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## **A Medical Approach to Sports Performance Enhancement**

### **Part II: The Program**

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*Part I of the 2 part series on a “Medical Approach to Sports Performance Enhancement” focused on the thorough evaluation process of an athlete. With the valuable information gained during an evaluation, you are equipped with the tools needed to write a quality program for your athlete and/or team.*

### **Weak Link Training**

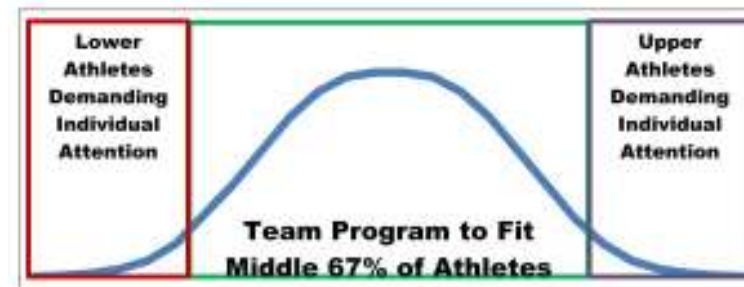
A comprehensive evaluation tool is only as good as your willingness and ability to do something within your training program to correct your team’s deficiencies. All too often, the signs of serious flaws in a team’s training program and/or athletic abilities are apparent when the evaluation process is complete, but coaches are either unable, or unwilling to change their training to meet the needs of their athletes. Like it or not, today’s athletes are very different than those who played 10-20 years ago. This is true of both their physical and mental approach to the game. So, as their trainer or coach, we must be willing and able to adapt to the ever changing needs of our athletes.

Every athlete and team has a weak link. These should be identified during the evaluation process and corrected immediately. The first and easiest approach to corrective exercise is to analyze the needs of your team overall. For example, we perform a Functional Movement Screen™ (for more information, visit [www.functionalmovement.com](http://www.functionalmovement.com)) with all of our athletes. If our team tends to score poorly on the Deep Squat and Rotary Stability movements, we obviously need to focus more attention as a team on those areas. Let the evaluation tool that you use, drive your programming. Compare data with other coaches or search the web for normative data on each test that you perform to identify areas of weakness.

That’s not to say that you should only focus on those areas, or dedicate the majority of your time to them. Rather, modify your workouts to include 2-3 extra exercises to improve the areas of concern.

In addition to the team approach, if you have the facilities and manpower, take an individual approach to weak link training. If done correctly, a good performance enhancement program should be designed to improve the abilities of approximately the middle 2/3 of the bell curve. Thus, it should be the best program for approximately 67% of your athletes. The mark of a truly good coach is understanding how to develop those athletes to fit either 1 Standard Deviation above or below the mean.

Spending an extra 5 minutes per workout to include 2-3 extra exercises that each athlete can do to improve their personal abilities can do wonders to improve the team's overall athleticism. This is usually best performed early in the workout. We prefer to perform our team dynamic warmup followed by weak link training and then we move into the bulk of our workout for the day; whether it is movement skills, power development, strength, etc. Thus, for the weak link period, we will typically have one athlete performing an In Line Lunge stretch next to their teammate who is performing an assisted deep squat with a band and so on. It is short and low intensity, but will make a huge impact on your team by helping you take a more individualized approach within a team setting.



The other option that works well for many athletes and teams is to perform separate weak point training for approximately 20 minutes 2-3 times per week at a different time during the week. We take this approach with our Men's Basketball team during their offseason training. The advantage of performing weak point in this manner is that it allows for team training sessions to take a more simplistic team training approach, while allowing for individualization to occur at a separate workout. The obvious disadvantage is more time spent in workouts.

### ***Program Design***

Every performance enhancement program should contain several key components. By combining research with clinical experience, we have established the following areas of emphasis which can be placed into 4 levels:

**Biomechanics:** Every athlete possesses a natural build which is either advantageous or undesirable for the purposes of their sport. As an example, an athlete who is very knock-kneed and flat-footed will be more likely to sustain an ACL tear than an athlete who possesses a more neutral position. An athlete's biomechanics is a huge factor for predicting injury. Thus, this factor **MUST** be addressed prior to competing and reassessed periodically. While you will rarely be able to completely fix a biomechanical issue, many times items such as orthotic inserts in an athlete's shoes or joint mobilizations will significantly help an athlete's poor situation

**Mobility:** Mobility is defined as an athlete's ability to move their joint(s) through a range of motion while moving. Giles recently demonstrated that lack of flexibility and mobility is the number one detriment for athletic performance. This factor should be addressed daily both pre and post workout with dynamic warmups and static flexibility workouts.

*Movement Skills:* An athlete's movement skills will have a major impact on performance and injuries. This includes running mechanics, change of direction skills, jumping ability, landing technique, and everything else movement related. Quality of motion has to be the priority during this part of the workout.

*Deceleration:* This pertains to an athlete's ability to slow under control from either a run or jump. It is common knowledge that many non-contact knee and ankle injuries take place while decelerating, but the performance component of deceleration cannot be dismissed. Most of the great athletes in the world are not necessarily faster, stronger, or more skilled than their opponents. Most of them combine those skills with an ability to stop under control faster than their counterparts.

*Core Stability:* Virtually all athletic movement begins at the core. This is specifically the abdominal and low back muscles. Don't confuse core strength with core stability. Just because an athlete can perform hundreds of floor crunches does not mean they can adequately stabilize the pelvis and low back.

*Asymmetries:* This refers to differences between an athlete's right and left side or front and back. Athletes presenting with either strength or flexibility asymmetries will eventually develop chronic injuries. These athletes will also tend to have difficulty moving in multiple directions with the same speed or efficiency.

*Glute Strength:* The glutes are arguably the most powerful muscles in the lower extremity, but usually the most underused. It can be very difficult for athletes to activate their glutes, thus robbing them of performance. The glutes are best trained through bridging movements and deep squats (below parallel).

*Neuromuscular Control:* The neurological system controls virtually all movements in the athletic body. Many athletes have the strength to control their body parts, but don't understand what positions are proper for performance (i.e. many athletes don't realize they enter a valgus or knock-kneed position during squatting movements). Teaching an athlete what positions their body is in and how to fire appropriate muscles is the key to controlling the extremities.

*Proprioception:* This is defined as a joint's awareness of where it is in space. This is easily trained by performing single leg balancing activities.

*Hip Abductor Strength:* These are the muscles on the outer hip responsible for moving the leg outward, away from the body's midline. These muscles control the knee to keep it from entering the inward valgus position which leads to so many ACL tears.

*Eccentric Strength:* An eccentric contraction of a muscle occurs when a muscle contracts as the muscle gets longer. This usually occurs as a muscle attempts to decelerate a limb (i.e. Hamstring fires to decelerate the lower leg during sprinting). Eccentric

contractions are very difficult for the muscle to perform and many times a great deal of damage can occur during this point of the contraction/relaxation cycle.

The following table illustrates each factor and how often it should be addressed:

	<b>Factor</b>	<b>Description</b>	<b>Comments</b>	<b>Exercise Example</b>	<b># of Exer.</b>
<b>Level 1</b>	Biomechanics	Anatomical and/or Functional Deficiencies	Foot Biomechanics, Q Angle of the Hip, Lumbopelvic Dysfunction, Leg Length Discrepancies Identify & Refer as necessary	Refer to medical personnel	Corrected by Medical Staff
	Mobility	Static & Dynamic Flexibility	Flexibility has the single largest impact on athleticism (Giles 2007)	Dynamic Mobility Warmup	Daily Pre & Post Workout
<b>Level 2</b>	Movement Skills	Planting, Cutting, Sprinting Skills	Emphasize quality of motion, not quantity of motion	Sprint Drills, Cone Drills	3+ per workout
	Deceleration	Ability to absorb force while landing or slowing from high speeds quickly	Must stay under control to place the body in advantageous position for next movement	Box Jumps-Emphasize Landing, Box Step Offs	
<b>Level 3</b>	Core Stability	Ability to fire transverse abdominus & multifidus	Must evaluate core strength v. core stability	Draw in progression, Stability Ball Exer	2-3 per workout
	Asymmetries	Strength and/or flexibility differences on half of the body	Second highest risk factor for injury behind previous injury	Single Leg Squat, Lunging Exercises	
	Glute Strength	Ability to fire glutes consistently	The most underused & explosive muscle in the body	Deep Squatting Exer., Single Leg Bridge	
	Neuromuscular Control	Ability to keep extremities in advantageous position	Many athletes do not control knees during movements	Single Leg Squat, Split Squat	
	Proprioception	Ability to balance in a variety of environments	Closely related to neuromuscular control	Single Leg Balance	
<b>Level 4</b>	Hip Abductor Strength	Glute Med & Tensor Fascia Latae Strength	Play a significant role in the valgus/varus position of the knee during movement	Miniband Sidesteps	Perform in 60-90% of workouts
	Eccentric Strength	Ability to control muscle as lengthens	Plays significant role in hamstring strains & deceleration	Romanian Deadlift, Good Morning	

**Below is a sample workout and exercise values for the workout:**

Dynamic Warmup	
Miniband Sidesteps	3x15
Single Leg Squat-off 8" box	2x8
Sprint Drills	
A Skips	3x20yds
High Knees	3x20yds
Butt Kicks	3x20yds
Leg Cycles	3x15
Accelerations	4x30yds
Box Jumps-Emphasize Landing	2x10
Power Shrugs	3x8
DB Bench Press	3x8
Front Squat	4x8
SL Romanian Deadlift	3x8
Standing Cable Row	3x8
Box Step Up w/ DB Press	2x6
Stability Ball Hold	3x30sec.
Stability Ball Pikes	2x15
Static Flexibility	10x5sec.

Plant/Cut/Deceleration = 5 exercises

Core Stability = 4 exercises

Asymmetries = 3 exercises

Glute Strength = 4 exercises

Neuromuscular Control = 6 exercises

Proprioception = 3 exercises

Hip Abductor Strength = 2 exercises

Eccentric Strength = 1 exercise

***“Unit Rich” Exercises***

So, how did I come up with these numbers? When you add the exercise values up, it comes to 28 exercises, but they only performed 16 exercises during the workout. Keep in mind that many of these exercises satisfy multiple areas of emphasis. For example, the Single Leg Squat off box offers a lot of “bang for your buck” as exercises go. It is a single leg activity, so it works on Asymmetries and Proprioception. By forcing the athlete to keep their knee and lower extremity in a neutral position, you are teaching Neuromuscular Control, and it can also be argued that by teaching the neutral knee position, you are forcing the Hip Abductors to fire to control the knee, thus possibly satisfying that area. And, as your athlete gets stronger and better at the Single Leg Squat, you can increase the size of the box until the athletes has to go so low to touch the ground that they reach and surpass the parallel squat position, forcing the glutes to fire and then satisfying the Glute Strength category.

Another great exercise is Box Jumps which emphasize the landing. Perform this by jumping from the floor onto a box. The focus of the jump is how the athlete lands on the box. The athlete should land flat footed, very softly, and with their glutes far behind their heels. By modifying the regular box jump to focus on the landing, not only do we get the power development of the jumping motion,

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but we teach an athlete how to decelerate and control their body. For the duration of the movement, they must keep their knees apart and in a neutral position. This is teaching Neuromuscular Control as well as Deceleration. If you would like to even more to the movement, place a band around the athlete's knees to satisfy the Hip Abductor Strength category.

“Functional” exercises have gained great fame over past years, with good reason. As you consider most “functional” exercises you will find that they are very “unit rich” by these classifications. Creativity will be the only thing that limits you with regards to exercises. I encourage you to try new movements and modify known exercises to fit many of these guidelines. A large list of sample exercises for each category is available at [www.maximumtrainingsolutions.com](http://www.maximumtrainingsolutions.com). Feel free to visit the website and download the list.

### ***Conclusion***

Over the past several decades, injury prevention programs have increased in popularity, and rightly so. They have done a good job of addressing some basic fundamentals for helping to prevent some horrible injuries. Unfortunately, they have left some gaps between the science of medicine and the art of sports performance enhancement. The “Medical Approach” to performance enhancement combines both of these areas with this set of flexible guidelines to maximize performance and minimize injury while allowing each coach to use their periodization schemes and sport specific exercises. Keep in mind, however, that these are “guidelines” and should be treated as such. There will always be phases and specific workouts during the year when these guidelines may not be appropriate. That is fine during short stints, but the more you can utilize the basics of this program, the more likely an athlete will improve performance and decrease injury.