs cycle is the end process where carbohydrates, fat and protein metabolism are directed. This system is the most efficient and quantitative producer of ATP for energy, but has limiting factors such as the need for oxygen, long duration, and minimal intensity.

Lactic Acid

Lactic acid is a chemical byproduct of pyruvic acid, and is produced from the breakdown of glucose. It is seen as an end product of anaerobic glycolysis. Lactic acid accumulation within the muscular tissue is said to inhibit the contraction of muscle fiber. This fact is now being challenged.

The thought of lactic acid being a fatigue producing substance is now being challenged. Dr. George A Brooks, a Professor in the Department of Integrative Biology at the University of California Berkeley states, "It's one of the classic mistakes in the history of science."More evidence is mounting that lactic acid is actually fuel for our muscles. Now, the understanding is that muscle cells convert glucose, or glycogen to lactic acid. The lactic acid is taken up and used as a fuel by mitochondria, the energy factories in muscle cells. The idea that lactic acid causes DOMS (Delayed Onset Muscle Soreness) one to two days after training is thoroughly incorrect, as lactic acid is gone from your muscles within one hour post exercise.

Metabolic acidosis is when the pH is lowered because of exercise. This decrease in pH can diminish the work rate of the cells' energy system. This may be what is really responsible for muscle fatigue.

What is the Most Efficient System?

As stated, the systems work together, and at no resting state or exercise level is there one system that completes the total energy production. When dealing with energy systems, the emphasis is on the dominating system. No activity, whether it's a gentle stroll or a high-intensity

sprint, exclusively uses one energy system – they all make a contribution depending on the length of time the exercise is performed, the level of energy expenditure, and the availability of oxygen. Exercise intensity is particularly important in determining the muscles' best energy source, and to what extent anaerobic or oxidative systems are primarily functioning.
A balanced program should include all training of all energy systems. (Speed training is a major category, but is generally practiced by competitive athletes only.)

Rules for Any Exercise Method

A few simple rules are helpful as you develop your own routine:

- Don't eat two hours before vigorous exercise.
- Drink plenty of fluids before, during, and after a workout.
- Adjust activity according to the weather, and reduce it when fatigued or ill.
- When exercising, listen to the body's warning symptoms, and consult a physician if exercise induces chest pain, irregular heartbeat, undue fatigue, nausea, unexpected breathlessness, or light-headedness.

Warm-Up and Cool-Down Period. Warming up and cooling down are important parts of any exercise routine. They aid the body in making the transition from rest to activity and back again, and can help prevent soreness or injury, especially in older people.

- Warm-up exercises should be practiced for at least eight to ten minutes at the beginning of an exercise session. Older people need a longer period to warm up their muscles. Low-level aerobic exercise is the best approach, such as dynamic warm ups, walking briskly, swinging the arms, or jogging in place.
- To cool down, one should walk slowly until the heart rate is 10 to 15 beats above resting rate. Stopping too suddenly can sharply reduce blood pressure, is a danger for older people, and may cause muscle cramping.
- Static stretching is appropriate for the cooling down period, but not for warming up because it can injure cold muscles. Particular exercises may require stretching specific muscles. For example, a jogger or biker might emphasize stretching the hamstrings, calves, groin, and quadriceps, while swimmers would focus on the groin, shoulders, and back.

The **phosphagen system** is typically in use with maximal, explosive effort and is very short in duration. Rest periods from five to seven minutes are crucial, because almost complete recovery of the muscle is needed to reset the phosphagen system, and to again reach maximal muscle goals. The bottom line is that a well-rested muscle will allow maximal effort to be reached. Examples of usage of this system include:

- Estoteric exercises (strong men competitions)

- Power lifting (heavy bench, heavy squat, and heavy deadlift)
- Olympic lifting (snatch, clean and jerk, power clean)
- High Jump
- Sprints
- Bound like sports (football, basketball, volleyball, soccer)

Glycolysis requires a sub-maximal effort, and is typically in use after the phosphagen energy stores have been depleted. As with the phosphagen system, sufficient rest periods are needed to return muscle almost to a resting state as this will enable the athlete to acquire maximal effort on the next major energy expenditure. The levels of rest should be within the realms of two to six minutes, because even though the glycolysis system deals with explosive power just like the phosphagen system, the levels are slightly sub-maximal in the glycolysis training principles. Examples of glycolysis usage in exercise are:

- Wrestling
- UFC (Ultimate Fighting Championship) training
- 200/400 meter run
- 50/100 meter swimming

Aerobic glycolysis, into the oxidative system, will be in use when enough oxygen is present. The requirements involve low intensity with long duration, mainly because ATP recovery is very high. Rest periods are near minimal in these pathways because of the low intensity over a long period of time. If rest periods are used, they should be in the realm of 0 to 90 seconds, followed by immediate return to the exercise. Examples of oxidative usage in exercise are:

- Distance or marathon running
- Cross country skiing

Understanding and Application of the Systems to Training

Applying energy systems to some sports can become quite complicated. It's easiest to look at basic running events first...

100m Sprint

Top athletes run this event regularly under 10 seconds. The **Phosphagen** energy system powers a sprinter for most of the race. If you watch a slow motion replay of a 100m sprinter, you will notice that their respirations are low or even non-existent during the sprint. With pursed lips, their face is a picture of concentration, and all of their energy production is from anaerobic processes that occur without oxygen.

800m Run

Just as with the 100m, an athlete is powered by the **Phosphagen** energy system for the first few seconds of the race. As the athlete is not running at maximal intensity, the stores of ATP will last a few seconds longer. **Anaerobic Glycolysis** then predominates for the rest of the race, although beginning stages of **Aerobic Glycolysis** make a small contribution.

Half Marathon

The **Oxidative-aerobic** system makes the greatest contribution to this event. The **Phosphagen** and **Glycolysis** (anaerobic and aerobic glycolysis) energy systems will predominate during the first one to two minutes of the race and in a sprint finish. What determines whether the athlete is 'burning' carbohydrate, fat or protein during the run? Well, at rest, 70% of the ATP produced is derived from fats, and 30% from carbohydrates. As the aerobic system begins to predominate, fats turn over to carbohydrates (ultimate efficient fuel) and make the greatest contribution to energy production at 100%. Primarily fat will begin as the energy source, but as exercise intensity is relatively low and constant, carbohydrates will last for a while. There will then be a switch back to fat as the carbohydrate stores are depleted. Fat will be relied on more as the duration of the race increases, until the duration reaches greater than 90 minutes. Here, the fat and carbohydrate stores have been depleted in the muscles, so protein may be slightly used. Carbohydrates are the most efficient source, but cannot always be relied upon. Again, the body does not suddenly switch from one substrate to another – the cross over is a gradual shift.

Multi Sprint Sports

So far the examples have been straight forward. What about multi-sprint sports like football, basketball, soccer, hockey and tennis? In short, **all three energy systems** make a significant contribution. This athlete uses the **phosphagen** system to jump, throw and sprint, while the **anaerobic glycolysis** system is taxed if the player has to make several back-to-back sprints. And of course the **aerobic glycolysis-oxidative-aerobic** systems contribute for the entire duration of the game, as the levels of duration increase.

Quick Summary

Phosphagen: 0 to 6 seconds, and is dominant from resting to near maximum intensity

Phosphagen and anaerobic glycosis: 6 to 30 seconds, dominant at near maximum intensity

Aerobic glycolysis: 30 seconds to 2 minutes, maximum intensity

Aerobic glycolysis and start of aerobic system: 2 to 3 minutes at moderate intensity

Aerobic system: over 3 minutes at light intensity

Manipulating the Energy Systems for Training Goals

The strength and conditioning professional's ultimate goal is to manipulate the systems to create the ultimate performance of the athlete for exercise, sport, or competition. The main factors to specifically manipulate are, **intensity**, **duration**, **rest**, and **sport specificity**. The systems, with examples of training variables focusing on specific training for the chosen energy system, are as follows:

Phosphagen Energy System

- Sprints, 12 x 20m with recovery of 2 minutes recovery between repetitions.
- Sprints, 5 x 60m with 6 minutes recovery between repetitions.
- 8 x 30m shuttle runs with 2 minutes recovery between repetitions.
- Resistance training of 3 sets of 3 repetitions at 90% 1rm, with 5 minutes rest between sets. The intensity should be done 2 to 4 times per week for maximal performance of the phosphagen system.

Glycolysis Energy System

- Distance sprints, 5 to 8 x 300m, with 5 minutes recovery between repetitions.
- 150m intervals at 400m pace with 3 minutes recovery between repetitions, until pace slows significantly.
- Long distance sprints, 6 x 500m with 3 minutes recovery between reps.

Oxidative Energy System

- 4 to 6 sets of 2 to 5 minute runs, with 2 to 5 minute recovery between intervals.
- 10 sets of 400m runs, with 60 to 90 seconds recovery between intervals.
- Long distance 5 to 10 km runs.

CHAPTER 3

STRETCHING

Stretching

Stretching is an integral part of a training program, however it is often overlooked. Lack of flexibility is the root of many problems. When a muscle is hypertonic, it is limited in its ability to contract and lengthen properly, causing inefficient movements and joint stress. They are also more likely to contribute to faulty biomechanics. Appropriate stretching and moderate exercise may prevent many musculoskeletal injuries prevalent in today's society. Stretching and strengthening, when implemented appropriately, produce a solid foundation for healthy biomechanics. Without this foundation, biomechanics and movement patterns will become inefficient, leaving one, not only performing at a less-than-optimal level, but with a possible increased risk of injury.

Arbitrarily, increasing the joints' range of motion without considering the individual and the tasks they need to perform may be detrimental. Studies have shown a decrease in muscle power output and increased muscle reaction time following a stretch. Stretching certain muscle groups may be contraindicated when strength and/or power are required of them during the activity.

In some instances a decreased range of motion of the body will enhance performance. An example would be the torso of a sprinter. Energy derived from the ground is transferred to the trunk by the lower extremities. Some of this energy can be lost to excessive lengthening of the trunk musculature. Therefore, in order to develop a training program that will improve upon the desired results, it is important to understand specific motion patterns. Furthermore, there is no evidence that stretching decreases the risk of injury. In fact, work by Dr. Stuart McGill has shown that the low back range of motion of injured workers had little relationship with their return to work. A negative correlation between low back flexibility and back injury has been documented. Muscle injuries such as tears or strains rarely occur at end ranges, discrediting the notion that stretching decreases the risk of soft tissue injury. Therefore, a training/stretching program must be tailored for each individual with an emphasis on their specific tasks or movements performed.

Precautions

Always consult a health care professional before initiating a stretch program. Stretching can be dangerous in the presence of musculoskeletal injury or disease. It is also important to warm up muscles before stretching them. Stretching a cold muscle can result in injury.

Problems with static stretching prior to exercise:

- Scientific evidence demonstrates that static stretching of muscle decreases isometric and dynamic muscle strengths at different velocities.
- Isometric strength is important for stability during complex movements.
- Dynamic strength has obvious importance when it comes to actual movement.
- In plain English, this means you will be slower and weaker on tasks that are fundamental to high-level performance.

Static Stretching Acutely Impairs:

- Slow-speed, High Force Movements (Power lifting)
- High-speed, Lower Force Movements (Jumping & Sprinting)
- Research also demonstrates that balance, reaction time and overall movement time are

negatively affected.

- Endurance athletes will be interested to know that static stretching also reduces muscular endurance.
- Static stretching some muscles before activity may be required if they are so tight they impede movement. Usually the Psoas and the Scalenes fall into this category. There are always exceptions to the rule so be aware of an individuals needs.

Two Factors:

1. Muscle/Tendon
2. Neuromuscular

Muscle/Tendon

- Prolonged stretching can actually make the muscle and tendon overly compliant.
- Whenever we want to develop force in a muscle, it is important that we have plenty of stiffness as this allows for better use of stored elastic energy in the muscle and tendon, and ensures that everything lines up properly at the level of the muscle fibers.

Nervous System

- Due to motor control and reflex sensitivity, stretching makes it harder for the nervous system to tell the muscle to fire.

Static Stretching has its benefits:

Post Workout:

- Relaxation
- Increase or maintain a particular range of motion
- After weight training
- After walking/running
- After aerobic activity

Stretching Principles

The Stretch Reflex

The stretch reflex is the neurological process with which the body responds to a sudden change in the length of a muscle. This pathway includes the muscle fibers, receptors, sensory and motor neurons of the spinal cord.

Stretch receptors (muscle spindles) are located within the sarcomere, or muscle cell, and, when lengthened, send a signal to the spinal cord through sensory neurons. These neurons transfer through the synapse to motor neurons that control the muscle being stretched. This causes contraction of the muscle in order to maintain its resting length.

Autogenic Inhibition

Autogenic inhibition is the neurological process whereby proprioceptors (golgi tendon organs), located at the musculotendinous junction, detect an increase in tension in that muscle. When a certain amount of tension is detected, the muscle is then inhibited in the spinal cord, preventing it

from contracting. As a result, it will relax.

Reciprocal Inhibition

Reciprocal inhibition is the process by which the contraction of an antagonist muscle neurologically inhibits the contraction of the antagonist muscle. This occurs as a motor neuron that causes contraction in the agonist muscle synapses signal to an inhibitory neuron that will inhibit the antagonist muscle. In other words, the antagonist muscle will relax, or be prevented from contracting.

Reciprocal inhibition may also contribute to muscle imbalances. If an agonist muscle is hypertonic, or overactive, its antagonist will be inhibited causing lengthening and a decrease in functional control. This will further allow the agonist to tighten, or shorten, creating a cyclical pattern of dysfunction.

Types of Stretching

Static Stretching

Static stretching is slow, and involves holding the end point of tension for 20 to 30 seconds. This type of stretch targets the passive elastic component of the muscles.

Passive Stretching

A passive stretch is achieved by having an external force such as a partner's push, or use of a wall, floor, or machine in order to attain and hold the end position. Using a well-trained partner can help to achieve greater range of motion (ROM), and also to target specific muscle groups.

Active Stretching

Active stretching uses agonist muscle contraction in order to stretch antagonist muscles. This type of stretching uses the principle of reciprocal inhibition.

Dynamic Stretching

Dynamic stretching uses active contraction of the antagonist muscle creating motion in order to produce a stretch to the agonist muscle. This type of stretch targets the series elastic component of the muscles. Yamaguchi and Ishi have demonstrated an increase in power during leg extensions following dynamic stretching. This may be due to the rhythmic contraction of antagonist muscles raising the temperature, and to post activation potential which improves muscular performance following contraction. This study was only performed on recreationally active men, and not athletes. Therefore, the effect of dynamic stretching on power is not known in competitive athletes.

Ballistic Stretching

Ballistic stretching involves active motion through a joint, and creating a bouncing motion at the end range of the stretched tissue. The goal is for the bouncing to cause an increase in motion past its end range on every repetition. This type of stretching may be detrimental to the target or surrounding tissues. It is not suggested to repeatedly force a joint or a soft tissue through its end range, as this could cause irreversible laxity and instability in the non-contractile tissues of the joint (ligaments, joint capsule).

This could also activate the stretch reflex which in turn causes the target muscle to respond by contracting, or tightening. This type of stretching is associated with injury and is only recommended under careful guidance of a professional.

Proprioceptive Neuromuscular Facilitation Stretching

Proprioceptive Neuromuscular Facilitation (PNF) includes four different types of stretching techniques. These combine muscle contraction and relaxation in order to relax an overactive muscle and/or enhance the flexibility of a shortened muscle. PNF was developed by Herman Kabat MD, PhD, Margaret Knott PT and Dorothy Voss PT in the 1940s to treat paralysis patients. Over the years, other forms of PNF were developed for the treatment of orthopedic, as well as neurologic, disorders.

Post Facilitation Stretch

1. Target muscle is placed in midposition
   - Midrange of the muscle's full contraction
2. Patient contracts isometrically for 10 seconds using maximum strength
   - Therapist must not allow muscle to bounce – positioning and leverage are key
3. Relaxation phase
   - Patient is instructed to let go
   - Therapist immediately stretches muscle
   - Patient may have to practice how to let go immediately
4. Stretch
   - Muscle is held at new barrier for 10 seconds
5. Repeat at new barrier
   - If no increase in ROM was achieved, start at midposition
     *Increase in ROM due to autogenic inhibition

Post Isometric Relaxation (PIR)

1. Engage barrier
   - This is done by lengthening the muscle until slight resistance is met
2. Isometric contraction
   - Patient is told to exert slight resistance (10-20% muscle contraction force) in the opposite direction
   - This is held for 10 seconds
   - It is important that the contraction is isometric, therefore, no movement must take place
3. Relaxation phase
   - Patient is instructed to relax
   - Wait at barrier for muscle to release and then initiate stretch
4. Stretch
   - Stretch until the next barrier is met and hold for 10 seconds
5. Repeat at new barrier
   *****Increase in ROM due to autogenic inhibition

PIR With Agonist Contraction

1. Same as PIR
2. Same as PIR

3. Agonist contraction
    - Following the isometric contraction, the agonist muscle is contracted as the target muscle is taken to its new barrier.
4. Repeat at new barrier
    * Increase in ROM due to reciprocal and autogenic inhibition

Contract-relax

1. Same as PIR
2. Concentric contraction
    - Target muscle is contracted through its full ROM against resistance.
3. Relaxation phase
    - Patient is instructed to relax and let go
4. Stretch
    - Stretch until next barrier is met and hold for 10 seconds
5. Repeat at new barrier.
    *Increase in ROM due to autogenic inhibition

***Note*:** It was assumed that the increased ROM of the muscle was based on muscle fatigue, reciprocal inhibition, muscle spindles, golgi tendon organs. However, EMG studies have shown significant activity in stretched muscles after their contraction in PNF-type techniques. Therefore, this increased ROM cannot be solely attributed to relaxation. It has been theorized that actively stretching allows the subject to feel as if they have more control, and as a result are more willing to extend their tissues into greater ranges.

Cramps

Muscle cramps are involuntary and often painful contractions of the muscles, resulting in shortening. It is a common misconception that cramps originate in the muscle itself and that the muscle fires randomly. Contrarily, cramps have been found to be a primarily neurological activity in which the motor neuron that controls a muscle fiber fires at a high frequency, causing this involuntary contraction.

Some Causes of Cramps May Be*:*

- Heavy exercise
- Pregnancy
- Hypothyroidism
- Depleted magnesium or calcium stores or other metabolic abnormalities
- Alcohol consumption
- Kidney failure leading to uremia
- Medications
- Muscle fatigue
- Dehydration

Although cramps may be benign, it is important to note that they may also be red flags of serious neurological, endocrine or metabolic disorders. Cramping should always be evaluated by a professional.

Fasciculation

Fasciculations are single involuntary firings of motor neurons that will cause brief twitches in the muscle fibers that they innervate. These twitches usually are low in intensity and usually do not produce motion at a joint.

Similar to cramps, many fasciculations are benign and do not indicate pathology. It is very common for healthy people to experience benign fasciculations. Common areas of fasciculations are eyelids and thumbs.

More serious causes of fasciculations such as motor neuron disease, or denervation due to radiculopathy are usually accompanied by weakness and atrophy of the affected muscle group. These pathological fasciculations generally tend to occur randomly, whereas benign fasciculations tend to occur repetitively at the same sight. As with cramping, it is suggested that fasciculations be evaluated by a professional to determine whether or not they are benign.

Dynamic Stretches


Alternating Lateral Lunge

Step directly to side, land on heel and sink into a lateral (side) lunge. Kep chest up, weight on heel, and trailing leg straight. Toes of both feet should point forward with feet flat on floor. Maintain good posture.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Deep Wideout Drop

From a shoulder width stance, quickly but smoothly drop into a wider stance deep squat (feet should momentarily leave the ground). At landing, sit into a deep squat with arms reaching out in front of you. Use glutes and hamstrings to helpquads cushion the drop, then "pop" up to a staring stance. Chest up, lower back flat..make it rhythmic

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


High Knee Skips

Skip with exaggerated arms swinging;get knees high. Come up on toes with standing leg.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Squat to Stand

With a wider than shoulder width stance, bend over and grab the bottom of your toes/shoes. Actively "pull" yourself into a deep squat position with chest up, knees out, lower back slghtly arched. Hold at bottom briefly and return to toe touch position and ultimately upright position.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

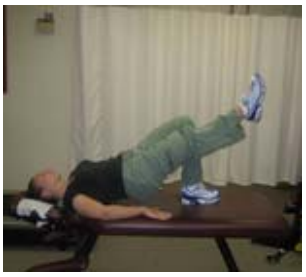

Crossover Overhead Rev. Lunge

Start with feet shoulder-width apart and arms atsides. Reach overhead as you stride backward and behind you with one leg;shin on the other leg should be completely vertical. Drive off front leg to "pull" yourself back to starting position with glutes of support leg. Transition immediately to opposite side.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Supine Leg Whips

Lay on your back and push your hips up by activating your glutes. With hips up, raise one leg straight up. Lower the leg directly to the side, then "whip" it back up to starting position.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Cat/Camel

Hands under shoulders, knees under hips. Lift head and chest and let stomach sink. Then round the back and bring head and hips together. Avoid bending elbows and moving body forward and back.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Bent Knee Twist

Start on back, knees bent, feet flat on floor. with feet and knees together, allow the knees to fall gently side to side. Dont force range of motion. Keep the shoulders down.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Calf Stretch

Start in "pike" position, hips high. Place left foot behind right ankle with legs straight out. Press heel of right foot down to stretch hold for 1-2 seconds then go back up on your toe.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Supine Bridge

Start on back, arms at side, knees bent, feet flat on the floor. Squeeze butt throughout the movement going up as high as the glutes take you. lower under control to a point just above ground, then repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Anterior-Posterior Leg Swings

Holding onto an immovable object, rhythmically swing thigh forward and backward, go further as you loosen up. Maintain good posture, chest out, shoulders back, and eyes looking straight ahead. Keep the movement around the hips.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Side-to-Side Leg Swings

Holding on to an immovable object, rhythmically swing the leg from side to side , go further as you loosen up. Maintain good posture; chest out, shoulders back, and eyes looking straight ahead. Keep the movement around the hips

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Toy Soldier
With opposite arm and oppositie leg, walk forward making sure to kick the leg high enough to get a stretch

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


High Knee Walks
Step forward and raise one knee. Actively pull knee up and in with both hands and come up on toes of opposite foot. Maintain good posture, avoid forward lean.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Windmills
Set up with a wide stance, upright torso. Rotate and flex at the hips reaching your right arm to left foot. Rythmically transition, with rotation to ight side with left arm. Keep neutral spine, focus on hip flexion rather than lumbar flexion.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Pull-Back Butt Kicks
Take a step forward and curl one leg toward your glutes. Using the same hand actively pull heel into your glutes and come up on toes of opposite foot. Maintain good posture and don't allow leg to move too far to the side.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Wall Slide / Arm Elevation
Stand with back against a wall with head touching wall and chin tucked in. Place feet a few inches away from the wall and raise arms above head. Squat body down the wall keeping arms elevated. Keep low back flat on wall with just a finger space. Actively exhale while performing squat to feel a stretch in the mid back.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Shoulder clocks
Lie on one side with knees bent and hands togther. While keeping hips on the ground, gently bring arm to other side of the body. Repeat

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Warrior Stretch With Twist

Keep back straight. Lunge forward, twist and reach overhead. Keep a neutral spine. Hold for 1-2 seconds and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Side lunge with a twist

Keep back straight and chest out. Lunge to the side and reach arms in the opposite direction.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Single leg supine bridge

Start on back, arms at sides, knees bent, feet flat on floor. Squeeze butt on plant side and pull opposite leg toward chest. Go only as high as your glutes will let you,dont arch the back. Lower yourself under control to a point just above ground and repeat. Maintain abdominal brace and neutral spine.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Glute Med Hip Hikes

Standing on one leg, let hip on balancing side "poke out". Hold for 2 seconds, then "correct" back to the starting position. Keep your torso level and don't let the body rotate.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Glute Med Band Side Step

Wrap a thera-band around legs above/at the ankles. Keeping your toes pointed inward and a slight bend in the knees, step to the side 10 steps then go back to starting place. Do not hike the hips or lean forward.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Serratus Push-Up Plus

Start in a push up position (or on knees), allow shoulder blades to come together. Drop about 2 inches toward the floor. Protract shoulder blades to return to starting position

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Static Stretches

Protocol : **xxsquash static**

ID :

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914 774 3644

Date : Monday, September 07, 2009

Shoulder Hyperflexion

Place hands on back of chair, gym ball, or counter. Keep elbows straight and relax upper body down through shoulders. Hold, relax and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Pectorals - Corner / Doorway

Facing corner or standing through a doorway.
Place forearms on each wall at shoulder height.
Slowly lean chest forward into corner, keeping upper body tall, to feel a stretch in the front of the chest.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

QL / Lats - Side Lying - Ball

Down on one knee, place ball against hip.
Raise body up sideways over ball, supporting with hand on floor.
Straighten top leg and bring arm over head to feel a stretch in the side of the low back and hip.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Biceps / Pecs - Ball

Lying on back with gym ball under mid back and head supported.
Drop both arms off to the sides, bending wrists backwards, and let arms 'hang' to feel a stretch across the chest and front of the arms.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Traps - Self Traction

Sitting tall, grasp back edge of a chair with hand of side to be stretched.
Turn head toward that same side and lean head and body away to feel a stretch in the side of the neck.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Posterior Capsule Stretch

On your side with arm out so that shoulder is aligned with elbow bring forearm up to a 90 degree angle. With opposite arm push wrist down to floor. Lean upper body toward floor until stretch is felt.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Adductors - Wall Splits

Lying on back with buttocks up against wall and legs up the wall.
Allow legs to drop out sideways along wall into a splits position.
Keep toes pulled back feel a stretch in the inner thigh.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Adductors - Standing Side Lunge

Standing, toes pointed forward, step out sideways into a side lunge position.
Bend upper body forwards, keeping back flat and stabilizing upper body with hands on floor or by holding a chair.
Shift weight from side to side, holding each way, to feel a stretch in the inner thigh and groin area.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

QL Side Bend Reach

Standing or sitting in readiness position.
Slowly bend to one side, without rotating, bringing one arm overhead.
Keep hand that is above head slightly forward and always in view.
Support upper body with opposite hand on hip. Feel a stretch in the side of the low back.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Fig.4 Knee to Chest - Supine

Lying on back, knees bent with feet flat on the floor.
Cross one ankle onto opposite knee.
Bring the knee (that is under the ankle) straight up towards the same side shoulder to feel a stretch in the buttocks.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Warrior Stretch With Twist

Keep back straight. Lunge forward, twist and reach overhead. Keep a neutral spine.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Gastrocs - Step

Standing tall with ball of foot on edge of stair or block.
Drop heel over edge to feel stretch in the calf.

To improve flexibility at the ankle joint.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

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Soleus - Wall

Standing in a lunge position, supporting upper body against wall.
Keeping back foot heel on floor and knee slightly bent, bend front knee.
Shift body weight forward through pelvis to feel a stretch in the lower calf area.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Internal Rotators. - Supine

Lying on floor, raise elbow to shoulder level, bending elbow up and facing hand forward. Rotate arm backward attempting to lower back of hand to the floor. Go as far as comfortable.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Pectorals / Mid Back Extension

Clasp hands together and gently place behind neck.
Sit tall and keep chin tucked down slightly.
Raise chest up, breath in and slowly bring elbows backwards.
Exhale, relax and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

CHAPTER 4

FOAM ROLLERS

Our Central Nervous System

Over time our bodies develop structural imbalances due to excessive scar tissue, trauma from injury, and painful points along a muscle or in the fascia. These ‘trigger points’ can cause a restriction in blood flow to the muscle, shortening of the muscle, and development of inflammation and pain. Any one of these problems can inhibit proper posture, proper exercise form, proper joint alignment, and lead to poor neuromuscular transmission potentially setting the stage for a more serious injury. Trigger points also put a strain on surrounding muscle and tissue that must compensate for the weakened area.

Foam rollers are an excellent method of myofascial massage. They break down the scar tissue that has formed, thereby returning the blood flow and nervous system transmission to and from the area. Removing the ‘knots’ will also allow for exercises to be effective in returning the structural balance and joint stability to the area, and removing the stress on the muscles that have been compensating for the weak area. Greater flexibility will also be achieved.

To correct poor movement patterns, one has to become aware of the pattern they’ve adopted, and retrain their brain and central nervous system (CNS). Small, precise movements are the most effective way to retrain the CNS and restore the correct muscle movement pattern.

Foam rollers are one tool that can be used to accomplish this task. They are hard, cylindrical and unstable, and its use requires complete concentration. Therefore, they are not only used for muscle exercises or treatments, but are brain exercises as well. Total focus is required to maintain stability. Foam rollers can be utilized in various ways. On the following pages there are examples of foam roller exercises for you to master

It is important to be able to activate our core musculature for stability and balance. It is not limited to athletes playing a sport, but for our day-to-day lives. As we age, we typically don’t engage in activities that require using our stabilizer muscles.

Some research suggests that exercises on an unstable surface, or exercises done on one leg challenge the core muscles to fire and aid in a person’s proprioceptive awareness – your body’s awareness of its limbs in relation to the rest of your body, and the environment or space around it. After an injury, for example, an athlete may find their performance and accuracy is not what it was prior to injury. This may stem from the inability of the necessary muscles to send and receive signals to and from the brain. Proper force generated in our core translates to proper force and movement in the rest of the body.


Foam Roll Hamstrings

Begin with the foam roller at the top of the hamstrings, keeping the feet off of the floor. Use arms to roll down the hamstrings to behind the knee. Roll back and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Foam Roll Glutes

Begin sitting with the foam roller at the top of the glutes. Use legs to push up and roll to the bottom of the glutes. Roll back and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Foam Roll IT band

Begin lying on side with foam roller at the top of the hip. Keeping the leg being rolled off of the floor, use other leg and arm to roll down the leg to just before the knee. Roll back to the top of the hip. Repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Foam Roll Low Back

Begin sitting on foam roller with roller just at the top of the glutes. Use legs and arms to roll up to the mid-back. Roll back and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Thoracic stretch

Begin lying on the foam roller with roller in the small of the back. Use legs to roll up the mid-back to the top of the traps. Roll back and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Foam roller thoracic mobility

Place foam roller horizontally on the floor.
With knees bent and your hands clasped behind your head, lay back over the roller.
Lay your mid back over the foam roller and then roll your spine back and forth slowly by
flexing and extending your knees. Keep a neutral spine and keep low back down as you extend over the roller.
Your head should almost touch the floor.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Foam Roll QL

Begin side lying on a foam roller with roller just above the top of the hip. Use arm and leg to roll up the side to just below the ribs. Roll back.
Repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Foam Roll Gastroc/Soleus

Begin with foam roller behind the knee with one leg crossed over the other. Using arms to support the body, roll down to the ankle and back. Repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Protocol : **xxbook foam roller nfpt body wt**
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914 774 3644

Date : Tuesday, May 26, 2009

Foam Roller Abductor

place roller under groin area and move from side to side

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Foam Roller Lat

lying on your side place roller under you
tip back slightly so you can really focus on lats
use legs to move up and down

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

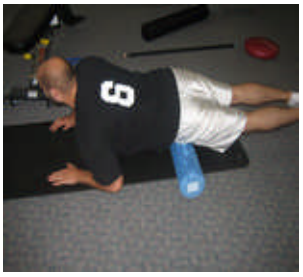
Quad roll

Place roller just above knees and roll up to hips then repeat. Tipping onto one side will focus on that side.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:



Psoas roll

place roller just below hip bone and roll up onto your belly and back

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

CHAPTER 5

Nutrition

Sports Nutrition

General Pre-Workout Snack Guidelines to Follow:

Food preferences for pre-workout snacks can vary depending on the individual, the type of exercise, and level of intensity. For example, endurance athletes can often eat more during a long slow cycle when their heart rate is lower, than while running or training at a higher heart rate. Experiment with the following guidelines to help determine an appropriate snack for you. Choose a snack that:

- Contains a sufficient amount of fluids to maintain hydration.
- Is low in fat and fiber to facilitate gastric emptying and minimize GI distress.
- Is high in complex carbohydrates such as fruits, vegetables, whole-grain bread, rice, pasta, and cereals to maintain blood glucose levels, and maximize carbohydrate stores.
- Contains some protein for staying power throughout your workout.
- Low in simple sugars such as candy. They can decrease your blood sugar level leading to a severe drop in energy.

The more time you allow between eating and exercise, the larger the quantity of food you will be able to eat. Allow more digestion time before intense exercise than before low-level activity. We suggest at least 90 minutes but no more than 3 hours, 2 hours seems to best. Your muscles require more blood during intense exercise, and therefore less blood will be available to your stomach to help with digestion. If you have a finicky stomach, try a liquid snack prior to your workout. Liquid snacks such as smoothies or sports drinks tend to leave the stomach faster than solid foods do and will be easier to digest. Engage yourself with the listed choices to see what works best for you and your workouts. Be careful not to take in large amounts of sugar before exercising or playing. This can cause a spike in insulin which will result in a crash and will greatly impede performance. The Glycemic Index is a great way to see the impact various foods have on your insulin.

Pre-workout Snack Ideas:

- Apple with almond or peanut butter (all natural)
- Protein bar – some brands: Larabar, Cliff mojo, Powerbar harvest, Jay-Rob or Myoplex bars.
- Whole wheat english muffin with cottage cheese
- Small bowl whole-grain low sugar cereal

General Post-Workout Snack Guidelines to Follow:

- In order to see improvements in your fitness level and help your body recover from an intense exercise session or competition it is extremely important to eat after a workout because two things are happening when you work out:

1) You are creating microscopic tears in your muscle tissue (during resistance exercise), and 2) You are depleting your body's glycogen stores. Glycogen is stored glucose in muscle tissue which is burned for energy during any workout.

- Experts believe that it's best to eat within 15-30 minutes of completing your workout. According to Martica Heaner at MSN Health and Fitness, this "metabolic window" is the time when "enzymes that replenish muscle carbs are at their highest levels," Martica further states, "insulin, which rebuilds protein stores, is at peak levels." Even if you'll be having dinner within the next couple of hours, it's best to keep a snack on hand for immediate consumption. These calories will be used for rebuilding and not stored as fat.

- Key Nutrients to Include in Your Post-Workout Snack are a mix of simple and complex carbohydrates combined with protein. Carbohydrates will restore glycogen to muscle and proteins will provide the necessary amino acids to rebuild muscle tissue. Ideally you should use easily digestible forms of these nutrients. You want your body to be able to break down these proteins quickly. For example, when using whey protein in a shake, your body can more readily breakdown its proteins than it can the protein available in a steak.

- Recommended post-workout snacks vary based on your weight and goals. If you expect to have a meal within the next couple of hours, a shake is best. Keep your post-workout snack below 250 calories. If the end of your workout coincides with a mealtime, eat a meal instead of a snack to replenish.

Post-workout Snack Ideas:

- Protein shake – Isopure, Myoplex, VPX, Jay-Rob, MY WHEY or Metagenics.
- Homemade Trail mix with raw nuts, raisins, freeze dried fruit and seeds
- Plain yogurt with fruit and low-fat granola
- Banana and peanut or almond butter on brown whole wheat bread or brown rice cake
- Hard-boiled eggs with whole-grain bread
- Smoothie with whey or egg-white protein powder, frozen berries, almond milk or organic skim milk, ground flaxseed
- Turkey wrapped in avocado with apple slices

Electrolytes Defined:
Electrolytes are a group of minerals – sodium, potassium and chloride that are extremely important to maintaining the proper fluid balance and hydration.

Excellent sources of electrolytes are:

- Coconut water, orange juice or Pedialyte instead of Gatorade because it is pure sugar. Cliff makes a recovery drink. Stay away "From Concentrate Juices".
- Banana, Potatoes, Prunes, Raisins

Day 1 Sample Sports Nutrition Food Plan

Breakfast: smoothie with egg white OR whey protein powder; frozen berries (no added sugar); skim, rice OR almond milk, 1-2 spoonfuls plain low-fat yogurt

Snack: 15 raw walnuts

Lunch: turkey chili (no cheese)

Snack: apple; ½ serving cottage cheese sprinkled with cinnamon and ground flaxseed

Dinner: turkey OR lean sirloin burgers; whole wheat bun; romaine lettuce leaves; tomato; baked sweet potato; salad; sautéed broccoli with garlic and olive oil

Day 2 Sample Sports Nutrition Food Plan

Breakfast: oatmeal; cinnamon; wheat germ OR ground flaxseed; sliced raw almonds

Snack: squeeze juice of a lime over broiled mango

Lunch: grilled chicken on whole wheat bread; 1 slice low-fat Swiss, lettuce, tomato, sprouts, balsamic vinegar OR mustard

Snack: homemade trail mix (handful raw almonds, raw sunflower seeds and raisins)

Dinner: grilled salmon; Asian vegetables (broccoli, bean sprouts, peppers, snow peas); brown rice

Rachel Lerner, CNC, FNC and Founder of Personal Web Nutrition, **www.personalwebnutrition.com**.

CHAPTER 6

BASIC PROGRAM DESIGN

Basic Program Design

In order to design a successful fitness program, it is essential to establish and understand the primary purposes of that program. Phases, or cycles, should be built into each program in order to obtain consistent challenge and overload for the participant. Each cycle should include certain parameters with realistic goals and progressions for the particular phase. Each phase should be a progression of the last; changing tempos, rep ranges, rest periods and order of body parts insures a balanced program. Generally, a phase should last anywhere between two and six weeks depending on exercise frequency, client progression, and goals. First and foremost, a thorough evaluation must be conducted to identify faulty movement patterns and postural distortions. The findings of your evaluation will ultimately guide you in the program design and customize it for your client. Any deficiencies noted during your evaluation will require attention in order to correct and build a strong fitness foundation for the participant. You need to ensure the client engages in proper warm-up activities according to the movements (both aberrant and normal) acknowledged in their initial evaluation. Dynamic warm ups and postural control exercises are a great way to get started. Effective program design is truly a fluid process, and it is important to keep in mind that program design should be based on initial as well as ongoing evaluation findings.

A well-designed fitness program will not only address goals but function as well. The client may have specific objectives in mind but the body needs to have a functional baseline in order to achieve such goals. For example, the participant may have an ambition of hypertrophy in the Pectoralis major muscles. However, if their pectoral muscles exhibit restricted flexibility and can eventually create a cascade of dysfunction for the entire shoulder girdle. It would not make sense to pursue the client's desire at this point in time. If the participant is insistent upon doing an exercise you feel is detrimental to their overall health and achievement of their goals, it is your job to educate them and provide them with a comprehensive explanation as to why certain exercises and movements may not be prudent. Demonstrate their weaknesses to them and describe their effects on daily activities. You must target weak muscles and address any flexibility issues right from the start. Introduce shoulder stability and back strengthening exercises in the situation just discussed. If you approach program design with function in mind, you will be providing the client with sound principles upon which they can build. Progression is paramount; it's always better to be cautious and easy than too difficult. The outcomes of each session will dictate short-term as well as long-term progression.

While function should be the cornerstone of program design, how does this translate into keeping your client interested? The average person with some postural issues or muscle weakness will not want to perform rehabilitative exercises for an hour. Generally, if the participant doesn't break a sweat or become winded, they don't feel like they did anything. You need to keep them motivated by giving them safe and easy exercises they can master quickly. If someone has a lot of issues, you can have them perform a circuit of two rehab exercises and one weight-lifting exercise, even if it's not "functional". The majority of your workout should be functional, but tossing in some safe, old-school basics can spice things up a bit and keep your client interested. Remember: client

satisfaction and progression in form and function are the hallmarks of effective program design.

Basic guidelines:

Heavy weight training and/or explosive movements should be avoided with beginners. With beginning clients, performing more sets of lower reps is better because it increases motor skill development while encouraging less fatigue. Teaching form is of utmost importance no matter how experienced your client, because you can actually create faulty motor patterns if the form is not disciplined. Also, it is important to provide a thorough explanation of how and where cardio training fits into a resistance-training program.

Minimize the amount of exercises to be performed in each session. You are teaching proper mechanics, and repetition and practice is paramount -- if you do one to two sets of 15 different exercises, they will never master the form of any of them. There are no fixed guidelines on how many exercises you should include, because it will be established on the individual's performance on that particular day. However, a good baseline is as follows: include full body movements as they progress from floor exercises and focus on mastering body weight before adding resistance.

Once a person has demonstrated they are ready to do more difficult exercises, start to incorporate multi-tasking exercises. Don't do the same program for more than 4-6 weeks. You need to vary repetition ranges as well as the amount of sets, tempos and rest periods. Include super sets and tri-sets. While diversity is important, don't change the workout every time. Basic structure and consistency is necessary and it will be impossible to track progressions if you do something off the top of your head every time you see them. The majority of the workouts should be uniform so that progress can be measured, and variety can be added so that the client is consistently challenged.

We wish to emphasize that the guidelines suggested here are simple in theory and presented as a starting point basis. This is not an all-inclusive approach to program design; in fact, our intent is to offer the fitness professional a foundation upon which to build. We offer more comprehensive, in-depth program design courses and provide suggestion reading/educational materials on our website.

Athlete program design guidelines

When designing a conditioning program for athletes, it is important to take into consideration the time of year it is for the athlete. Periods to take into account include off-season, pre-season, in-season, and post-season, with cycles or phases incorporated within each period. Workouts must accommodate the primary sport(s) in order to avoid over-training. Program design for athletes is similar to that for other individuals in that initial and on-going evaluations will determine the structure of the workouts and adjustments must be made accordingly.

Despite such similarities, all sports have different demands and training programs must take into account the dominant energy system utilized. Coaches frequently have athletes running long distances, which in many cases is counterproductive. Instructing a squash player to run five miles makes little sense when you consider the no squash course covers that distance! Cardio work should be done in intervals related to the sports demands and rest periods. Sport-specific drills should be a big part of the program and be based on athletic movements during game play. Below is a sample program for squash players who are new to weight training:

Off-season
Rep ranges: 6-10
Tempos: 4/0/1 and 3/0/x
Rest periods: 60-120 sec
How many days in the weight room per week? 4-5

Phase 1: Concentrate on gross movements and form with slower tempo.
Duration: 3-4 weeks

Phase 2: Gross movements at an explosive tempo – the focus is on power and explosion. Exercises should increase in difficulty as time progresses.
Duration: Until pre season

Pre- season
Rep ranges: 6-8
Tempos: 3/1/1
Rest periods: 45-60 sec
How many days in the weight room per week? 3-4

Phase 1: Focus on power and building endurance strength. Variety can be implemented with incorporation of bi-sets.
Duration: 3-4 weeks

Pre-season

Phase 2: Perfecting and getting ready to play. Drills will increase in intensity; heavy lifting will still be involved, but changes will be incorporated. Higher reps will be used with the power exercises, e.g., one gross exercise performed slightly heavy for 6 repetitions, followed by a 15-repetition of easier exercise.

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Duration: 2 weeks
Rep ranges: 8-10
Tempos: 3/0/1
Rest periods: 60-90 sec
How many days in the weight room per week? 3

In-season
Rep ranges: 6-8
Tempos: 3/0/x or 3/0/1
Rest periods: 10- 45 sec
How many days in the weight room per week? 3 or from whatever the athlete can recover.

Phase 1: Adjusting to playing and training together. Continue explosive lifts but decrease frequency and avoid high risk exercises. Shorten workouts slightly and avoid a lot of aerobic activity.

Duration: 4-6 weeks

Phase 2: Continue explosive lifts but further decrease frequency. Incorporate more flexibility and recovery exercises.

Duration: Until post season.

Phase 3: Usually occurs around crunch time or making it to postseason play. As a general rule it is prudent to keep the workouts to a moderate intensity and eliminate explosive weight training. Focus more on drills and explosive on-court movements. Increase time passively stretching the athlete.

Duration: until end of regular season

Post season
Rep ranges: 12-20
Tempos: 5/0/1
Rest periods: 30-120 sec depending on weaknesses
How many days in the gym per week? 3-4

Phase 1: Higher reps and low weights for recover, do not overdo it keep intensity around 65%. Do mostly stretching, dynamic on court movements and tons of foam rolling. The athlete is playing their hardest at this point the goal is recovery and remaining pain free.

Duration: until the end of the season. After their final match give the athlete a week or two to recover. Don't do any weights just stretches and really basic simple movements.

Sample In Season Program Day One

Protocol : **xsquash exercise day 1**
ID : THR :

914 774 3644

Date : Monday, September 07, 2009


Cat / Camel

On hands and knees.
Let stomach muscles relax and spine sag down as you exhale.
Suck stomach muscles up and in and arch spine up toward the ceiling like a 'mad cat' while inhaling.
Lower back down and repeat.
Move within your pain free range of motion.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


standing external rotations

With one knee up and elbow on knee, hold dumbell thumb side up and 90 degree angle elbow flexion. Slowly rotate lower arm downward while keeping 90 degree angle. Repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Hip Hinge

A: Correct: Keep spine straight by hinging at the hips.

B: Incorrect: Spine bends forward putting low back in a harmful position.
Hold pole against back of head and tail bone
Once the pole breaks from the body clients not using their hips. Client may bend knees to get lower.Master this before doing any weights.
This is not so much a test its just a way for you to see how poor bending mechanics are.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


1 Arm 1 Leg Row
Stand on 1 leg and with opposite arm, pull cable toward body keeping elbow close to body.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Backward Lunge
Start by standing with feet about shoulder width apart. While bracing the core take a step back into a split stance. Dont let back knee touch the floor. Return and repeat

To improve single leg strength and proprioception

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Hamstring Curls - Supine
Lying on floor, place heels on ball with both knees straight.
Use heels to pull ball toward the buttocks.
Straighten legs and repeat

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Face Pulls
Stand holding ends of rope in each hand. Keeping arms up and elbows out, pull rope toward face, and keep scapua depressed. return to start

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Straight Leg Dead Lift
Taking a shoulder width, overhand grip on a barbell, bend forward at the hip under control keeping the kneesand back straight until hamstrings become tight. Return to starting position by extending the hip and coming to a stand. Avoid rounding the back, and don't bounce at the bottom of the movement.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Side walks with band
Place band around your ankles. While toes are pointed maintain neutral spine, slowly step to the side. Do not hike hip.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Protocol : **xsquash exercise day 1**
ID : THR :

914 774 3644

Date : Monday, September 07, 2009

Plank - Feet Wide

Support body in a plank position with forearms shoulder width apart and feet wide apart. Keep a straight line through the knee, hip and shoulder. Maintain contraction of the transverse abdominal. (suck abs in against gravity)

To improve core strength.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Cable Crossover

Grasp cables from opposite sides and crossover so they make an "X". keep elbows bent and bring elbows straight back contracting the rear deltoid and mid back. Return to start

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Corkscrew

With med ball, extend left leg back while twisting trunk to the right. Raise left leg with knee up and twist trunk to the left. Return to starting position. Repeat with opposite leg.Maintain neutral spine through entire movement.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Side Bridge - Forearm

Lying on side with legs out straight (feet staggered) keeping, hip and shoulder in line.
Support upper body on forearm, placing elbow directly under shoulder.
Raise hip up off floor brace core maintain a neutral spine and hold.
Avoid rotating forward or backward.

To improve core strength.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Bridge One Leg Dips

From the bridge position, maintain pelvic tilt and abdominal hollow.
Raise and extend one leg out until it is straight.
With control, slowly lower pelvis down to floor and raise back up to the starting position.

For glute recruitment and core strength.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Crunch on dyna disc

Place dyna disc under low back. The closer to the tail bone the more difficult.
Start with back off the floor, crunch up and return to start. Crunch by shifting the air not by flexing your spine. Dont come too far up.
Aviod touching the floor.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Protocol : **xsquash exercise day 1**
ID : THR :

914 774 3644

Date : Monday, September 07, 2009


Cross Crawl Quadruped
On hands and knees, maintain abdominal brace and neutral spine.
Slowly extend one leg behind while at the same time extending opposite arm out in front until parallel with floor.
Squeeze glutes
Keep trunk square and stable.
Return arm and leg to floor and alternate.

To improve core strength and spinal stability.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
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Notes:


Foam roller thoracic mobility
Place foam roller horizontally on the floor.
With knees bent and your hands clasped behind
your head, lay back over the roller.
Lay your mid back over the foam roller and then roll your spine back and forth slowly by flexing and extending your knees. Keep a neutral spine and keep low back down as you extend over the roller. Your head should almost touch the floor.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
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Notes:


Plyoball Lateral Walk
start on ball with head resting
shift body so ball rolls under you to one side
go as far as you can hold a neutral spine

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Notes:

Day Two

Protocol : **xsquash exercise balance flex day 2**
ID : THR :

914 774 3644

Date : Monday, September 07, 2009


Cat/Camel
Hands under shoulders, knees under hips. Lift head and chest and let stomach sink. Then round the back and bring head and hips together. Avoid bending elbows and moving body forward and back.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Side Lying Trunk Twist
Start on side, arms outreached, hips and knees flexed to a 90 degree angle. Reach back and across the body with the top arm until you get a stretch in the middle and lower portion of the back. "down" knee should not come off the ground

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Calf Stretch
Start in "pike" position, hips high. Place left foot behind right ankle with legs straight out. Press heel of right foot down to stretch hold for 1-2 seconds then go back up on your toe.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Anterior-Posterior Leg Swings
Holding onto an immovable object, rhythmically swing thigh forward and backward, go further as you loosen up. Maintain good posture, chest out, shoulders back, and eyes looking straight ahead. Keep the movement around the hips.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Side-to-Side Leg Swings
Holding on to an immovable object, rhythmically swing the leg from side to side , go further as you loosen up. Maintain good posture; chest out, shoulders back, and eyes looking straight ahead. Keep the movement around the hips

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Standing Airplane
Standing with feet together, raise arms out to each side while bending at the hip on one leg keeping it slightly bent. Once desired forward bend is achieved, twist body to the side of the extended leg. Return back to bent position then back to standing position. Repeat

To improve single leg strength, core stability, and proprioception.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


One Legged Standing
Standing in readiness position, close to a wall or within a doorway.
Raise one leg up in front and hold balanced.
Mainain a braced core and neutral spine.

To improve single leg proprioception and balance.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


'Brugger' Postural Relief Position
Sitting at edge of chair, feet and knees wider than pelvic width and rotated slightly outward.
Maintaining a chin tuck, raise chest up, allowing spine to relax into a gentle arch.
Relax shoulders and rotate arms / hands so that thumbs point backward.
Hold, breath, release and repeat throughout the day.

To retract and depress the scapula.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


One Leg Lateral - Rocker
Keeping finger tips on wall or chair for support, step onto rocker board with one foot.
Keeping eyes looking straight forward, raise opposite foot onto board.
Maintaining a short foot and readiness position, raise one knee up in front.
Standing on one foot, keep board balanced.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Serratus Push-Up Plus
Start in a push up position (or on knees), allow shoulder blades to come together. Drop about 2 inches toward the floor. Protract shoulder blades to return to starting position

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Balance walk
Put half foam roller on the floor and have patient walk down to the end, turn around, and walk back. Repeat

To improve balance and proprioception.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Lateral Walk
Place half foam roller on floor and have patient side step along the foam roller from one end to the other. Repeat.

To improve balance and proprioception in the frontal plane.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Posterior Capsule Stretch

On your side with arm out so that shoulder is aligned with elbow bring forearm up to a 90 degree angle. With opposite arm push wrist down to floor. Lean upper body toward floor until stretch is felt.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Warrior Stretch With Twist

Keep back straight. Lunge forward, twist and reach overhead. Keep a neutral spine. Hold for 1-2 seconds and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Active Levator

Seated, turn head to one side and drop head forward.
Rest same side hand on back of head, do not pull on head.
With opposite hand, slowly alternate shrugging with reaching for the floor.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Pectorals - Corner / Doorway

Facing corner or standing through a doorway. Place forearms on each wall at shoulder height. Slowly lean chest forward into corner, keeping upper body tall, to feel a stretch in the front of the chest.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

active stretch

Thoracic stretch

Begin lying on the foam roller with roller in the small of the back. Use legs to roll up the mid-back to the top of the traps. Roll back and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Foam Roller Lat

lying on your side place roller under you
tip back slightly so you can really focus on lats
use legs to move up and down

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Foam Roll Glutes
Begin sitting with the foam roller at the top of the glutes. Use legs to push up and roll to the bottom of the glutes. Roll back and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Foam Roll Hamstrings
Begin with the foam roller at the top of the hamstrings, keeping the feet off of the floor. Use arms to roll down the hamstrings to behind the knee. Roll back and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Foam Roll IT band
Begin lying on side with foam roller at the top of the hip. Keeping the leg being rolled off of the floor, use other leg and arm to roll down the leg to just before the knee. Roll back to the top of the hip. Repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Day Three

Protocol : **xsquash exercise day3**
ID : THR :

914 774 3644

Date : Monday, September 07, 2009


Wall Slide / Arm Elevation
Stand with back against a wall with head touching wall and chin tucked in. Place feet a few inches away from the wall and raise arms above head. Squat body down the wall keeping arms elevated. Keep low back flat on wall with just a finger space. Actively exhale while performing squat to feel a stretch in the mid back.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Upper Back 'Cat'
From a hands and knees position, raise forearms up onto a low stool. Let upper body drop down through arms as if to sink spine into the body. Spine should sink through the shoulder blades, not arch at the low back,keep it neutral. Relax into the position, breath and return to start.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Hip Hinge
A: Correct: Keep spine straight by hinging at the hips.

B: Incorrect: Spine bends forward putting low back in a harmful position.
Hold pole against back of head and tail bone Once the pole breaks from the body clients not using their hips. Client may bend knees to get lower.Master this before doing any weights. This is not so much a test its just a way for you to see how poor bending mechanics are.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Cable External Rotation

Keeping elbow bent to 90 degrees, against the body and keeping the shoulder down, hold handle of cable and rotate outward in a controlled movement. Return to start.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Standing depressions

Shoulders back, chest out and arms straight at your sides. Start by very slightly raising the shoulders and then squeeze your shoulders downward. Repeat

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


1 Arm Stiff Pushdown

Stand holding cable handle in 1 hand with arm extended out in front of body. Push arm down, keeping it close to the body. Repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Cable Hamstring Curl

Stand with one foot on wood block and other foot with cable attached. Bring foot back and contract the hamstring. Return to start under control.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Chest Press - Ball

Lying on back over ball in a bridge position with weights raised up over chest, palms facing downward. Keep shoulder blades back and down, elbows slightly bent and maintain an abdominal hollow. Lower weights down straight down toward chest until elbows are level with ball. Push weights straight back up to start position and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Modified Pull up

Grip bar with both hands using an overhand grip, keeping heels on floor and abdominals tight. Relax arms and drop down, pull body back up so chest is almost touching bar and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Reverse Flys - Incline Bench

Kneeling on incline bench holding weights straight down, palms facing each other. Raise arms up in an arc like motion, squeezing through the mid back. Keep elbows slightly bent and palms facing in. Hold, lower with control and repeat.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Field Goals

Place dyna disc under chest and have arms hang relaxed.
Actively retract shoulder blades.
Extend the elbow to 90 degrees. The elbows should be flexed to 90 degrees.
While remaining scapular retraction, externally rotate the shoulders to 90 degrees.
Then depress the shoulders.
To strengthen the external rotators of the shoulder.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


One Leg Row

Standing on one leg in hip hinge position perform one arm row. Brace the core and maintain balance.
To start place resistance on same side as planted foot.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


No Rotation transverse cable chop
Grasp handle of cable with both hands keeping abs tight and shoulders down, twist from the hips while pulling cable straight across your body.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:


Side Bridge - Forearm
Lying on side with legs out straight (feet staggered) keeping, hip and shoulder in line.
Support upper body on forearm, placing elbow directly under shoulder.
Raise hip up off floor brace core maintain a neutral spine and hold.
Avoid rotating forward or backward.

To improve core strength.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

Opposite leg arm raise
Lie back on foam roller. Extend one leg and opposite arm out. Brace abdominals and hold a neutral spine position.
The further you extend the leg the harder it is.

Sets:	
Reps:	
Weight:	
Hold:	
Rest:	

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

Notes:

CHAPTER 7

Truth Behind The Gyms Most Common Exercises

Exercises that should be avoided

- The following are some exercises that are often used in most gyms. We are going to point out the problems with these specific exercises and what exercises can be used as an alternative.

Bad: Smith Machine Squats

- Fixed plane of motion
- Takes pressure off of the back, but puts significant pressure on the knees.
- Minimizes hip extension, which takes hamstring involvement out of the exercise.
- The hamstrings, however, are the muscle group that helps to stabilize the kneecap.
- Alternative: The box squat.

Alternative: Box Squats

- Wrong:

  Tendency to sit with weights

  Rounding the back

- Right:

  When you perform box squats, position the barbell on your shoulders, then position yourself near a box, or bench, as shown above. Descend under control until you feel the bench touching you, then push the weight upwards until you reach the initial position again.

* Never sit or rest on the bench with the weight on your back! Also, remember to maintain a neutral spine and braced core.

Bad: Smith Machine Bench Press

- Fixed plane of motion
- Works same muscle fibers each rep
- Takes the natural motion out of the movement
- Puts extra pressure on the joints
- Alternative: Barbell Bench Press or Dumbbell Bench Press

Alternative: Bench Press

- Place feet flat on the floor under thighs.
- Keep shoulders pulled backward and down toward the hips.
- Hold bar with wider than shoulder width grip, keeping elbows less than 90 degrees in relation to the shoulder.
- Lower bar to chest and press up. You may need to modify the range of motion for some clients.

Bad: Leg Extension

- The four parts of your quadriceps are designed to work together as one, but a recent study in Medicine & Science in Sports & Exercise found that leg extensions activate the sections slightly independently of one another. Even a five-millisecond difference can cause uneven compression between the kneecap and thighbone, inflaming the tendon that connects the kneecap to the shinbone.

- This exercise should only be done under very specific circumstances in rehabilitation setting. This movement puts a tremendous amount of torque on the knee and since the resistence is placed across the shin and not along the length of the bone, the bones are pressed backward which puts a tremendous amount of stress on them.

- When done for rehabilitation purposes, a very specific range of motion should be used and the shin pad should be placed higher up on the lower leg and the resistance should not start at any more than a 90 degree angle.

Alternative: Single Leg Squats

- Start with one leg out in front of body keeping the knee and foot in line with hip. Opposite leg should be resting on stepper or bench
- Perform a half squat
- Return and repeat

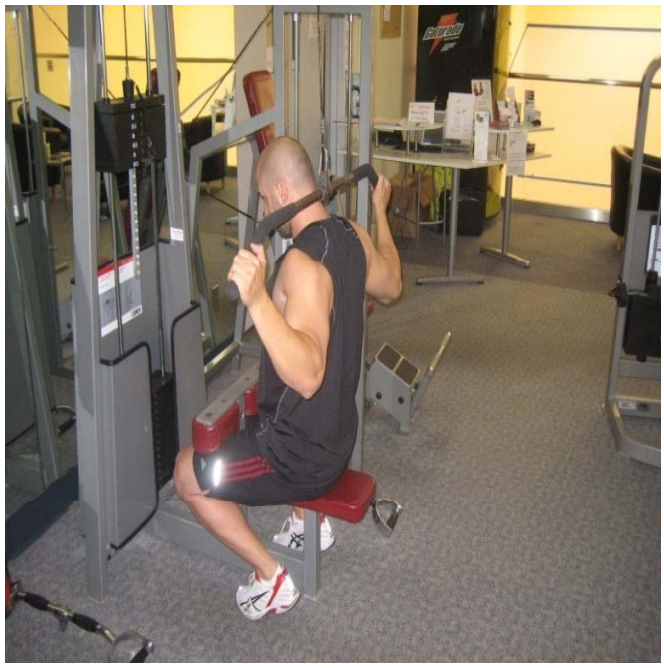
Bad: Behind the Neck Press

- Just as posterior pull downs strain your shoulders on the way down, this exercise hurts them on the way up. It also puts too much stress on the acromioclavicular joints (those little knobs on the tops of your shoulders), which can lead to an overuse injury.
- Neck injury
- Alternative: **Seated Shoulder Presses**

Alternative: Seated Shoulder Press

- Sitting tall on ball holding weights at shoulder level with palms facing forward.
- Keep shoulder blades down and back while pushing weights straight up over head.
- Do not touch weights together overhead, keep them shoulder width apart.

Bad: Behind the Neck Pulldown

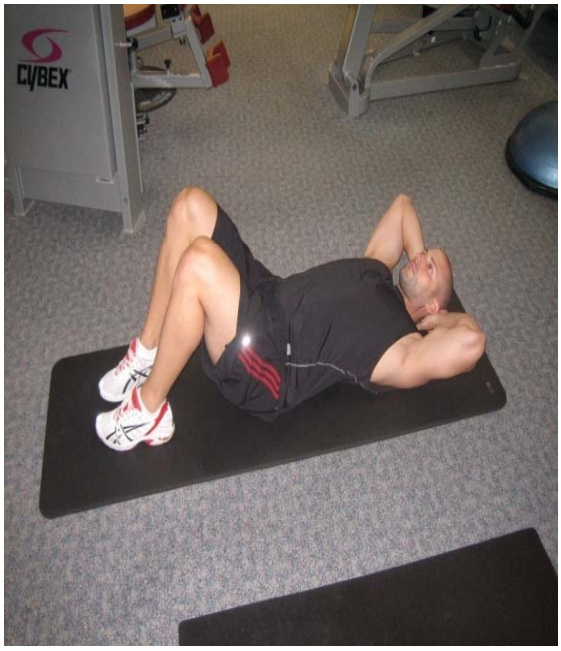


- Potential rotator cuff strain
- Potential neck injury
- Alternative: Lat pull-downs to the front.

Alternative: Lat Pull Down to the Front

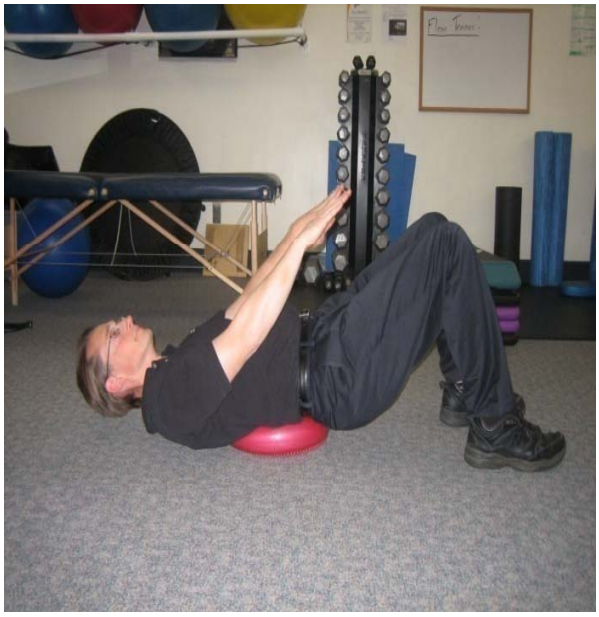
- Grasp lat bar at outer most bend with overhand grip.
- Bring lat bar to upper chest by pulling the upper arms and shoulder blades downward and backward.
- Maintain the natural curve of the back.

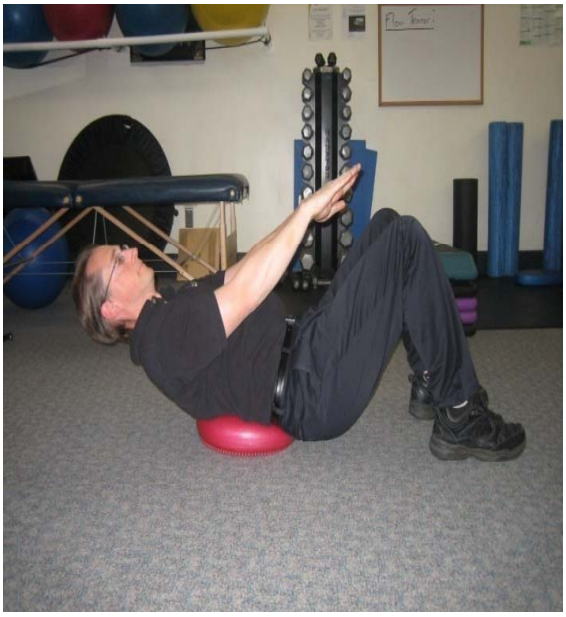
Bad: Traditional Sit Up



- Repeated lumbar flexion
- Strain on cervical spine
- Neck strain
- Alternative: Plank, support body in a plank position with forearms shoulder width apart and feet together. Keep a straight line through the knee, hip, and shoulder. Maintain contraction of the abdominals.

Alternative: Crunch on a Dyna Disc



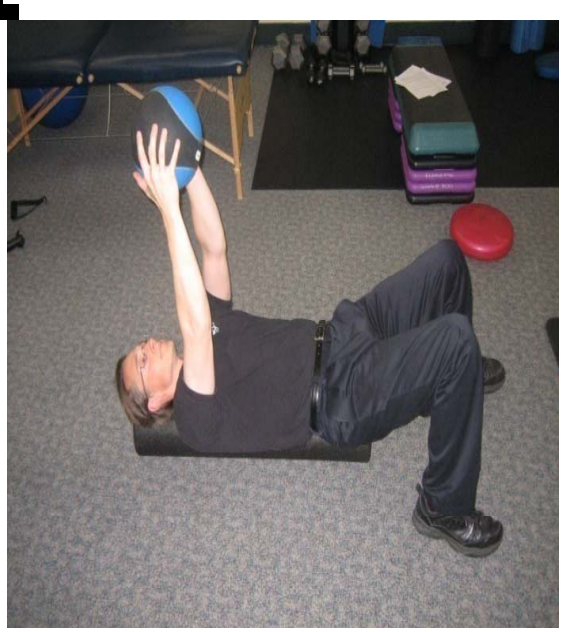


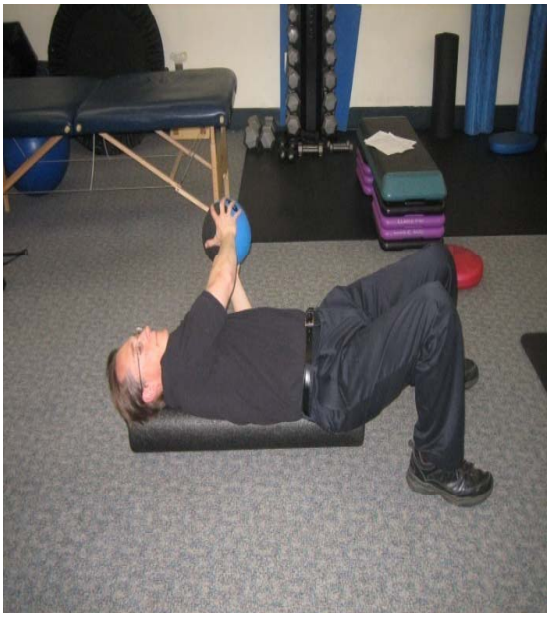
- Place dyna disc under low back. The closer to the tail bone the harder it is.
- Start with back off the floor, crunch up and return to start.
- Avoid touching the floor.

Bad: Leg Raise

- Over activation of the psoas
- Low back pain
- Alternative: Cross Bridge on Foam Roller

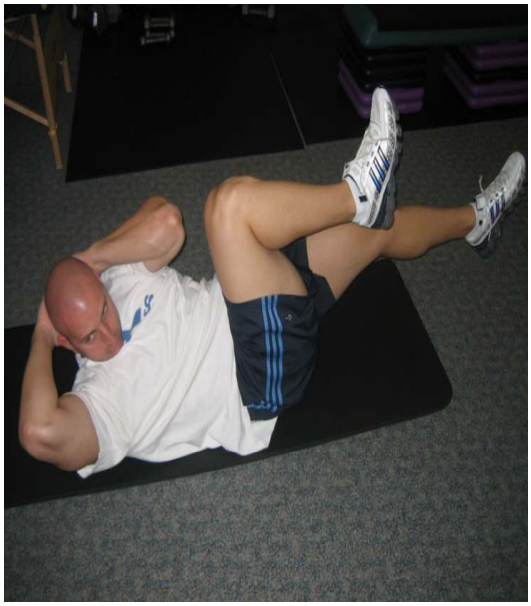
Alternative: Cross Bridge on Foam Roller





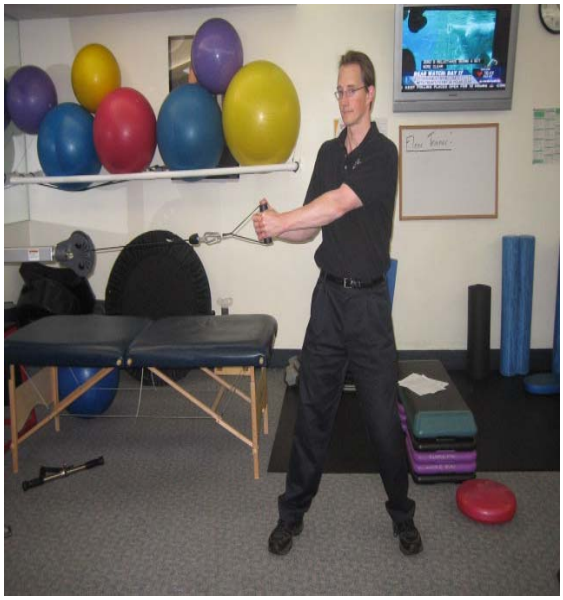
- Lie on foam roller with feet on the floor and holding medicine ball.
- With arms straight and keeping abdominals tight and neutral spine, move medicine ball from side to side.
- Return and repeat.

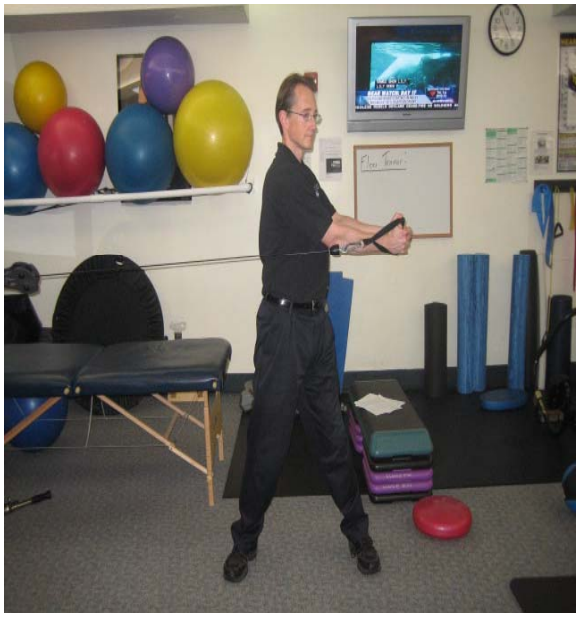
Bad: Bicycle Crunches



- Over activation of the psoas
- Low back strain
- Neck Strain
- Alternative: Transverse cable chop

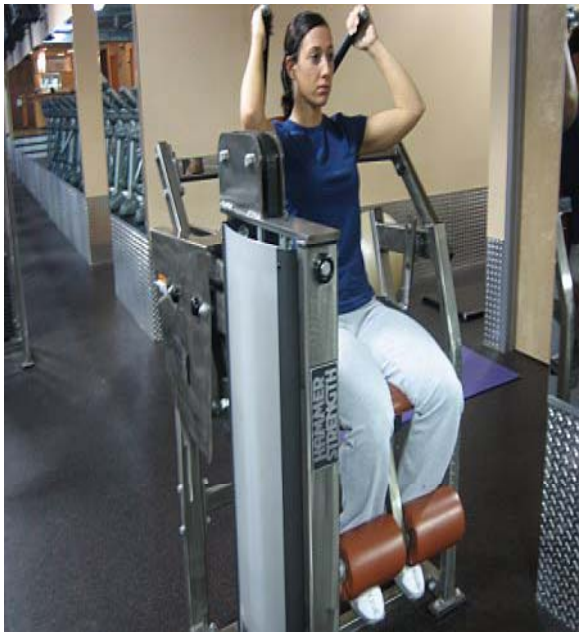
Alternative: Transverse Cable Chops





- Keeping abdominals tight and neutral spine.
- Twist from your hips while pulling through with your arms. Keep shoulders and hips lined up.
- Repeat

Bad: Sit Up Machine



- Forced lumbar flexion
- Locked range of motion
- Alternative: Crunch on the stability ball

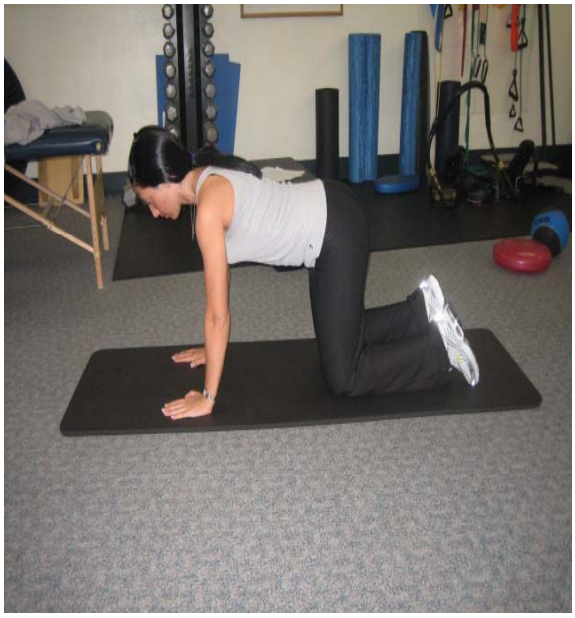
Alternative: Crunch on the Stability Ball

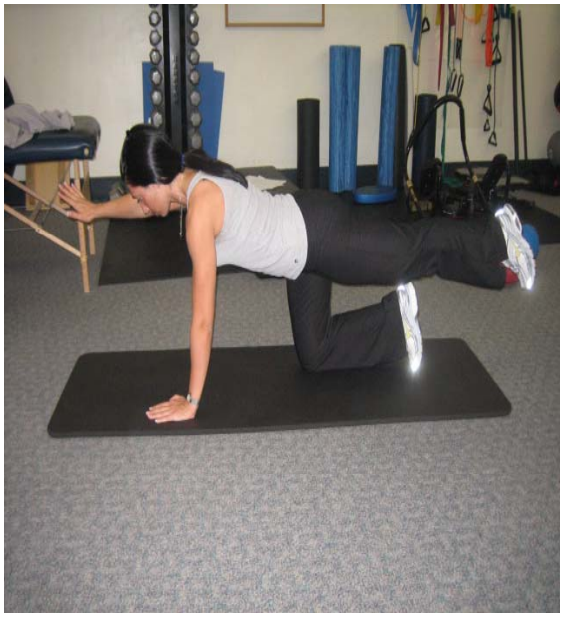
- Lie back with ball supporting low back.
- Place fingertips behind head but don’t pull your neck. Look at the ceiling and don’t poke chin.
- Crunch your body forward raising shoulder blades off ball. Do not come up too high and flex the spine.
- Lower back down, but avoid shoulder blades touching the ball.

Bad: Superman

- This results in over 6000 N (about 1300 lbs) of compression to a hyperextended spine, loads the facets, and crushes the interspinous ligament.
- “This is a poorly designed exercise”,Stuart McGill PhD.
- Alternative: Quadruped arm and leg raise

Alternative:Quadruped Arm-Leg Raise





- Start on all fours, knees under hips, hands under shoulders.
- Brace the core and squeeze the glutes.
- Press the heel straight back to straighten the leg while keeping the torso level and spine neutral.

Bad: Hack Squat

- Patella Femoral shear
- Forced Range Of Motion
- Alternative: Squatting against the wall with a stability ball or foam roller

Alternative: Foam Roller Wall Squat

- Stand with foam roller placed on low back, feet about shoulder width apart and about 2 feet from the wall.
- Keeping abdominals tight, roll body downward into a

  squat position, then roll back up to start.

Bad: Upright Row

- Impaired Rotator Cuff Range Of Motion
- By maintaining a closed grip with palms (and thumbs) facing you, you have created internal shoulder rotation. As the bar is raised your shoulders are abducted and internally rotated, and that is a pinching combination. As the soft tissue structures within the shoulder are pinched, they become chronically inflamed.
- Alternative Exercise: Properly executed Deltoid Flyes and Shoulder Shrugs are good replacements.

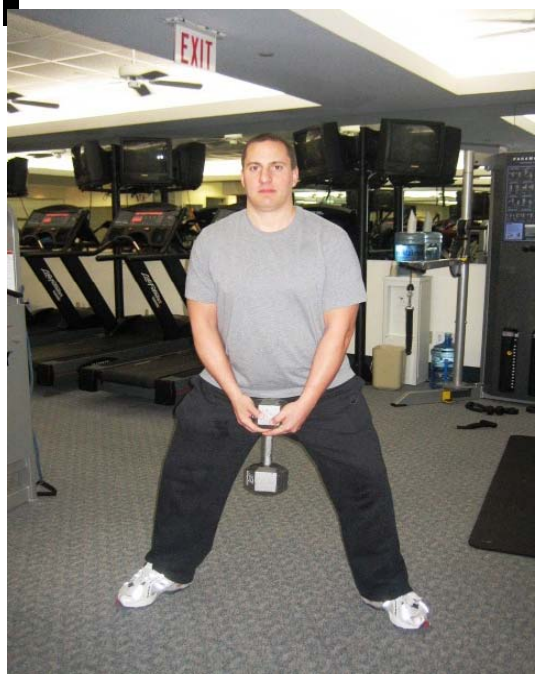
Alternative: Deltoid Flyes

- Kneeling on incline bench holding weights straight down,
  palms facing each other.
- Raise arms up in an arc like motion, squeezing through the mid back.
- Keep elbows slightly bent and palms facing in. Hold, lower with control
- Repeat.

Bad: Adductor Machine

- Forced Range Of Motion
- This exercise further tightens an already tight are most people.
- The hips must simultaneously rotate and rise laterally. These actions place great stress on the lumbar spine, especially when heavy weights are used. The danger is even greater if the movement is done quickly, with a jerk, or if there is excessive hip rotation when the leg is out in front of the body
- When working the adductors, more emphasis should be put on flexibility unless directed by a physician for a specific purpose.
- Alternative: Sumo Squat

Alternative: Sumo Squat



- Start with feet wider than shoulder width and toes slightly pointed outward
- Holding weight in front you between your legs , squat w/o letting knees cave in or letting your back round.
- Only go down as far as you can maintain a neutral spine
- *Flexibility is important in these muscles. The next slide will demonstrate a proper stretch

Alternative: Adductor Stretch

- Standing, toes pointed forward, step out sideways into a side lunge position.
- Keep body upright by holding a chair.
- Shift weight from side to side, holding each way, to feel a

  stretch in the inner thigh and groin area.

Good Exercises that are Performed Improperly

- The following exercises are great to incorporate into your routine when performed correctly, but are often performed improperly.

Stiff Leg Deadlift

- Wrong:
  Hyperextending or locking the knees
  Going too heavy
  Letting the weights hit the floor
  Heels lifting
  Rounding the back

- Right:
  Bend at your waist with your head up, back straight and knees soft. Hold bar with hands about 16 inches apart. Straighten up while holding the bar at arm's length. Can also be done standing on a bench or box (so that plates don't touch the floor) or with dumbbells.

*A person's flexibility will determine the range on this exercise. This exercise needs to be practiced before adding resistance. People with low back injuries may be excluded unless prescribed for rehab.
It is a good idea to slightly bend the knees for beginners, especially when muscles are tight.

When performing these lifts under normal circumstances it is important that the knees are not hyper extended.

Good Morning

- Wrong:

  Rounded back with a load on the shoulders

  Force hamstring range of motion

- Right:

  Place a barbell on your shoulders. Keep your head up and your back completely straight. Stand with your knees slightly bent and feet shoulder width apart. Bend at your waist until your upper body is just above parallel to the floor. Return slowly to the upper position.

Hanging Knee Raise

- **<u>Wrong:</u>**
  The majority of the movement is done with hip flexors.
  Hyperextend spine.

- **<u>Right</u>**
  Hanging from arm slings or chin up bar with the knees bent; draw the hips upwards until a strong contraction is felt in the abdominal. Return to the starting position under control and repeat for the prescribed number of repetitions. Remember to avoid arching or hyper extending the lower back and raise the legs by using the strength of the abdominal rather than bending at the hip.

*This is a good exercise if you have proper core strength and are experienced. It is impossible to maintain proper form if you do not have good core strength.Do not let the legs completely straighten. Clients with back problems should be excluded.

This is a very high level exercise.

Swiss Ball Crunch

- Wrong:
  - Pulling neck toward chest
  - Strain on cervical spine
- Right:

Sit on top of an exercise ball with your feet placed firmly on the floor. Roll the bottom half of your glutes off the ball by sliding forward. Your lower back should be centered on top of the ball. Place your hands on the sides of your head, but don't use your hands to pull. Look up at the ceiling and crunch by bringing lower ribs and pelvis toward each other. Don’t round your back it’s a small movement. This exercise should be avoided by any disc patient.

Romanian Deadlift

Right Wrong

- **Wrong:**
  - Rounding the back
  - Too much weight
  - Letting the weight touch the floor
  - Keeping head down

- **Right**

Put a barbell in front of you on the ground. Standing on a box if needed, grab the dumbbell with a little wider than shoulder width grip. Bend the knees slightly. The position should be shins vertical, hips back and back straight. Keeping your back completely straight at all times, use your hips to lift the bar. The movement should not be fast but steady and under control. The arms should remain straight. Once you are standing completely straight up, lower the bar by pushing the hips back, only slightly bending the knees, unlike when squatting. Take a deep breath at the start of the movement and keep your chest up. Hold your breath as you lower and exhale as you complete the movement. Start with light weights to get used to it and be careful!

Correct Squat

Description: Center a barbell behind the neck and across the shoulders with hands approximately half-way between the shoulders and the weights. Feet should be positioned approximately shoulder width with feet pointing slightly outward. Lower yourself under control into the squat by bending the knees and hips until the thighs are parallel to the floor. Return to the starting position by extending the knees and hips. Remember to keep your knees in line with the toes throughout the movement and keep your eyes fixed straight ahead and not upward as this may lead to neck injury. Don't bounce at the bottom of the movement and don't allow the thighs to travel below parallel at the bottom position or allow the back to deviate from the upright position.

*Things to watch: squats are a demanding exercise and should be worked up to. Keeping form is crucial. If the person has shoulder or neck issues it may be best to do dumbbell squats and hold them at your sides. Remember you are loading the spine not just the legs so people with back injuries sometimes shouldn't squat. Core strength is very important and should be noted. It would be a good idea to get every client to be able to do some form of squat. Clients with knee injuries may need to modify the range or use a ball or roller on a wall to decrease knee torque. There is no conclusive evidence that states the knee passing the toe is bad. In fact there are times when it is necessary. A good rule is if there is no pain then the knee may pass the toe but that debate is too in depth for this course.

Incorrect Squat

- **<u>Wrong:</u>**
  - Rounding the back
  - Heels lifting
  - Weights too heavy
  - Excessive forward lean
  - Bar too high on neck

  * Squatting incorrectly can cause joint problems throughout the entire body, especially the lower back. Proper core strength is imperative if you wish to squat correctly. If the core is weak you will not be able to maintain a neutral spine and drive the necessary force through the hips to move the weight. Lack of core strength will overload the low back and promote faulty movement patterns. In most cases you'll see the glutes aren't working the the erectors are doing all the work.

Squats: A Word of Caution

- Squats are a demanding exercise and should be worked up to.
- **FORM IS CRUCIAL-** Note Core Strength
- Shoulder / Neck issues- alternate dumbbell squats with arms at side
- Knee issues- modify squat range of motion or use a physio ball to decrease knee torque
- Do not squat if suspect a back or spine injury
  - There is no conclusive evidence that states the knee passing the toe is bad. In fact there are times when it is necessary. A good rule is if pain is absent the knee may pass the toe, but that debate is too in depth for this course.

Brace Yourself

Weight Belts and Knee Braces: A Help or A Hinder to the Core?

Why are braces bad?

- **Knee Wraps:** Relying on wraps during regular workouts could decrease the training effect --- when the wraps are doing some of the lifting, your muscles aren't which can overload the joint itself and create improper motor patterns. Also, there is little evidence that wraps prevent injury. They may actually do more harm than good.
- Heavy wrapping can warm your knees too much, or, conversely, the tightness could cut off some circulation causing a drop in temperature --- either extreme weakens the muscle tissue. Also, tight wraps may cause damage by increasing the friction between the knee cap and leg bone, and the edge of the wrap may dig into the skin causing micro-tears in the muscles and tendons.
- In addition, the wraps can bunch up in back of the knees, tending to separate the joint during a deep squat --- like putting a wedge in the door jam and trying to close a door.
- Finally, heavy wrapping may slow down the quickness that is critical in Olympic-style lifting.

Why are braces bad?

- **Weight Belts:** A belt is very effective for stabilizing the abdominal area. However, it is so effective that your core muscles aren't challenged and don't contract effectively. The nervous system doesn’t know to activate more muscles fibers because of the false sense of stability created by the belt, this creates a reliance on the belt. This will also lead to synergistic dominance not only in the trunk but in the extremities.
- A belt should really only be used for near-maximal lifting with very heavy weights during competition. If you need a belt to do bench presses or barbell curls, you should re-examine your form and honestly evaluate your core strength. You may be setting yourself up for a back injury.
- A belt works to stabilize your core by making your abs push outwards against it. And limiting movement.
- **Lesson:** Ease yourself off the belt if you currently use one. You will need to slowly work back up to your current weights to ensure you don't hurt yourself. When you go to do a lift, brace your abs while breathing maintaining the brace. You will develop far better core strength and stability, and tighter, flatter abs. A weak core will overload the extremities and open the athlete up to injury.

CHAPTER 8

OVERTRAINING AND INJURIES

Over Training and Resistance Exercise

What is Over Training?

"Overtraining is a common problem in weight training, but it can also be experienced by runners and other athletes. It occurs when the volume and intensity of the exercise exceeds an individual's recovery capacity. They cease making progress, and can even begin to lose strength and fitness.

Why is it harmful?

- Persistent muscle soreness
- Elevated resting heart rate
- Increased susceptibility to infections
- Increased incidence of injuries
- Irritability
- Depression
- Loss of motivation
- Insomnia
- Decreased appetite
- Weight Loss
- Chronic Fatigue
- Muscle and eyelid twitches

Symptoms of Over Training

- Totally run down after a workout
- Experience chronic joint stiffness
- No longer making any progress
- Have a bad attitude towards your workouts
- Your resting morning heart rate is 5 to 10 beats per minute too high
- Experience an increase in body temperature
- Insomnia
- The development of a chronic overuse injury, usually in the joints
- Have a positive Keto-Stix reading

If you experience any of these symptoms, you may be over training.

Causes of Overtraining

- Not resting long enough between heavy workouts
- Not eating enough food
- Training beyond failure in every workout

- Performing too many sets per body part
- Taking in too little protein

States of Metabolism

There are three distinct stages of metabolism undergone in the cell; equilibrium, catabolism and anabolism.

Equilibrium

Equilibrium can be easily defined as a fully recovered state, where energy is neither being depleted nor replenished, and structural tissue is not being damaged or repaired. As a resistance athlete, it is desirable to achieve a momentary state of equilibrium if over training is to be avoided. However, if this stage of metabolism is maintained for long periods (10-15 days or more), atrophy of the contractile proteins will result in gradual tissue loss. It is worth mentioning that the over trained athlete's metabolism, seldom, if ever, enters into the stage of equilibrium. This is because the muscle tissue never reaches a fully recovered state. Reducing the duration of intense training sessions, allowing for longer rest between workouts, and eating plenty of total calories from healthy protein and carbohydrate foods can all help to avoid over training.

Catabolism

Catabolism is the stage when energy is being depleted and tissue damage is taking place. Catabolism obviously occurs during exercise. There are two distinctly different processes taking place; energy is depleted and structural tissue is damaged. Your ultimate goal is to "keep catabolism in the gym." If you are over training, catabolism will continue long after the workout is over. The body will continually feed off of hard earned muscle tissue for its recovery needs (gluconeogenesis).

Anabolism

Anabolism is the stage of metabolism when energy is being repleted and tissue damage is being repaired. This is the most valuable stage of metabolism to the resistance trainee. The purpose of expending less total energy during catabolism is to allow for the post-workout presence of sufficient pyruvate (converted form of stored glycogen) to initiate anabolism. Anabolism can only be initiated in the presence of cellular recovery energy. Most successful resistance athletes know the value in ingesting a high carbohydrate post workout meal, but even these carbohydrates can be a day late, and a dollar short if the training session was too exhaustive. It takes time for digested nutrients to reach the exhausted tissues, and during this time, continued catabolism is occurring in the over trained muscle.

All things considered, you are better off slightly under training and reaching the stage of equilibrium, than over training and remaining longer in the stage of catabolism.

Injuries

Although sports and exercise programs offer numerous benefits, there is always the risk of injury. Athletes physically strengthen and condition their bodies with the hope of avoiding injuries but unfortunately this does not always prevent them from occurring. Every sport or activity presents different risks of injury. Regardless of the type of injury, evaluation and treatment by a professional must take place as soon as possible after the injury has occurred. This evaluation should include an inspection, physical exam, and if necessary, diagnostic testing such as x-ray, CT scan, MRI, or NCV/EMG. The time between the injury and seeking professional help will play a vital role in the athlete's recovery. The more time that passes between the onset of injury and treatment, the higher the risk of further damaging the affected tissue(s), lengthening and complicating the time of recovery.

This is even the case in minor injuries, or aches and pains that one might experience as a result of their sport or activity. It is important to listen to one's body. Pain is an alert mechanism of the brain to let one know that there is a problem somewhere in the body. Therefore, pain should be immediately addressed, and athletes should not be encouraged to play or train through pain without it being professionally addressed.

There are many different types of injuries that can occur. A large portion of athletic injuries cause damage to the soft tissues of the body. Soft tissue injuries affect muscles, fascia, tendons and ligaments, which all control and protect the joints. There are two types of soft tissue injuries – closed and open. A closed injury occurs when the soft tissue has been damaged, but the surface of the skin has not been broken. An example of a closed injury would be an ankle sprain. An open injury is the same as a closed injury except for the fact that it involves a break in the skin. An example of an open injury is a cut or scrape.

Inflammation will infiltrate the affected area, and following this, fibrosis will occur, creating scar tissue adhesions. These adhesions will not develop along the normal fiber patterns of the affected soft tissues. Rather, they will form random patterns, not in accordance with these normal patterns. They may develop within the actual fibers of a particular tissue, or between different tissues all together. This will create restrictions in the function, or range of motion, that will alter movement patterns and biomechanics. As a result, other tissues will have to do extra work in order to compensate for this lack of function, and over time, may become overloaded themselves. Soft tissue dysfunction may also contribute to degenerative processes in the future. This creates a cyclic pattern of dysfunction and injury that can be avoided by seeking immediate attention.

Strains and sprains are common closed injuries that occur during sports and exercise programs. A strain is a tear in the muscle or tendon fibers. A sprain will stretch or tear ligaments, but not cause a dislocation of the accompanying joint. Both can be categorized as mild, moderate or severe. There are characteristics that help indicate the

severity of the injury; pain, temperature, redness and swelling. In addition to these, there may also be a loss of function, or range of motion.

The recommended treatment of choice after an injury has been evaluated by a professional and stabilized is RICE; rest, ice, compression and elevation. This will reduce the risk for further damage to the injured area and control the rate of bleeding.

The next step is to rest the injured area from the painful or offending activity. This will allow the body to begin the healing process, and again, prevent further damage from occurring. If the injured area is not rested, the healing process will be delayed and recovery will be slowed down.

It is also important to note that, depending on the injury, while resting from the offending activity, active and passive treatment to the injured and surrounding areas is of the utmost importance. This will allow the speediest rate of recovery. A healthcare practitioner specializing in neuromusculoskeletal injuries will determine the appropriate treatment.

While the injured area is being protected and rested, ice therapy can begin. This promotes recovery by helping to reduce inflammation at the site of injury. When blood flow is reduced, swelling and/or pain are minimized. The recommended time for ice therapy is 10-20 minutes, with a 20 minute to one hour rest period between treatments, depending on the location of the injury.

In addition, compression can begin to be applied to the injured area. The compression should firmly lend support to the injured area but should not cut off circulation and/or blood flow.

Finally, the injured area should be elevated approximately 12 inches above the level of the heart whenever possible. This will aid in venous and lymphatic drainage of the affected region, helping reduce inflammation.

Everyone that participates in a sports or exercise program should be aware that injuries sometimes cannot be avoided. The risk of injury can be reduced by properly training and conditioning to enhance performance and function. Unfortunately, there is no way to completely remove the risk. There is no such thing as perfection in the tissues of the body, and, therefore, there is always the chance of overloading a tissue, causing damage. The reality is that injuries will occur when dealing with sports. They can, however, be prevented from worsening by taking some precautions. The most important thing to do when an injury occurs is to seek immediate professional or medical attention and to be evaluated and treated appropriately.

CHAPTER 9

Evaluations

Name_____ Today's date:_____

Phone (h)_____(w)_____

Address_____ Email_____

Medical Information:

When was your last complete physical examination? What were the results?

List any medications *you* are currently taking, or have taken in the past 6 months. Provide the reason they were prescribed.

List any operations that *you* have had (include date):

Are *you* on a special diet?

Have any member of *your* immediate family (mother, father, sister, brother) had:

Heart disease Hypertension High Cholesterol Heart Attack
Diabetes Stroke Obesity

Indicate any of the following which currently or have existed in the past, and note when:

Anemia___ Arthritis___ Asthma ___ Back pain/injury___
Bursitis___ Cancer___ Diabetes___ Dizziness___
Epilepsy___ Headaches___ Heart problems___ Hernia___
Hypoglycemia____ Joint problems____ Kidney problems___Liver disease___
Lung disease____ Shortness of breath__Ulcer ____ Weight problems____
Chest Pains____ High blood pressure__Thyroid problems_ High cholesterol___
Osteoporosis_____ Neurological Disorder_____ Other_____

***Do you* currently smoke? ____ Have *you* ever smoked? _____**

Age: ____

Are you pregnant or trying to become pregnant?_____

***BLOOD PRESSURE:*____**

Explain your current eating habits How many times do you eat per day?___

Do you take any supplements?_____
_____
_____
_____
_____
_____

How do you spend your day at work? **Hours of sleep do you get each night?___**
Sitting at a desk walking/ active highly active **Hours per week_____**

How would you rate your daily stress level?_____ Rate your daily energy level?_____

Do you enjoy exercising?____ How often do you perform resistance training?_____

How often do you perform moderate exercise?___ Vigorous exercise? ___

How would you rate your current fitness level?
Poor Below Avg. Moderate Above Avg. Excellent Competitive Athlete

List any other factors which might affect your safe participation in a fitness program?

Weight _____ Height____ Body Fat___ Measurements: Waist___ Thigh___ Chest___ Arms___
Lowest weight_____ Highest weight_____ Favorite weight_____

Personal Goals: (circle all that apply)

Weight loss lbs._____	**Improve strength**	**General Fitness**
Reduce risk of disease	**Improve Flexibility**	**Improve cardio Vascular Health**
Improve posture	**Tone and firm**	**Injury Rehabilitation _____**
Strengthen Bones	**Exercise regularly**	**Balance and Stability**
Other _____		

Please list anything else that will help provide a better Fitness Program

Rest HR____ Max HR_____ Recovery HR_____

NOTES:

Body Composition Analysis

Body Part	Date	Date	Right	Left	Observations	Observations
Chest						
Triceps						
Subscap						
Axilla						
Superiliac						
Abdomen						
Thigh						
Total:						
BMI						
Weight						
Percent Body Fat						
Fat Weight (lbs)						
Lean Body Mass (lbs)						
Circumference Measurments	Date	Date	Right	Left	Observations	Observations
Arm						
Chest (male only)						
Waist						
Hip						
Abdomen						
Calf						
Thigh						
Waist-to-hip Ratio						

Movement Screening

	IE	Date	Date	Date	Date	Observations
Date						
Overhead Squat						
Torso Lean Forward						
Pain With Arms Extended						
Depth						
Shoulder Elevation						
Lunges						
Heel Rise						
Knee Collapse						
Torso Lean Forward						
Pronation						
Single Leg Squats						
Depth						
Knee Collapse						
Heel Rise						
Pronation						
Hip Drop						
Squat						
Heel Rise						
Knee Forward						
Rounding Back						
Pronation						
Knee Knocking						
Push-up						
Shoulder Pain						
Low Back Drop						
Shoulder Elevation						
Shoulder Retraction						
Scapula Winging						

Muscular Strength and Endurance Analysis

Exercise	Date	Weight	Rep	Date	Weight	Rep	Observations
Front Squat							
Glute Bridge							
Bench Press							
Plank							
Chin Ups							
R/L Ext. Rotation							
Dead Bug							
Dead Lift							
Exercise	Date	Weight	Rep	Date	Weight	Rep	Observations
Front Squat							
Glute Bridge							
Bench Presss							
Plank							
Chin Ups							
R/L Ext. Rotation							
Dead Bug							
Dead Lift							

Speed and Agility Analysis

Exercise	Date	Date	Date	**Observations**	Starting HR	Ending HR	1min Post HR
3 Cone Drill							
Time							
Multistage Fitness Test							
					Distance	Distance	Distance
Vertical jump							
Long Jump							

Clinical Postural and Flexibility Analysis

Exercise	Date/Rep	Date/Rep	Date/Rep	Date/Rep	Observations
L Thomas Test					
R Thomas Test					
L Shoulder Flexion					
R Shoulder Flexion					
L Shldr Ext. Rotation					
R Shldr Ext. Rotation					
L Shldr Int. Rotation					
R Shldr Int. Rotation					
L Shoulder Ext.					
R Shoulder Ext					
Sit and reach					

Name	Activity	Date	Time	DATE	Time	DATE	Time	DATE	Time	DATE	Time	DATE	notes

Exercise	Reps	Set	Tempo	Rest	Weight	Reps done	Notes

Westchester Sports & Wellness Squash Presentation

Principles of Movement Dysfunction and Injury Management

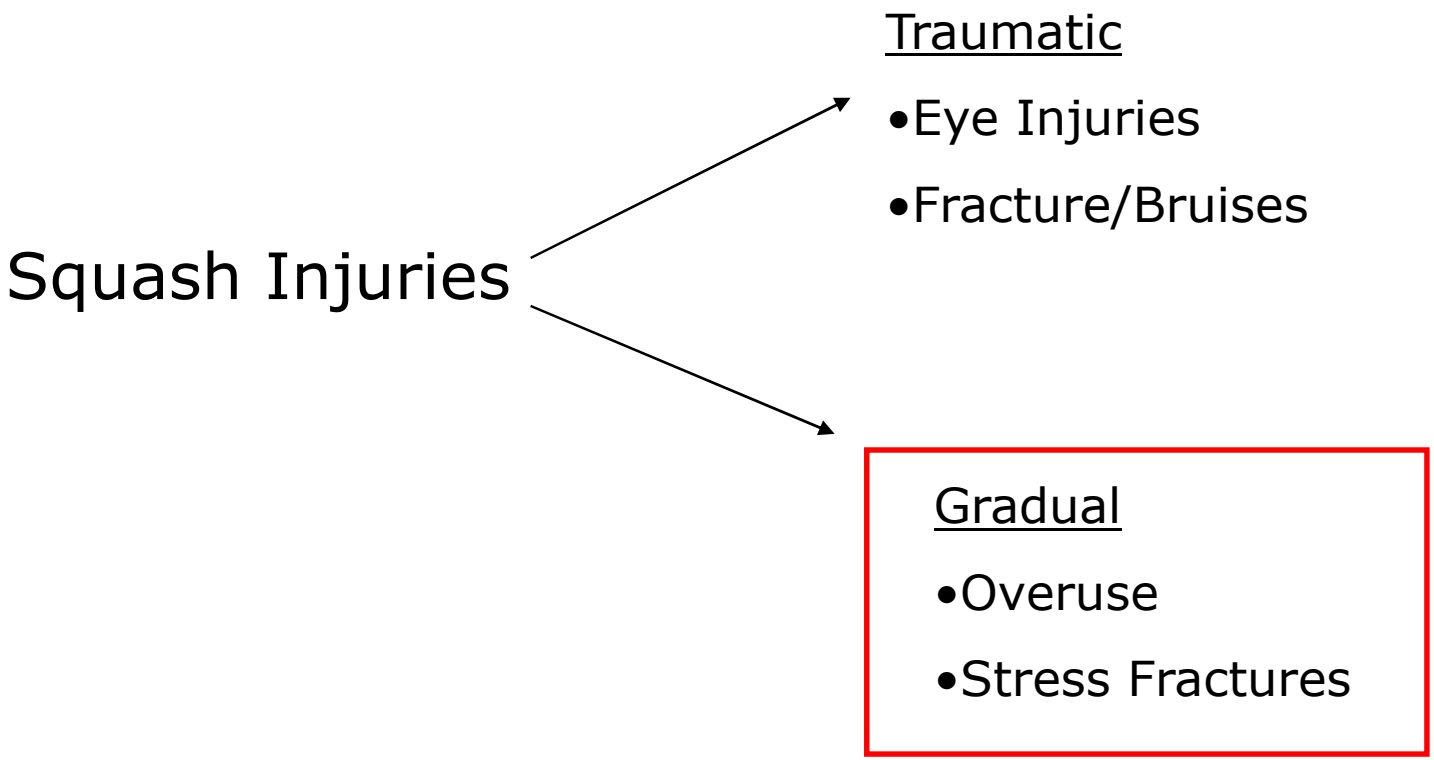
Objectives:

- Introduce common Squash Injuries
- Explain why Injuries Occur
- Assessment of Injuries – Movement Analysis
- Importance of strength training

Squash

- Players require a high level of fitness, they are active 50-70% of the playing time
- Players are at increased risk of overuse injuries due to high impact, repetitive, multidirectional movements
- One of the most demanding sports because it requires aerobic endurance combined with anaerobic power, quickness, strength and flexibility

Squash Injuries



Upper Extremity Squash Injuries

- Rotator cuff syndrome
- Supraspinatus tendonitis
- Medial/Lateral epicondylitis
- Wrist strain/sprains

Rotator Cuff Syndrome

- Four muscles of the Rotator Cuff become imbalanced
- Acute injuries occur due to trauma
- Chronic injuries occur due to overuse and shoulder girdle weakness

Supraspinatus tendonitis

- Inflammation of the rotator cuff
- Caused by rotator cuff overload and muscle imbalance
- Repetitive overhead shoulder movements

Lateral epicondylitis

- Also known as tennis elbow
- Inflammation is caused by rotation of the elbow
- Repetitive extension and flexion also irritates lateral elbow
- When inflammation sets in bone rubs against the tendon causing increased pain

Medial Epicondylitis

- Inflammation of the medial elbow
- Caused by an overuse of the flexorpronator muscle
- Chronic swings in which top spin is placed on the ball increase flexorpronator use

Wrist Strain/Sprain

- Occurs because its ligaments are stretched beyond their normal limits.
- Categorized into three grades
- Ligaments around flexor and extensors of the wrist help stabilize the hand

Lower Extremity Squash Injuries

- Foot Injuries
- Knee Injuries
- Hamstring Sprains
- Squash Hip

Plantar Fasciitis

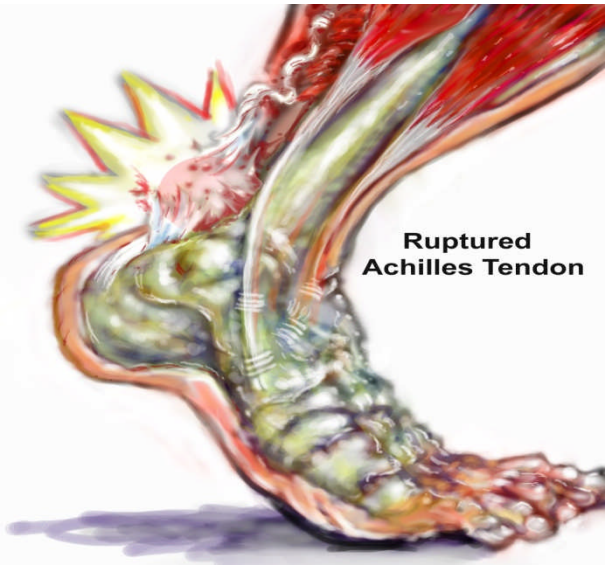
- Localized pain on bottom of foot
- Worse in the morning when getting out of bed
- Heel spurs may develop and contribute to localized pain

Shin Splints

- Painful condition that develops along the medial edge of the tibia
- Worse when you first start running and may disappear as running time increases.
- Preventive exercises include calf stretches, gait function, and heel raises.
- Chronic shin splints can be a symptom of a stress fracture.

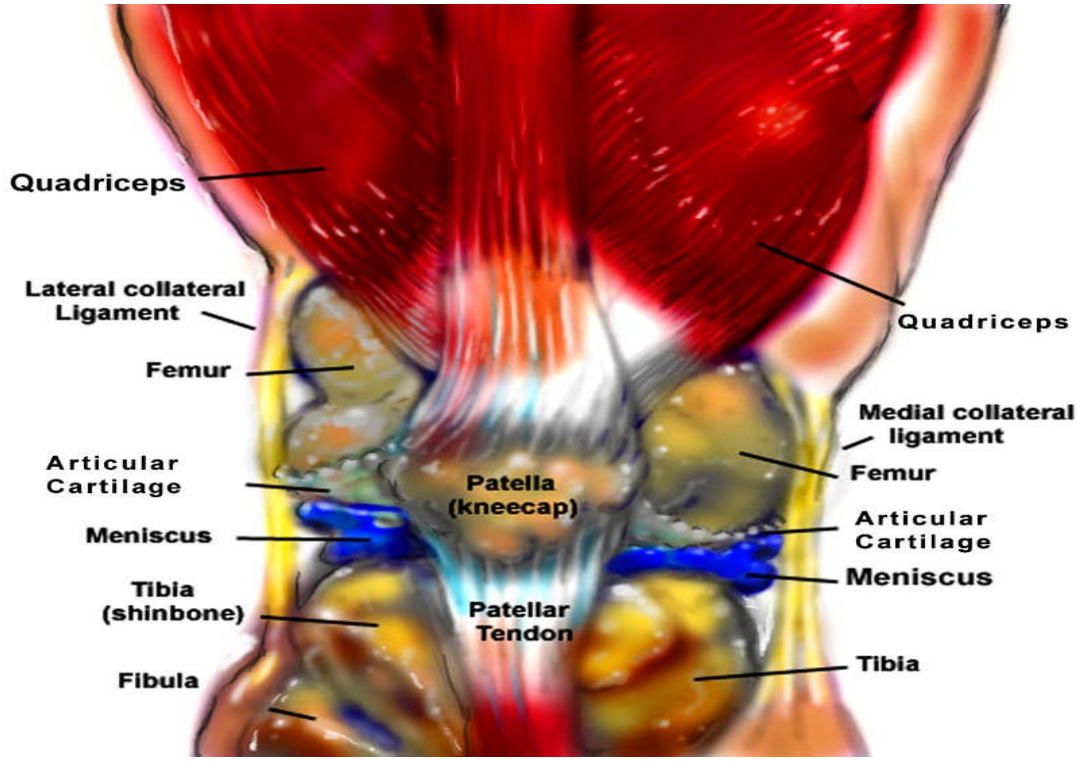
Achilles Tendonitis

- Inflammation of the Achilles tendon causing pain.
- Pain increases with ambulation
- Rupture = lack of plantarflexion



Patellofemoral Pain Syndrome

- Pain over anterior knee
- Worse with ascending stairs, sitting, lunging, and squatting



Popliteus Syndrome

- Point tenderness at lateral and superior aspect of knee
- Injured with lunging exercises
- Aggravated by running downhill, descending stairs

Quad/Hamstring Strains/Sprains

- A sprain is an injury to the ligament and a strain is an injury to a muscle
- Develops after quick lunges
- Decreased vascular muscles
- Identified by sharp pain resulting in the inability to properly perform a lunge

Squash Hip

- Psoas Tendonitis – Inflammation and pain in the groin area, especially with weight-bearing
- Bursitis: Extreme tenderness

  over the hip joint worsens with climbing and walking/running up stairs

Low Back Pain

- Results from repetitive lunging
- Decreased hip mobility, tight hamstrings

Overuse Injuries

- AKA Repetitive Stress Injuries
- Result of cumulative microtrauma for example, lunging
- Most prevalent cause of injuries today
- Most misunderstood, misdiagnosed, and often poorly treated

Why Do Overuse Injuries Occur?

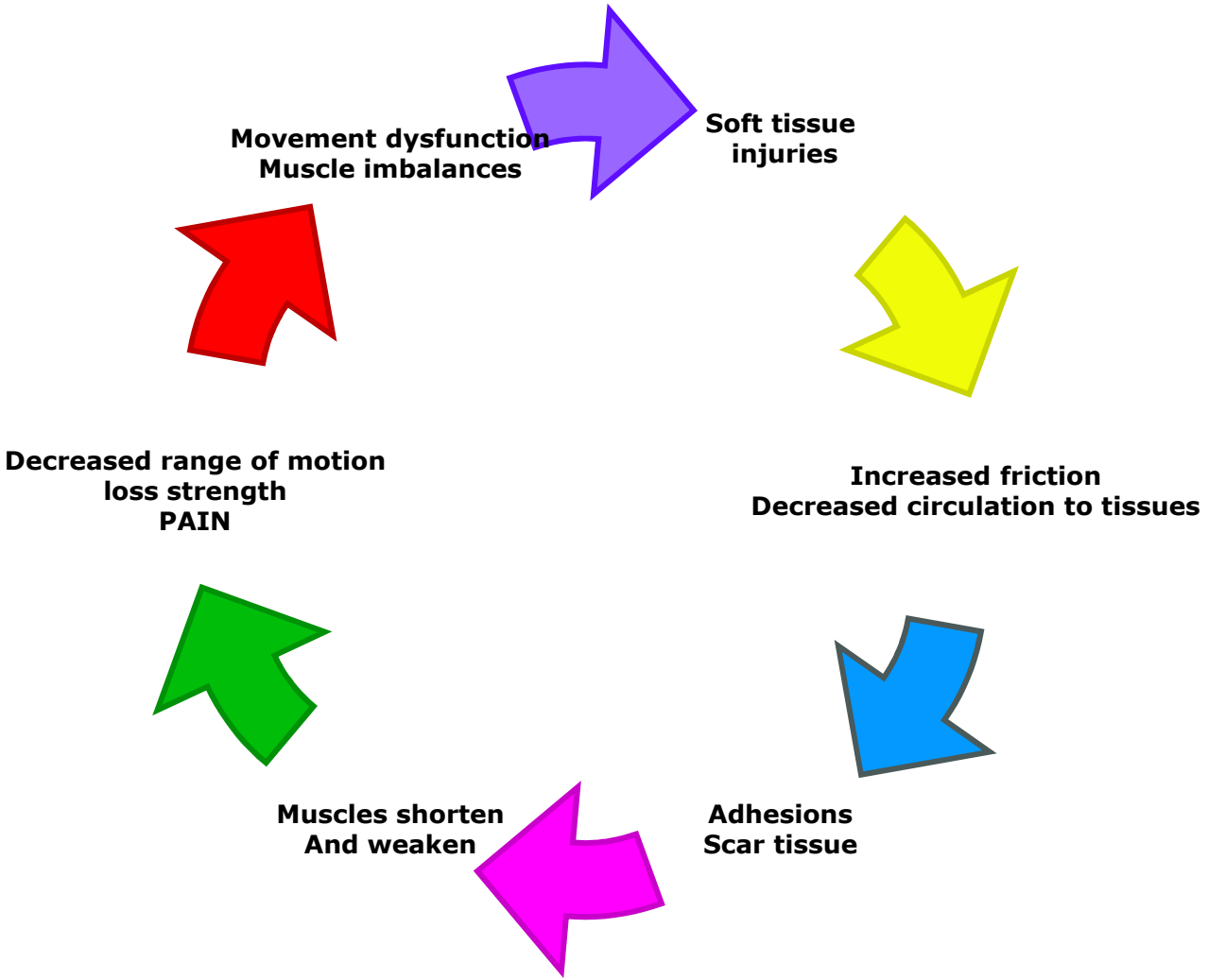
External Factors

- Decreased flexibility and range of motion
- Changes in training routine
- Errors in training technique
  - Muscle imbalances
- Improper attire (worn out shoes, etc)
- Inadequate physical conditioning
- No warm up/cool down

Internal Factors

- Nutrition
  - Poor diet
  - Proper hydration
- Structural and biomechanical imbalances
  - Overpronation
- Inadequate rest

The Cycle


Soft tissue injuries
Increased friction
Decreased circulation to tissues
Adhesions
Scar tissue
Muscles shorten
And weaken
Decreased range of motion
loss strength
PAIN
Movement dysfunction
Muscle imbalances

How are Overuse Injuries Identified?

Movement Analysis

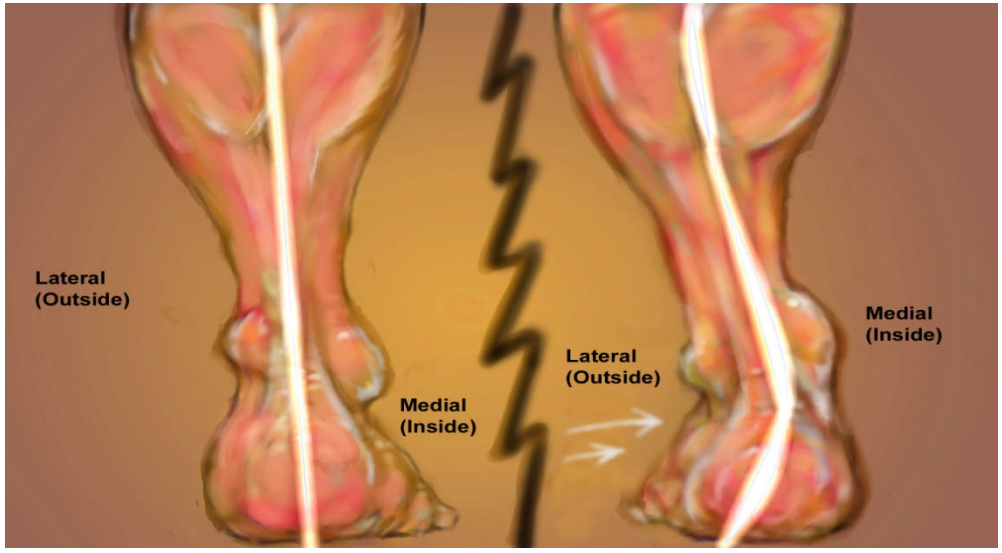
- Lower extremity biomechanics is essential
- Observing a lunge or squat exercise can reveal poor movement patterns, dysfunction, and compensated pronation

Soft Tissue Analysis

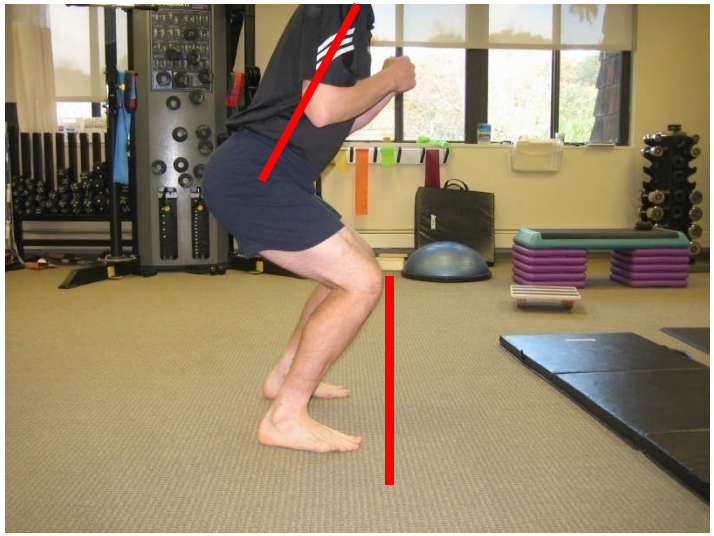
- Decreased range of motion
- Scar tissue

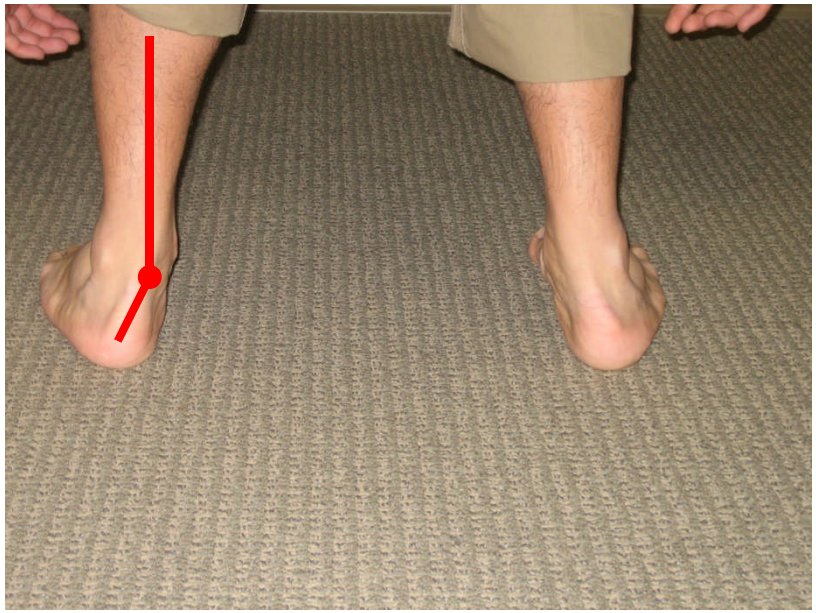
What is Overpronation?

- Feet rolling inwards - the arch flattens, collapses, and soft tissues stretch
- higher risk of developing lower extremity problems



Movement Analysis: Squat Test





Soft Tissue Analysis

- Soft Tissue: Muscles, Ligaments, Fascia, Tendons
- When soft tissue is injured or tighten, scar tissue develops
- Scar tissue texture feels “stringy” and “ropey” – trigger points, taut bands
- Decreases range of motion and causes dysfunction in other areas !!

Why is Range of Motion Important?

- Helps maintain joint and muscle flexibility
- A loss can cause compensation in other areas
  - Ex. Contracted hip flexors can cause a squash player to overload their back

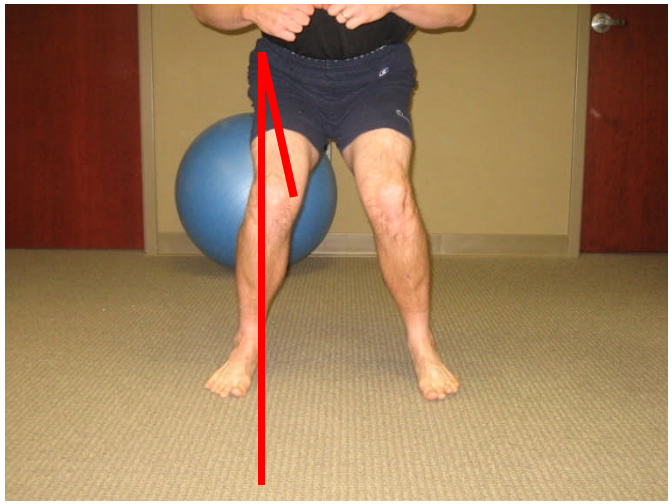
Benefits of trainer evaluation

- Perform a Functional Evaluation and static posture analysis
- Reveal postural distortions with subsequent corrective education
- Hands on evaluation
  - Tissue texture – scar tissue, trigger points, taut bands
  - Lines of tension – active movement restriction

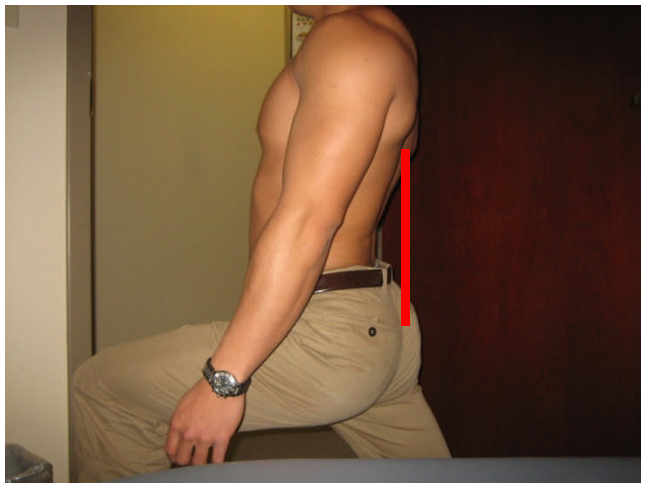
Keys to evaluation

- Lack of core stability
- Rotation of the trunk
- Hyper/hypo lordosis
- Side shifting of the pelvis
- Leg crossing midline
- Overpronation of foot
- Knee shearing
- Lack of flexibility in hip
- Poor balance

Movement Analysis: Squat Test



Movement Analysis: Lunge Test



Movement Analysis: Lunge Test

References

1. Cosio-Lima LM, Reynolds KL, Winter C, Paolone V, & Jones MT. *Effects of physioball and conventional floor exercises on early phase adaptations in back and abdominal core stability and balance in women*. *J Strength Cond. Res*. 2003; 17(4): 721-5
2. Hides JA, Richardson CA, & Jull GA *Magnetic resonance imaging and ultrasonography of the lumbar multifidus muscle*. Comparison of two different modalities. *Spine*. 1995; 20: 54-8
3. Hides JA, Stokes MJ, Saide M, Jull GA, & Cooper DH. *Evidence of lumbar multifidus muscle wasting ipsilateral to symptoms in patients with acute/subacute low back pain*. *Spine*. 1994; 19:165-72
4. Yoshihara K, Shirai Y, Nakayama Y, & Uesaka S. *Histochemical Changes in the Multifidus Muscle in Patients With Lumbar Intervertebral Disc Herniation*. *Spine*. 2001; 26: 622-626
5. Hides JA, Richardson CA, & Jull GA. *Multifidus Muscle Recovery Is Not Automatic After Resolution of Acute, First-Episode Low Back Pain*. *Spine*. 1996; 21: 2763-2769
6. Etty Griffin LY. *Neuromuscular training and injury prevention in sports*. *Clin Orthop*. 2003; 409: 53-60
7. Bompa, T. *Periodization Training For Sports, 2nd Edition*. Champaign, IL: Human Kinetics. 2005.
8. Cerretelli, P., D. Rennie, & D. Pendergast. *Kinetics of metatbolic transients during exercise*. *Int. J. Sports Med*. 55:178-180. 1980
9. Cain, D.F., & R.E. Davis. *Breakdown of adenosine triphosphate during a single contraction of working muscle*. *Biochem. Biohpys. Res. Commun*. 8: 361-466. 1962.
10. Coyle, E.F., A.R. Coggan, M.K. Hemmart, & T.J. Walters. *Glycogen usage performance relative to lactate threshold* (abstract). *Med. Sci. Sports Exerc*. 16:120, 1984.
11. Lemon, P.W., & J.P. Mullin. Effect of initial muscle glycogen levels on protein catabolism during exercise. *J. Appl. Physiol. Res. Env. Exerc. Physiol*. 48: 624-629, 1980.
12. Baechle, T.R. *Essentials of Strength and Conditioning*. Champaign, IL: Human Kinetics. 1994.
13. Brooks, G.A., & T. D. Fahey. *Exercise Physiology: Human Bioenergetics and Its Applications*. New York, NY: Wiley. 1984.
14. Brown, L. Muscle Fuel. *NSCA's Performance Training Journal*. 9: 6-7, 2003.
15. Carmichael, C. *The Ultimate Ride.* New York, NY: G.P. Putnam & Sons. 2003.
16. Granner, D., Mayes, P., Murray, R., & Rodwell, V. *Harper's Biochemistry*. New York, NY: Appleton and Lange. 2000.
17. Mckee, J., & Mckee, T. *Biochemistry: an introduction*. Boston, MA: Mcgraw-Hill. 1999.
18. Ryan, M. *Sports Nutrition for Endurance Athletes.* Boulder, CO: Velopress. 2002.
19. Janda V, Va' vrova' M. Sensory motor stimulation. In; Liebenson C (ed). *Spinal Rehabilitation: A Manual of Active Care Procedures*. Baltimore, Williams and Wilkins, 1996.
20. Rutherford OM. Muscular coordination and strength training, implications for injury rehabilitation. *Sports Med* 1988;5:196.
21. Lewit K. *Manipulative Therapy in Rehabilitation of the Motor System*, 2nd edition. London: Butterworths, 1991
22. Bob Anderson, *Stretching*. Shelter Publications, 1980
23. J Sports Med Phys Fitness 2003 Mar;43(1):21-7
24. Eur J Appl Physiol. 2002 Mar;86 (5):428-34.
25. Epub 2002 Feb 5; Med Sci Sports Exerc. 2004 Aug;36(8):1389-96.
26. http://www.thestretchinghandbook.com/archives/pnf-stretching.php
27. http://www.octogen.com.au/Issue9.htm
28. http://www.cmcrossroads.com/bradapp/docs/rec/stretching/stretching_4.html
29. .Liebenson, C. *Rehabilitation of the Spine, Second Edition*. Philadelphia: Lippincott, Williams & Wilkins. 2007
30. Clemente CD. Anatomy: A *Regional Atlas of the Human Body*. *4th ed*. Baltimore: Williams and Wilkins, 1997
31. Behnke RS. Kinetic Anatomy, Second Edition. Champaign: Human Kinetics. 2006
32. Guyton AC, Hall JE. *Textbook of Medical Physiology, Eleventh Edition.* Philadelphia: Saunders. 2006
33. Kandel ER., Schwartz JH., Jessel TM. *Principals of Neural Sciences. Fourth Edition*. New York: McGraw-Hill. 2000.
34. Baechle, T.R. *Essentials of Strength and Conditioning*. Champaign, IL: Human Kinetics. 1994.
35. Bompa, T. *Periodization Training For Sports, 2nd Edition*. Champaign, IL: Human Kinetics. 2005.
36. Hammer, W. *Funtional Soft Tissue Examination and Treatment by Manual Methods*. *2nd ed*. Maryland: Aspen Publication; 1999.
37. Jobe FW, Moynes DR, & Brewster CE. *Rehabilitation of shoulder joint instabilities*. *Orthop Clin North Am.* 18:473; 1987.
38. Kendall HO, Kendall FP, & Wadsworth GE. *Muscles: Testing and Function. 2nd ed.* Baltimore: Williams & Wilkins; 1971.
39. Sakurai G, Ozaki J, Tomita Y, et al. *Electromyographic analysis of shoulder joint function of the biceps brachii muscle during isometric contraction*. *Clin Orthop Relat Res.* 354: 123-131;1990.
40. http://www.dryessis.com/wp/?p=391
41. Periodization Training for Sports, 2nd Edition – Bompa, Tudor O; Carrera, Michael C.
42. Athletic Body in Balance – Cook, Gray
43. Total Body Training – Dominguez, Dr. Richard H; Gajda Robert
44. Janda V, Va' vrova' M 1996. Sensory motor stimulation. In Liebenson C (ed) *Spinal Rehabilitation: A Manual of Active Care Procedures.* Williams and Wilkins, Baltimore.
45. McGill S. Stability: from biomechanical concept to chiropractic practice. *J Can Chiro Assoc* 1999;43:75-87.
46. Radebold A, Cholewicki J, Panjabi MM, Patel TC. *Muscle response pattern to sudden trunk loading in healthy individuals and in patients with chronic low back pain*. *Spine* 2000;25:947-954.
47. Janda V, Va' vrova' M. Sensory motor stimulation. In; Liebenson C (ed). *Spinal Rehabilitation: A Manual of Active Care Procedures*. Baltimore, Williams and Wilkins, 1996.
48. Liebenson CS. Advice for the clinician and patient: Functional exercises. *Journal of Bodywork and Movement Therapies* 2002;6(2)108-116.
49. Rutherford OM. Muscular *coordination and strength training, implications for injury rehabilitation*. *Sports Med* 1988;5:196.
50. Hagen KB, Harms-Rigndahl K. *Ratings of perceived thigh and back exertion in forest workers during repetitive lifting using squat and stoop techniques.* Spine 1994;19(22):2511-7.
51. Liebenson C, Hyman J, Gluck N, Murphy D. Spinal stabilization. Top Clin Chiro 1996;3(3):60-74.
52. McGill SM. Spine instability. In: Liebenson C (ed) *Rehabilitation of the Spine: A Practitioner's Manual*, 2nd edition. Lippincott/Williams and Wilkins, Baltimore, 2003 (sched pub).
53. Sanders, Chris. *8 Common Weightlifting Mistakes of the Overhead Athlete*. http://www.multisporthealthcenter.com/files/Download/Weightlifting%20Mistakes%20of%20Overhead%20Athlete.pdf

54. 1. McGill, S. *Ultimate Back Fitness and Performance* Ontario: Wabuno Publishers. 2004.
55. 2. Kendall FP, McCreary EK, & Provance PG. *Muscles: Testing and Function. 4th ed*. Philadelphia: Lippincott, Williams & Wilkins. 1993.
56. 3. Runnersworld.com

About this book

This book is for the purpose of educating an athlete on the basics of proper training with a distinct focus on squash related movements. Increased emphasis on individual needs,deficiencies, and conditions should be considered while training, especially since squash is predominantly an individual sport. This manual provides proper evaluation techniques and general recommendations that are a great starting point. Since no two people are the same we advise that each athlete see a trainer specializing in squash conditioning.

It is important to research your trainer and to not assume that because they work in a club or reputable gym that they are an expert. Unfortunately, many trainers are not well-educated in exercise physiology and sport-specific functional training. Educate yourself so that uneducated trainers will not put you at a physical disadvantage.

About the authors

Charles DeFrancesco is the owner of Fit and Functional and Consultant to Club @800 and Club @1133. His company owns and operates the gyms personal training and corporate wellness program, he is a consultant to Westchester Sports and Wellness in Eastchester, NY and consults with many local schools on exercise programs for kids.

He specializes in trainer education, functional assessments, flexibility, and treatment of sports injuries. He is certified by the National Academy of Sports Medicine (NASM), the National Federation of Professional Trainers Master Trainer (NFPT) and Equinox Fitness Group Prenatal Certified. He has specialty certificates for Funtional Exercise Specialist, Cardiac Conditions (AFPA), attended EFTI and has attended and hosted numerous strength and conditioning seminars.

Along with these certifications, Mr. DeFrancesco is one of the authors of the accredited NFPT standard CPT study manual, created their advanced trainer workshop, has written various continuing education courses for ACE, NASM and NFPT. He teaches workshops and proctors exams for NFPT. He is a board member of the Ethics and Safety Compliance Standard for personal trainers and sits on the NFPT Board of Education. Mr. DeFrancesco is the main author of Principles of Functional Exercise.

In addition, Mr. DeFrancesco has written numerous articles and presented various lectures on the essentials of core rehabilitation and flexibility. He currently has courses and articles featured on PT on the net. Mr. DeFrancesco's active rehabilitation and conditioning have been essential in the prevention of injuries as well as for performance enhancement. Mr. DeFrancesco works with a variety of doctors and has consulted on setting up programs and training staff for their rehabilitation facilities.

Dr. Robert Inesta earned his Doctor of Chiropractic degree at New York Chiropractic College, where he graduated Magna Cum Laude and was inducted into the Phi Chi Omega Honor Society. He was the recipient of the Frank DiGiacomo Technique Award for distinguished excellence in manual adjusting procedures, and the Levittown Health Center Award for distinguished excellence in diagnosis and case management.

Dr. Inesta is a Certified Chiropractic Sports Practitioner and a Certified Strength and Conditioning Specialist. His extensive post graduate training consists of functional rehabilitation, functional soft tissue therapy and biomechanics, clinical neurophysiology and electrodiagnosis and nutrition. He is a certified provider of Active Release Techniques, Graston Technique and Kinesiotaping.

Dr. Inesta's main goal is to help his patients to reach their goals in the most efficient and effective way. He is consistently pursuing new information and treatment methods in order to provide the most cutting-edge care package.

He has worked with a wide variety of patients, including athletes at the high school, college, and professional levels, post operative patients, pregnant women and children. He has lectured on topics including sports medicine, functional training, biomechanics, injury prevention and nutrition and has co-authored articles on functional training.

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