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Introduction

Thanks for being a member of StrengthCoach.com, "The World’s Best Source of Strength & Conditioning Information!"

Our members have compiled a list of articles that they felt were in the “must read” category.

Of course, this is just scratching the surface of the mountain of incredible content we have, but this is a great place to start to get a feel for some of the content that you will see in StrengthCoach.com articles, videos, webinars, audio interviews and forum threads.

After each article that contains videos, there is a link back to the article on the site, and you can watch any videos that accompany the article there.

Once your trial membership is over, make sure you check out your two other bonuses, my two downloadable books, “Designing Strength Training Programs and Facilities” and “Advances in Functional Training”. You can download them here: http://www.strengthcoach.com/members/programs/opendownloads.cfm

You can stay up to date with everything that is happening on StrengthCoach.com

By visiting my blog- http://strengthcoachblog.com/

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"Likeing" our Facebook page- https://www.facebook.com/pages/Strengthcoachcom/55191031868

If you have any questions about anything or would like to request an article, please let us know at StrengthCoachPodcast@gmail.com.

Thanks for being a member!

Michael Boyle
Does It Hurt?
Michael Boyle

I get asked rehab questions all the time. I have rehabilitated athletes in almost every major sport who were told they were "all done" by a doctor or a team trainer. Because people know my background, they often ask for advice.

Most of the time they ignore the advice because the advice does not contain the answer they want. They say, "it only hurts when I run", I say things like "don't run".

A famous coach I know once told me "people don't call for advice, they call for agreement or consensus. If you don't tell them what they want to hear, they simply call someone else". His advice to me, don't bother wasting your time with advice.

Here I go again wasting time.

If you have an injury and are wondering whether or not a certain exercise is appropriate, ask yourself a simple question. "Does it hurt"? The key here is that the question 'does it hurt?' can only be answered yes or no. If you answer yes, then you are not ready for that exercise; no matter how much you like it.

Simple, right? Not really.

I tell everyone I speak with about rehab that any equivocation is a yes. Things like "after I warm-up it goes away" etc. are all yes answers. It is amazing to me how many times I have asked people this simple question only to have them dance around it. The reason they dance around the question is that they don't like my answer. They want to know things like "what about the magic cure that no one has told me about?". What about a secret exercise? I have another saying I like, "the secret is there is no secret". Another wise man, Ben Franklin I think, said, "Common sense is not so common".

If you are injured and want to get better, use your common sense. Exercise should not cause pain. This seems simple but exercisers ignore pain all the time and rationalize it. Discomfort is common at the end of a set in a strength exercise or at the end of an intense cardiovascular workout. Additional discomfort, delayed onset muscle soreness, often occurs the two days following an intense session. This is normal. This discomfort should only last two days and should be limited to the muscles not the joints or tendons.

Pain at the onset of an exercise is neither normal nor healthy and is indicative of a problem. Progression in any strength exercise should be based on a full, pain-free range of motion that
produces muscle soreness without joint soreness. If you need to change or reduce range of motion, this is a problem.

Progression in cardiovascular exercise should also be pain free and should follow the ten percent rule. Do not increase time or distance more than ten percent from one session to the next.

I have used these simple rules in all of my strength and conditioning programs and, have been able to keep literally thousands of athletes healthy. I'm sure the same concepts will help you.

A Joint-by-Joint Approach to Training
Michael Boyle

"We get old too soon and smart too late." Swedish Proverb

My good friend, Physical Therapist Gray Cook, has a gift for simplifying complex topics. I envy his ability to succinctly take a complicated thought process and make the idea appear simple. In a recent conversation about the effect of training on the body, Cook produced one of the most lucid thought processes I have ever heard. Gray and I were discussing the findings of the Functional Movement Screen (www.functionalmovement.com), the needs of the different joints of the body, and how the function of the joints relates to training.

One of the beauties of the Functional Movement Screen is that the screen allows us to distinguish between issues of stability and those of mobility. Cook's thoughts were simple and led me to realize that the future of training may be a joint-by-joint approach rather than a movement-based approach.
Gray's analysis of the body was a straightforward one; in his mind, the body is a just a stack of joints. Each joint or series of joints has a specific function and is prone to specific, predictable levels of dysfunction. As a result, each joint has specific training needs. The table below looks at the body on a joint-by-joint basis from the bottom up:

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<th>Joint</th>
<th>Primary Training Need</th>
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<tr>
<td>Ankle</td>
<td>mobility (particularly sagittal)</td>
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<tr>
<td>Knee</td>
<td>stability</td>
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<tr>
<td>Hip</td>
<td>mobility (multi-planar)</td>
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<tr>
<td>Lumbar Spine</td>
<td>stability</td>
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<td>T-Spine</td>
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<td>Gleno-humeral</td>
<td>stability</td>
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The first thing you should notice as you read the above table is that the joints simply alternate mobility and stability. The ankle needs increased mobility, and the knee needs increased stability.
The knee needs stability

As we move up the body, it becomes apparent that the hip needs mobility. And so the process goes up the chain: a simple, alternating series of joints. Over the past twenty years, we have progressed from the moronic approach of training by body part (sorry, bodybuilders) to a more intelligent approach of training by movement pattern. In fact, the phrase "movements not muscles" has almost become an overused one and, frankly, that is progress. I think most good coaches and trainers have given up on the old chest-shoulder-triceps thought process and moved forward to a push-pull-hip extend- knee extend thought process.

Interestingly enough, I now believe the "movement not muscles" process probably should have gone a step further. I think that injuries relate closely to proper joint function or more appropriately to joint dysfunction. Confused? Let me try to explain. Problems at one joint usually show up as pain in the joint above or below.

The hips need mobility

The simplest illustration is in the lower back. It seems obvious based on the advances of thee part decade that we need core stability and also obvious that lots of people suffer from back pain. The interesting part lies in the theory behind low back pain. My theory of the cause? Loss of hip mobility. Loss of function in the joint below (in the case of the lumbar spine, the hip) seems to affect the joint or joints above (lumbar spine). In other words, if the hip can't move, the lumbar spine will. The problem is that the hip is built for mobility, and the lumbar spine for stability. When the supposedly mobile joint becomes immobile, the stable joint is forced to move as
compensation, becoming less stable and subsequently painful.

The process is simple:
- Lose ankle mobility, get knee pain.
- Lose hip mobility, get low back pain.
- Lose thoracic mobility, get neck and shoulder pain (or low back pain).

Looking at the body on a joint-by-joint basis beginning with the ankle, this thought process seems to make sense. An immobile ankle causes the stress of landing to be transferred to the joint above: the knee. In fact, I think there is a direct correlation between the stiffness of the basketball shoe and the amount of taping and bracing that correlates with the high incidence of patella femoral syndromes in basketball players. Our desire to protect the unstable ankle comes with a high cost. We have found that many of our athletes with knee pain have corresponding ankle mobility issues. Many times this follows an ankle sprain and subsequent bracing and taping.

The exception to the rule seems to be at the hip. The hip can be both immobile and unstable, resulting in knee pain from the instability (a weak hip will allow internal rotation and adduction of the femur) or back pain from the immobility. How a joint can be both immobile and unstable is the interesting question. It seems that weakness of the hip in either flexion or extension causes compensatory action at the lumbar spine, while the weakness in abduction (or, more accurately, prevention of adduction) causes stress at the knee. Poor psoas and iliacus strength and/or activation will cause patterns of lumbar flexion as a substitute for hip flexion. Poor strength and/or activation of the glutes will cause a compensatory extension pattern of the lumbar spine that attempts to replace the motion of hip extension. Interestingly enough, this fuels a vicious cycle.

As the spine moves to compensate for the lack of strength and mobility of the hip, the hip loses mobility. It appears that lack of strength at the hip leads to immobility, and immobility in turn leads to compensatory motion at the spine. The end result is a kind of conundrum: a joint that needs both strength and mobility in multiple planes. The lumbar spine is even more interesting.

The lumbar spine needs stability
This is clearly a series of joints in need of stability, as evidenced by all the work in the area of core stability. Strangely enough, the biggest mistake I believe we have made in training over the last ten years is engaging in an active attempt to increase the static and active ROM of an area that obviously craves stability. I believe that most if not all of the many rotary exercises done for the lumbar spine were misdirected.

Both Sahrmann *(Diagnosis and Treatment of Movement Impairment Syndromes)* and Porterfield and DeRosa *(Mechanical Low Back Pain: Perspectives in Functional Anatomy)* indicate that attempting to increase lumbar spine ROM is not recommended and potentially dangerous. I believe our lack of understanding of thoracic mobility has caused us to try to gain lumbar rotary ROM; this is a huge mistake. The thoracic spine is the area about which we seem to know least.

Many physical therapists seem to recommend increasing thoracic mobility, though few seem to have exercises designed specifically for thoracic mobility. The approach seems to be "we know you need it, but we're not sure how to get it." I think over the next few years we will see an increase in exercises designed to increase thoracic mobility. Interestingly enough in *Diagnosis and Treatment of Movement Impairment Syndromes*, physical therapist Shirley Sahrmann advocated the development of thoracic mobility and the limitation of lumbar mobility.

The gleno-humeral joint is similar to the hip. The gleno-humeral joint is designed for mobility and therefore needs to be trained for stability. I think the need for stability in the gleno-humeral joint presents a great case for exercises like Stability Ball and BOSU Push-ups as well as unilateral dumbbell work.

The inability of joints to function normally places stress on the joints above or below. In the book *Ultra Prevention* (actually a nutrition book), the authors describe our current method of reaction to injury perfectly. Their analogy is simple; our response to injury is like hearing the smoke detector go off and running to pull out the battery. The pain, like the sound, is a warning of some other problem. Icing a sore knee without examining the ankle or hip is like pulling the battery out of the smoke detector.

What we need to realize is that, as the opening quote says, "we get old too soon and smart too late". Every day, I learn more and more about the body. What I learn allows me to be a better coach and a better educator. Often, what I learn contradicts what I formerly believed. Just remember, the world was once thought to be flat.
Advanced Program Design Part 1
Michael Boyle

My recent experiences with Crossfit caused me to put some ideas down on paper. I think it is important to write down what you really believe just so you have to think about what your philosophy actually is. In my *Advanced Program Design DVD* set I expanded on a lot of these concepts. I think the real key to program design is not to adopt someone else’s philosophy but to develop your own? What does this mean? This means that coaches need to do what’s best, not what’s trendy. Coaches should not simply copy someone else’s system. In order for a coach to do this they need to do three very important things.

**Think**- What will work best for my athletes?
**Question**- Don’t copy. Ask yourself "why is this exercise in my program?"
**Analyze**- Look for programs that get the type of result you want.

Creating a Great Program
To create a great program it is important to have some underlying goals or objectives. Your goals or your objectives should be simple and reflect your fundamental beliefs.

**Objective 1- Prevent Injuries in the Actual Training Process**
I used to believe that the assumption above was so basic and common sense that it did not need to be mentioned. However, the proliferation of programs that flirt with or cross the line between safe and unsafe makes me realize that objective one needs to be stated clearly. In order to prevent injuries in the actual training process coaches need to minimize risk. This does not mean eliminate risk, only minimize it. Everything you want to include in the program must be analyzed in terms of risk/benefit ratio. Simply put, is the benefit of the exercise worth the risk inherent in the exercise? This ratio of risk to benefit changes with age and, with levels of experience. Things like squats, deadlifts, and Olympics lifts, although excellent choices, may not be for everyone.

There are two simple things we need to accept to become better coaches:
1- Injuries in training are our fault
2- No one should be injured while training
Vern Gambetta, speaking at a seminar nearly fifteen years ago, stated that coaches need to accept responsibility for injuries in programs they design. That statement was a turning point for me as a coach. Up until that day I would have classified myself as just another meathead strength coach. I believed that "real lifters" should have sore shoulders and sore backs. I believed it was just a by-product of training hard. Upon leaving that seminar I think I took my first step toward becoming a real coach. I made a conscious decision to make my athletes better on the field and, keep them healthy in training. I am ashamed that this was such an epiphany.

Bottom line, no one should ever be injured in training. Does this mean we train with machines and take no risks? No, it means that we constantly balance risk/benefit ratios. What I do with a young healthy twenty year old is different than what I do with my 35-year NHL clients. What I do with my 35-year-old NHL clients is different than what I do with my 55-year-old personal training clients. One size does not fit all and neither does one exercise. This is the reason we do front squats versus back squats and, never use box squats. It is the same reason we Olympic lift from a hang position above the knees rather than the floor. As coaches we must constantly make choices that balance the risk/benefit ratio.

Objective 2- Reduce Incidence of Performance Related Injury
The second objective of quality strength program is to reduce the incidence of injury in performance. I used to view this as goal number one, however recent developments in the field have made me adjust. Notice I said reduce versus prevents. No coach will prevent injury. Injuries will happen. However it is critical to realize that our primary goals are to prevent injury, not improve performance. In both the NFL and the NHL strength and conditioning program success is measured by the strength and conditioning coaches ability to keep the best players playing. The NHL uses a stat called Man Games Lost; the NFL uses Starters Games Missed. In either case, the great teams have their best players playing.

Objective 3- Improve Performance
The biggest take-away point of this article is this is not objective one. First, we need to keep training as safe as possible. Then we need to work to prevent/reduce injury potential. Finally, we get improved performance. I know there are many that disagree. I can't tell you how many times I have heard coaches talk about the need to "take risks", "lay it on the line" etc. etc. I can only tell you that those who advocate risk usually work in the area of fitness where they can brainwash clients and dispose easily of the injured. In the world of sports, coaches take injury very seriously and strength and conditioning coaches who encourage their athletes to "lay it on the line" in training end up in a different line, the unemployment line.

However, there needs to be balance. A vanilla machine-based program with no risk will not reduce the incidence of performance related injury. The key is developing the ability to balance risk/benefit ratio.
Advanced Program Design Part 2
Michael Boyle

The ideal program is designed with the previous three goals in mind. The ideal program takes risk, but analyzes risk to benefit ratio. The ideal program works on all aspects of training but in a progressive manner that minimizes exposure to undue stress. The big key is that the program improves performance but, never at the expense of health.

Program Design Keys

Consistency- a bad workout is better than a missed workout. It is still better to go through the motions than to miss a day.

Structure- coaches need to figure out how to divide up the time they are given to train. I can't tell you how many times I have heard strength and conditioning coaches complain about lack of time. Figure out how much time you have and go for maximum bang for the buck.

Density- density is really a measure of work per unit of time. How much work can I get into the time allotted? Good program structure leads to density. The best way to achieve density is to pair exercises. This is a concept that everyone should be using. Doing multiple sets of an exercise with 2-5 minute rests betweens sets should be done only by competitive lifters. Those of us who train athletes or train clients should be pairing exercises. The next best way to achieve density is to use rest time for something other than rest. All of our core work and half of our stretching is done between sets when we are "resting". I hate wasted time and, time spent sitting around waiting to do the next set is wasted time.

Program Structure

As I said above structure is key. I have often used the analogy of baking a cake. You can't pick and choose ingredients. All the ingredients need to go and, they need to go in the proper amounts. The "pre-workout" process must include work for:

- Tissue length (foam roll)
- Tissue Density (stretching)
- Tissue readiness (activation)
Now think time. How many minutes can I devote to the above? My feeling is that it should be 10-20% of training time for young healthy athletes. That means 6-12 minutes out of an hour. We always work off a clock with our groups.

**Warm-up**
Warm-up is different than tissue work. In the beginning of the workout we are preparing the muscles. In the next step we are preparing the athlete. A good dynamic warm-up can be done in 5-6 minutes and will be particularly successful once the tissue is properly prepared.

**Developing Power and Speed**
Once the tissues are prepared the next step is power and speed development. After a proper warm-up bodyweight power (plyometric exercises) and light implement power work (medicine balls) will be done. In addition, this is also the time to add in short sprints and sprint drills. Many of the sprint drills have been done as part of the dynamic warm-up but the actual sprints occur after. From a training density standpoint I prefer to pair jumps and throws. One set of a plyometric drill will be followed by a set of medicine ball throws. Three sets will be done in alternating fashion. This allows adequate rest between sets of plyos, without wasted rest time.

The nice thing about plyometric exercises and medicine ball exercises is that they also provide an increased level of preparation for the nervous system. The last thing done before entering the weight room are sprints. I like a low volume of sprinting. We will usually only do 5-6 sprints of 5-20 yards before our strength work.

**Moving Into the Weight room**
For a young healthy athlete power development in the weight room revolves around the Olympic lifts. Older athletes may perform additional plyometric exercises at this point like Jump Squats or MVP Shuttle Jumps. Based on the age and health of the trainee, resisted exercises are selected to develop lower body power. In the last few years I have developed a greater affinity for the Close Grip Snatch. Many coaches are afraid of snatches and find them difficult to teach however I feel quite the opposite. I think snatches are easier to teach as the athlete is less limited by poor upper body flexibility.

In any case, we will perform hang cleans, close grip hang snatches, DB snatches or, in the case of younger or older athletes, kettlebell swings to develop total body power. These will generally be done in what we call a tri set with a core exercise and an active stretch or mobility exercise. What this means is that instead of resting the athlete will do core work and mobility work during the rest time. This concept goes back to our idea of density. The goal is to get maximum work done in the time allotted. This will not be accomplished by sitting for 3 minutes between sets.

Tri sets are used for power exercises so that the focus remains on the power exercise and so the nervous system is not overstressed.

**Strength Programming**
The strength program looks very similar to the power program except that we often move from tri sets (3 movements) to quads sets (4 movements). In strength work, strength exercises are paired with other non-competing strength exercises and the rest time is "filled" with core and mobility work. Another video sample is provided below.
The most important thing to understand in program design is that time should never be wasted. To create a great program first create a great preparation sequence then, choose exercises that are appropriate for your population. Last, use time as a precious commodity not to be wasted. However, the real key to great program design comes from the beginning of the article. Develop a philosophy of training, don't adopt or borrow one. Be a critical thinker and take responsibility for your results, either good or bad.

Check out the video samples here: http://www.strengthcoach.com/members/1670.cfm

Undulating Periodization for Athletes
Alwyn Cosgrove

I recently wrote a series of articles for this website’s sister site: bodybuilding.com on undulating periodization. These articles were well received and to this day remain one the most popular articles I have ever written. I was asked several times by readers to then develop a similar program for the athlete. Every athlete and indeed every individual is different, but there are some similarities. Most athletes want explosive power and strength -- so use this program as a starting point -- as a template that you can use to tweak your own program. Keep the sequence however that has an explosive Olympic lift and a plyometric exercise at the start.

Let's review the details of undulating periodization:

• Recent published research from Arizona State University has shown that a method of structuring the set and rep protocols in a vastly different manner (called undulating Periodization) has proven to be especially effective in inducing maximum strength gains, when compared to traditional linear or alternating Periodization models.

• Traditional thinking states that the body adapts to a workout in as little as 6 exposures. In actuality - the body adapts to the rep range the fastest, and the exercise selection the slowest. So we need to change the rep bracket more often than we change the exercises. Typically a trainee will change the exercises first - not the most effective training system.

• The undulating Periodization program actually adjusts the sets, reps, speed of movement (tempo), and rest period every single workout. So in effect, your body has to grow bigger and stronger than it normally would when using one of the more traditional Periodization models.
• During this phase, train three times per week -- and alternate the workouts. For example -- in week one, you will do Monday: workout A, Wednesday: workout B, Friday: workout A. the next week would be the reverse. However, due to the unique loading parameters, you will actually train each program three times before ever repeating a rep scheme. The fun part is the variety of doing so many different routines. The exciting part is that as you only repeat each workout every 10 days or so, you can stay with this program for longer, and make better and faster gains than you typically would.

No More Sit-Ups and Crunches
Anthony Renna

Although there have never really been much of a staple in my program design, I have stopped doing any sit-ups and crunches with my clients. In the past, I have had my clients doing some stick crunches and medicine ball sit-ups during my core routine (along with bridges, planks and quadruped exercises).
I had heard about other coaches taking them out of their programs, particularly Coach Boyle, and although I thought he made sense, I didn't feel I really needed to eliminate them since they were a small part of the program.
As I thought about it though, it made more sense to me that the population that I mostly work with, golfers and executives should really avoid crunches and sit-ups.

Why?

First of all, crunches and sit-ups can reinforce poor posture. According to Stuart McGill, poor posture "places an enormous amount of stress on the spine." Crunches and sit-ups involve spinal flexion and too much flexion of the spine can lead to disc problems over time. We have enough ways to ruin our back, why are we doing it in the gym?

Second, with golfers, we always talk about posture. One of the first things that teaching pros will talk about with students is having good posture. If you have a rounded upper back with your shoulders slumped forward at address, commonly called a C-Posture, "it will be very difficult to keep your posture in the backswing without keeping it short and wide," according to the Titleist Performance Institute (TPI). You get much less rotation
when you are hunched over in C-Posture. Below is a picture of TPI co-founder Dave Phillips showing good and bad posture.

Picture courtesy of [http://www.mytpi.com](http://www.mytpi.com) [MyTPI.com](http://www.MyTPI.com)

So now think about the crunch and the sit-up. Basically, they just reinforce that poor posture. I rotated the picture to give you a better look at this idea. Look at the red line on Alex's back and compare it to the pictures above.

Take into account all the hunched over positions we are in from sitting, commuting, texting on the Smartphone and working on the computer. Then we go to the gym to do sit ups and
work too much on chest and bicep muscles and not enough upper back; more reinforcement of poor posture.

**OK, so how do we work our abs?**

I have continued to do the core stabilization exercises that I have done in the past, i.e. planks, side planks, bridges and quadruped exercises, but I have cut out my bicycle crunches, stick crunches and med ball sit-ups (which weren’t a huge part of my program anyway).

**What I have replaced them with is:**

- Advanced Plank Positions
- Stability Ball Roll-outs
- Core Rows
- Medicine Ball Slams
- Standing Barbell Anti-rotation exercises
- Turkish Get Ups

**3-point Planks**

Lie face down with your forearms on the floor, keep your elbows under your shoulders. Come up off the ground, support yourself with your forearms and toes, forming a straight line from your ankles to your shoulders. Engage your pelvic floor muscles (hold your pee in) and brace your abs (as if someone was going to punch you in the stomach)

 Make sure you do not have your butt too high in the air or that it doesn't sag down, keep the straight line and **MAKE SURE YOU KEEP BREATHING!**

After you can do the prone plank for 1 minute, you can start to add movement of the arms and legs in a stabilizing position. The first progression is to move your elbow back toward your hips, maintaining the straight line, and not moving the rest of your body. Pause for 1 second and go back to regular plank position. Alternate arms.
To make it harder, you can extend your arm out forward in a diagonal position.

Here is a great plank progression that I first learned from Coach Robert dos Remedios in *Men's Health Power Training*. It’s called the Plank Walkup.
The key to this exercise is NO TORSO MOVEMENT. A good feedback mechanism is a foam roll or water bottle on your lumbar spine. It will help you to remember to keep the torso still.
Start out in the standard plank position explained above.

Leading with your left arm, go into a push up position
Pause for 3 seconds at the top, and go back down leading with the left arm

Into the starting plank position and hold for 3 seconds.

For the next rep, lead with the right arm going up and coming down.

**Stability Ball Rollouts**
This is totally influenced by Coach Boyle, and it really works the anterior core. You will definitely feel it in your abs. This can be tougher than it looks so start out with the basic progressions. If your back is hurting during this exercise, you need to take a step back.
Start with the stability ball very close to you and your hands up top.

Keeping a straight line from knees to shoulders, start to roll the ball out.

Roll out into a plank position with your elbows on the ball, again, maintaining the straight line from knees to shoulders.
To come back, push off with your elbows and hands, being careful not to lead with your butt.

End in the starting position.

A good cue (from Physical Therapist Gray Cook) is to try to "stay tall" through your spine throughout the movement.

Some progressions to this:
- Start with the ball farther away and your hands lower
- Elevate your knees on an Airex pad or use a smaller ball
- Use the Ab-wheel (don't start with this!)
- Use a slide board

The Core Row:
This is a great variation to the plank, definitely a little more advanced. Get into a push up position with your hands holding on to dumbbells (don't get crazy at first!). Make sure your hands are directly under you shoulders. Keep your feet wide at first and as you develop better stability, narrow the stance.
Try to keep your whole body straight, crush the weight with a strong grip and do a row, bringing the weight to your torso.

Don't crash back down and try to keep you feet on the ground. The opposite foot will try to come off the ground when you row so be careful.
Standing Barbell Anti-rotation Exercise
I first learned this from Coach Boyle, although he uses a device called the Landmine and the handles that come with it. Remember that the idea is to avoid rotation in this exercise.

With the weight going back and forth, it will be hard to do. Stand in your athletic ready position, similar to the golf stance but not with as much hip hinge. Hold the barbell with 2 hands with the barbell standing at about a 45-degree angle.

Keep your torso still (do I sound like a broken record yet?), and bring the weight as far as you can, maintaining your athletic ready position.

Go Back and forth, starting slow first, then adding speed.
This is a tough exercise, believe me, you will feel it. If you don’t have a barbell or want to start slow, use a medicine ball.
**Medicine Ball Slams**
Believe it or not, this can be a great abs exercise. Now I know I said I am not doing abs exercises in order to maintain back health, but the main reason is that the ones I am cutting out are isolation exercises. **This exercise involves complete integration of the total body.** It will also teach you power development from the ground up and get your heart racing.

**Take a medicine ball and get in your athletic ready position.** Bring the ball overhead really fast and slam it as hard as you can. Make sure you do a few slow first to get a feel for the bounce of the ball since you have to catch it.
I like to do these with 3 different weights. I start out with the medium weight, go to the heaviest and end up with the lightest. Basically, I want to end with the fastest slams I can.

The Turkish Get Up is one of my favorite exercises. I think it accomplishes so much and can really help golfers. It is not only great for shoulder stability, but also abdominal and grip strength, hip internal rotation, triceps (opposite arm), hip external rotation (on the non-bent leg going back), hip flexor flexibility (in the half kneeling position before coming up) and single leg strength coming up from the half kneeling position.

Rui Rosario, has an e-book called Back 9 Strength, and today I am taking an excerpt right out of his book to show you The Turkish Get Up.

1. Lie on the floor, in a supine position (i.e. face up), next to an appropriate size kettlebell.
2. Use both hands to press the kettlebell vertical -- directly above your shoulder. Once in position, keep your elbow locked, wrist straight, and your eyes on the kettlebell.

3. Post your foot close to your buttocks (same side as your working arm.)
4. Allow the weight to drift slightly forward, then push off your posted foot and sit up. It is acceptable to allow your free arm to assist slightly in sitting up.
5. From sitting, slowly move to the kneeling position. This can be done a number of ways. The main thing is to move slowly, keeping your working arm perpendicular to the ground and to finish in well-supported, 3-point kneeling position.
6. Slowly straighten your torso, and then stand straight up

7. Now that the fist half of the TGU is over, simply reverse the steps until you have reached your starting point.

Jump Training: More Than Just the Vertical

Andy Twellman

In the few years that we've been training athletes at Train 4 The Game, we've often found ourselves focused on how to help our athletes jump higher. At the end of every phase we'd test them to see how much they had improved their vertical jump, and invariably we'd get them jumping higher and everyone was happy. It wasn't until we started watching videos of basketball injuries one day that we started to realize that we might be missing a piece of the puzzle. What we were doing was getting results, but we started to realize that in spite
of our success at helping athletes jump higher, we might still be able to do it better, both in terms of performance and injury prevention.

At the time, the majority of our athletes played either basketball or volleyball, so we took a step back and watched how they played. We looked at how they jumped and how they moved. We saw that sometimes they had to jump 2 or 3 times in a row with only a very brief time on the ground between jumps. Often the player that could get back up the quickest won the battle.

We also looked at how they loaded their bodies prior to jumping. Sometimes the jump was preceded by a large amount of trunk flexion and arm swing, other times the trunk stayed fairly upright and the arms stayed high overhead. More interestingly, we noticed that the athletes rarely landed quietly with their feet square like we taught them to. It seemed like they were more concerned with the ball than on the landing. Sometimes they landed on two feet, but sometimes they landed on one. Sometimes they landed in the same place they had jumped from, but often they landed elsewhere. There were also times when their arms were overhead reaching for the ball when they landed rather than swinging downward.

What we began to realize was that while jumping higher and more efficiently was an important part of the game, it was a lot more complicated than that. They needed to be able to jump with the mechanical advantage of hip flexion and arm swing, but they also needed to be effective when jumping (and landing!) at a mechanical disadvantage.

**Some variables to consider when evaluating jumping demands of a sport**

1. Arm actions. Sometimes swinging, other times hands overhead, reaching rotationally
2. Amortization phase lengths.
3. Takeoff weight distribution. 1 leg vs. 2.
4. Planes of jumping. In place, forward, backward, rotational, etc.
5. Landing weight distribution. 1 leg vs. 2.
6. Direction of attention.

To this point, we almost always trained either with no arm action or with a downward arm swing on the load. We had also focused on landing quietly on either 1 leg or two, allowing the knee and hip to bend to help dissipate force and create stability.

However, we started to suspect that in addition to improving the ability to jump high from a variety of positions, we might also be able to prevent some of the landing injuries inherent to playing sports if we made some additions to our program. Clearly the upper part of the chain had a huge impact on the lower part of the chain and vice versa. The take home message was that rarely during competition was the action driven by attention to the jump. Instead, we saw that jumping was influenced by the position and direction of the ball, other players, and other continually changing variables. Those variables require the body to adjust.

What we realized was that rather than spending all of our time training our athletes to jump and land a certain way, we may be more successful if we teach them to jump and land in a lot of different ways. That way, when the game asks that they adjust, they adjust. The consequences for not being able to adjust have ended the athletic careers of too many. Enter the jump, hop, and leap matrices. By going from 2 feet to 2 feet, one foot to the same foot, one foot to the opposite foot, or even 2 to 1 or 1 to 2, all of the possibilities are
covered. Add in all of the possibilities for different reaches and swings with the arms, and suddenly you've got a huge toolbox to choose from. The great part is that based on who the athlete is and what their sport demands, you'll probably only need to use bits and pieces of the matrix. You also will have the flexibility to intelligently progress athletes as they gain the necessary mobility and stability to control their bodies. The take home point is that by taking a closer look at the biomechanics your athletes’ sport requires, you can successfully add a few simple components that will help their performance and decrease their risk of injury.

Check out Video Samples of all the exercises here: [http://www.strengthcoach.com/members/1358.cfm](http://www.strengthcoach.com/members/1358.cfm)

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**The Case For Single Limb Training**

Michael Boyle

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This guy runs on two legs at a time. It’s really called jumping. Bunnies don’t run, they jump.

Running, by definition, is a single leg action, really a series of bounds. This is why vertical jumps correlate so highly to speed. Running is simply a series of horizontal bounds.

In the early 1990s, when people like Vern Gambetta and Gary Gray began to point out simple anatomical lessons to me, all I could do was listen. Guys like Gray and Gambetta basically said that our approach of conventional double leg training was flawed, that our sagittal plane dominated world wasn’t realistic. Heresy or science? Think about it.
Strength training has been and still is primarily sagittal plane and double limb. However, we've used single limb training for upper body stuff for years and raved about its superiority. We call it dumbbell training. Dumbbell bench presses and incline presses are widely accepted, as are dumbbell rows. However, unilateral lower body training was frowned upon. Step-ups? Lunges? Those are exercises for girls, right?

My reaction back in 1990 was, "What do you mean, do single leg exercises? What about squats and deadlifts?" The idea that single leg squats or lunges done with only bodyweight might be beneficial to athletes or to those looking to gain more muscle mass was initially as foreign and abhorrent to me as it was to many of you. Bodyweight? Are you kidding? Come on, pile on the plates! Don't show me your single leg squat; tell me how much you squat!

Unfortunately for those who think that, training really comes down to two things: anatomy and physics. Our knowledge of physics hasn't changed greatly over the last few decades, but our knowledge of what we now call "functional anatomy" really has. The concepts presented in functional anatomy are what led me to functional training.

I often describe functional training as the application of functional anatomy to training. The truth is I'm a little embarrassed that I'm forever stuck with the "functional guy" label. People see the cover of my book and never read it. It's the classic case of judging a book by the cover. Don't people always tell us not to do that?

Okay, what does this have to do with the average T-Nation reader? The reality is it has a lot to do with the average T-Nation reader. Single limb training is a logical outgrowth of what we now know about functional anatomy. It'll promote greater muscle growth and greater muscle strength because it works more muscles. Knowing the way the body works allows us to develop and utilize exercises that work not just prime movers, but stabilizers and neutralizers.

Understand, I'm not anti-bilateral exercise; I'm simply pro uni-lateral exercise. Until recently, my athletes performed Olympic lifts almost every day. This is a double leg activity designed to work power. In addition, we'll perform front squats at least once per week. However, that doesn't negate the case for single leg exercise either for performance or for muscle gain. The anatomical evidence for single leg exercise is still overwhelming.

As a result, my athletes and personal training clients do lots of single leg exercises. When looking at the anterior chain we see what's called the lateral sub-system. The lateral sub-system consists of the gluteus medius, the adductors, and the quadratus lumborum.
When we stand on one leg, as in a one-leg squat, we engage three muscles that we don't use in a two-leg squat. I know some will say we use the adductors because the knees move apart in the descent, but this isn't the same. The key to the lateral sub-system is that we engage these additional muscles in their normal role of stabilizers, not as movers. In addition, in any single leg exercise, bodyweight becomes a more significant part of the resistance.

Voila, functional training: training the muscles that we're using in the way that we use them. Bottom line: this doesn't happen in any version of the double leg squat. In a conventional double leg squat, we simply strengthen the prime movers and neglect the stabilizers. Using the car analogy, we get a bigger engine, but maybe bad tires.

Now, I know many readers will say, "We've done it this way for years and it works." Well, here's where I disagree. We've done it this way for years, but I'm not so sure it works all that well. People have been squatting for years but very few athletes squat properly. Go into any weight room in America and I guarantee you'll see more bad squatters than good ones.

As for the "it works" part, again I'm not so sure. If what we were doing worked so well, why do we have so many ACL tears and so many bad backs? I truly believe that single leg training is the best way to prevent knee injuries and the best way to train around a back problem. Double leg training may create double leg strength, but double leg training doesn't have the additional preventative value of single leg training.
My other problem: double leg strength doesn't correlate to single leg strength. I can't tell you how many athletes I've seen that can squat in excess of 500 pounds yet can't do a single leg squat. The reality is that they lack "functional strength."

Very little in life or sport is done with two feet on the ground. In fact, rowing is the only sport where both legs work simultaneously. In life, it rarely happens. Single leg training breaks down the same as double leg training; we have knee dominant and hip dominant exercises.

**Anterior Chain or Knee Dominant Single Leg Training**

All of the squat variations fall under the category of anterior chain or knee dominant single leg exercises. Lunges, step-ups, split squats, rear foot elevated split squats (Bulgarians, as much as I hate the term) and true one leg squats (pistols, another name I don't like) are all examples of knee dominant single leg exercises.

The great part about these exercises is that it's really hard to make them into glute or lower back exercises. Not true with the old back squat. The really beneficial (and really difficult) knee-dominant single leg exercises are what we call single leg unsupported. Static, unsupported single leg exercises consist of single leg movements done on one leg with no movement forward or back (see video above). To further explain, a lunge would be dynamic as the center of gravity moves forward and back. It's supported, as the non-working foot is in contact with the ground.
In an unsupported single leg exercise, the non-working extremity isn’t allowed to touch the ground or any other object such as a bench. The only true static unsupported exercises are variations of one-leg squats. These may be referred to as pistols, one leg squats, balance squats, or step-downs in various texts.

The One Leg Squat: A true static unsupported exercise

Until recently, I didn't feel it was necessary to distinguish between a static unsupported exercise and a static supported exercise. Strength and conditioning coach Karen Wood convinced me otherwise. Wood's rational was that there was limited functional carryover from the single leg supported category to the single leg unsupported category. In other words, performance of exercises like split squats or one leg bench squats (Bulgarian lunges in the literature) didn't seem to carry over to performance in a true one-leg squat. More and more evidence points to the relationship of the hip rotators and the glute medius to overuse knee problems. In static supported exercises (Bulgarians, split squats) the hip rotators and glute medius don't take an active role in stabilizing the femur. In true static unsupported exercises, the hip rotators and glute medius must actively work to prevent internal rotation of the femur. The exercises are essentially tri-planar as the movement may be sagittal, but the stabilizers must prevent movement in the frontal and transverse plane. Any static unsupported exercise automatically becomes a tri-planar movement as the stabilizers work as what we call anti-rotators.

The bottom line is, more muscles work in an unsupported one-leg squat. Either way, if you’re looking for assistance exercises to work more muscle and improve performance, forget extensions and leg presses and add in some one leg squat variations. I’ll bet you that if you don’t know where your glute medius is today, you will after your first day of one-leg squats!

**Posterior Chain or Hip Dominant Single Leg Training**

The interesting thing about hip dominant single leg training is that it's in fact not only single limb, but also single joint. For years we've heard the gurus (and that often included
me) say that single joint exercises are a waste of time. We advocated multi-joint movements as they gave us the most "bang for the buck."

Over time, I've realized that it's not about how many joints work as it is about how many muscles work. The "no single joint exercises" mantra may be an oversimplification. I may dislike a lateral raise or a leg extension because it isolates a single muscle in a non-functional manner, but I love one leg straight leg deadlifts.

In truth, a one-leg straight leg deadlift is a single joint exercise. What makes it better than a leg extension or a leg curl? The number of muscles working. It's not about the number of joints that are moving; it's about the combined action of moving a joint in one plane while stabilizing in two others.

In the one leg straight leg deadlift, the action is a sagittal plane hip hinge. However, the spinal erectors, lower traps, and rhomboids must work to stabilize the spine and the scapula. The hip rotators and pelvic stabilizers work to keep the pelvis moving in the sagittal plane.

What appears to be a relatively simple single joint exercise is actually an extremely complex exercise in muscle synergy that incorporates a huge amount of muscle. In addition, one leg straight leg deadlifts provide great stress to the glutes and hamstrings while providing 50% less back stress. Another great selling point.

The same can be said for the slideboard leg curl. Once again we have a single joint action. In fact, biomechanically, some would claim that it's the same action as a prone machine leg curl. However, as they say in the NFL, upon further review, the slideboard leg curl becomes a far superior exercise.

Why? Because the glutes and hamstrings must work together to hold the hip in extension while the hamstring works alone to flex the knee. The slideboard leg curl in effect forces the hamstring to work from both ends in its two joint function as a synergist of hip extension and a prime mover in knee flexion.

Wrap-Up
Sound complicated? I guess it is. It's clearly not as simple as "single joint is bad, multi joint is good." But if you're an athlete training to improve performance, an athlete trying to reduce injury potential, or a bodybuilder looking to stress some little used muscles, give one leg squats, one leg straight leg deadlifts, and slideboard leg curls a try!

Check out the video samples here:
http://www.strengthcoach.com/members/1369.cfm
25 Years, 25 Mistakes
Michael Boyle

This year I'll enter my twenty-fifth year as a strength and conditioning coach. Last month I watched Barbara Walters celebrate her thirtieth year with a special called "30 Mistakes in 30 Years." I'm going to celebrate my twenty-fifth anniversary by telling you my top twenty-five mistakes. Hopefully I'll save you some time, pain, and injury. Experience is a wonderful but impatient teacher. And unfortunately, our experiences in strength and conditioning sometimes hurt people besides us.

**Mistake #1: Knowing it all**
I love Oscar Wilde's quote, "I'm much too old to know everything." Omniscience is reserved for the young. As the old saying goes, you have one mouth and two ears for a reason. I'd take it a step further and say the ratio is four to one: two eyes, two ears, and one mouth. To continue down the cliché road, how about this one: "It's what you learn after you know it all that counts." When I was young I had many answers and few questions. I knew the best way to do everything. Now that I'm older I'm not sure if I even know a good way to do anything.

**Mistake #2: Not taking interns sooner**
I was so smart that no one was smart enough to help me. (See mistake number one.) My productivity increased drastically when I began to take interns. Note: Interns aren't janitors, laundry workers, or slaves. They're generally young people who look up to you and expect to learn. Take your responsibility seriously. Remember the golden rule.

**Mistake #3: Not visiting other coaches**
God, it seems everything goes back to number one! I was too busy running the perfect program to attempt to go learn from someone else. Plus, when you know it all, how much can you learn? Find the good coaches or trainers in your area (or in any area you visit) and arrange to meet them or just watch them work. I often will just sit with a notebook and try to see what they do better than I do.

I can remember current San Francisco 49’ers strength and conditioning coach Johnny Parker allowing us to visit when he was with the New England Patriots and then asking us questions about what we saw and what we thought he could do better. Coach Parker is a humble man who always provided a great example of the type of coach and person I wanted to be.
Mistake #4: Putting square pegs in round holes
The bottom line is that not everyone is made to squat or to clean. I rarely squatted with my basketball players as many found squatting uncomfortable for their backs and knees. It killed me to stop because the squat is a lift I fundamentally believed in, but athletes with long femurs will be poor squatters. It’s physics. It took me a while to realize that a good lift isn’t good for everybody.

Mistake #5: Not attending the United States Weightlifting Championships sooner
My only visit as a spectator to an Olympic lifting meet made me realize that Olympic lifts produced great athletes. I know this will piss off the powerlifters, but those Olympic lifters looked so much more athletic. I remember being at the Senior’s when they were held in Massachusetts in the early eighties and walking away thinking, "This is what I want my athletes to look like.” Understand, at that time I was a competitive powerlifter and my programs reflected that.

Mistake #6: Being a strength coach
How can that be a mistake? Let’s look at the evolution of the job. When I started, I was often referred to as the "weight coach." As the profession evolved, we became strength coaches, then strength and conditioning coaches, and today many refer to themselves as "performance enhancement specialists."

All these names reflect the changes in our job. For too many years, I was a strength coach. Eventually I realized that I knew more about conditioning than the sport coaches did, so we took on that responsibility. Later, I realized that I often knew more about movement than the sport coaches too, so we began to teach movement skills. This process took close to eighteen of my twenty-five years. I wish it had been faster.

Mistake #7: Adding without subtracting
Over the years we’ve continued to add more and more CNS intensive training techniques to our arsenal. Squatting, Olympic lifting, sprinting, pulling sleds, and jumping all are (or can be) CNS intensive.
I think I do too much CNS intensive work, and intend to change that. My thanks go out to Jason Ferrugia for pointing out this one.

Mistake #8: Listening to track coaches
Please don’t get me wrong. Some of the people who were most influential in my professional development were track coaches. I learned volumes from guys like Don Chu, Vern Gambetta, Charlie Francis, and Brent McFarland.
However, it took me too long to realize that they coached people who ran upright almost all the time and never had to stop or to change direction. The old joke in track coaching is that it really comes down to "run fast and lean left."

Mistake #9: Not meeting Mark Verstegen sooner
Mark may be the most misunderstood guy in our field. He’s a great coach and a better friend. About ten years ago a friend brought me a magazine article about Mark Verstegen. The article demonstrated some interesting drills that I’d never seen. I decided my next vacation would be to Florida’s Gulf Coast as Mark was then in Bradenton, Florida.

I was lucky enough to know Darryl Eto, a genius in his own right, who was a co-worker of Mark’s. In the small world category, Darryl’s college coach was the legendary Don Chu. Darryl arranged for me to observe some training sessions in Bradenton. I sat fascinated for hours as I watched great young coaches work. Mark was one of the first to break out of the
track mold we were all stuck in and teach lateral and multi-directional movement with the same skill that the track coaches taught linear movement. This process was a quantum leap for me and became a quantum leap for my athletes.
This was my step from strength and conditioning coach to performance enhancement specialist (although I never refer to myself as the latter). The key to this process was accepting the fact that Mark and his co-workers were far ahead of me in this critical area.

**Mistake #10: Copying plyometric programs**
This goes back to the track coach thing. I believe I injured a few athletes in my career by simply taking what I was told and attempting to do it with my athletes. I’ve since learned to filter information better, but the way I learned was through trial and error... and the error probably resulted in sore knees or sore backs for my athletes.
Track jumpers are unique and clearly are involved in track and field because they're suited for it. What’s good for a long jumper is probably not good for a football lineman. It took me too long to realize this.

**Mistake #11: Copying any programs**
Luckily for me, I rarely copied strength programs when training my athletes. This mistake might be beyond the statute of limitations as it was more than twenty-five years ago.
I think copying the training programs of great powerlifters like George Frenn and Roger Estep left me with the sore back and bad shoulders I’ve carried around for the last twenty-five years. What works for the genetically gifted probably won’t work for the genetically average.

**Mistake #12: Not teaching my athletes to snatch sooner**
We’ve done snatches for probably the last seven or eight years. The snatch is a great lift that’s easier to learn than the clean and has greater athletic carryover. Take the time to try it and study it. You’ll thank me.

**Mistake #13: Starting to teach snatches with a snatch grip**
When I realized that snatches would be a great lift for my athletes I began to implement them into my programs. Within a week some athletes complained of shoulder pain. In two weeks, so many complained that I took snatches out of the program. It wasn’t until I revisited the snatch with a clean grip that I truly began to see the benefits.
Just remember, the only reason Olympic lifters use a wide snatch grip is so that they can reduce the distance the bar travels and as a result lift more weight. Close-grip snatches markedly decrease the external rotation component and also increase the distance traveled. The result is a better lift, but less weight.

**Mistake #14: Confusing disagree with dislike**
I think it’s great to disagree. The field would be boring if we all agreed. What I realize now is that I’ve met very few people in this field I don't like and many I disagree with. I probably enjoy life more now that I don’t feel compelled to ignore those who don’t agree with me.

**Mistake #15: Confusing reading with believing**
This concept came to me by way of strength coach Martin Rooney. It’s great to read. We just need to remember that in spite of the best efforts of editors, what we read may not always be true.
If the book is more than two years old, there’s a good chance even the author no longer agrees with all the information in it. Read often, but read analytically.
Mistake #16: Listening to paid experts
Early on, many of us were duped by the people from companies like Cybex or Nautilus. Their experts proclaimed their systems to be the future, but now the cam and isokinetics are the past. Just as in any other field, people will say things for money.

Mistake #17: Not attending one seminar per year just as a participant
I speak approximately twenty times a year. Most times I stay and listen to the other speakers. If you don’t do continuing education, start. If you work in the continuing education field, go to at least one seminar given by an expert in your field as a participant.

(Note: Mistakes 18-25 are more personal than professional, but keep reading!)

Mistake #18: Not taking enough vacation time
When I first worked at Boston University we were allowed two weeks paid vacation. For the first ten years I never took more than one. Usually I took off the week between Christmas and New Years. This is an expensive week to vacation, but it meant that I’d miss the least number of workouts since most of my athletes were home at this time. I think the first time I took a week off in the summer was about four years ago. My rationale? Summer is peak training time. Can't miss one of those weeks. I think there’s a thin line between dedication and stupidity, and I often crossed it. I think in my early years I was more disappointed that the whole program hadn’t collapsed during any of my brief absences. I felt less valuable when I returned from a seminar and realized that everything had gone great.

Stephen Covey refers to it as "sharpening the saw." Take the time to vacation. You’ll be better for it.

Mistake #19: Neglecting your own health
This is an embarrassing story, but this article is all about helping others to not repeat my errors. Every year in February I’d find myself in the doctor’s office with a different complaint: gastro-intestinal problems, headaches, flu-type illnesses, etc. I had a wonderful general practitioner who took a great interest in his patients. His response year after year was the same: slow down. You can't work 60-80 hours a week and be healthy. Like a fool I yessed him to death and went back to my schedule. After about the fifth year of this process my doctor said, "I need to refer you to a specialist who can help you with this problem" and he handed me a card. I was expecting an allergist or perhaps some type of holistic stress expert. Instead I found myself holding a card for a psychiatrist. My doctor’s response was simple. I can’t help you. You need to figure out why you continue to do this to yourself year in and year out. I went outside and called my wife. I told her it was a "good news-bad news" scenario. I wasn’t seriously ill, but I might be crazy. Unfortunately, she already knew this.

Mistake #20: Not recognizing stress
Again I remember talking to a nurse who was treating me for a gastrointestinal problem. I seemed to have chronic heartburn. Her first question was, "Are you under any stress?" My response was the usual. Me? Stress? I have the greatest job in the world. I love going to work every day!

Do you know what her response was? She said, "Remember, stress isn’t always negative." It was the first time I’d really thought about that. My job was stressful. Long days, weekend travel, too many late nights celebrating victories or drowning sorrows. A part-time job to
make extra money meant working at a bar on Friday and Saturday until 2 AM, and that was often followed by drinks until 4 AM. Sounds like fun, but it added up to stress. The lesson: stress doesn’t have to be negative. Stress can just be from volume.

**Mistake #21: Not having kids sooner**

As a typical type-A asshole know-it-all, I was way too busy to be bothered with kids. They would simply be little people who got in the way of my plans to change the world of strength and conditioning. I regret that I probably won’t live to 100. If I did I’d get to spend another 53 years with my kids.

**Mistake #22: Neglecting my wife**

See above. It wasn’t until I had children that I truly realized how my obsession with work caused me to neglect my wife. I have often apologized to her, but probably not often enough.

**Mistake #23: Not taking naps**

Do you see the pattern here? Whether we’re personal trainers or strength and conditioning coaches, the badge of honor is often lack of sleep. How often have you heard someone say, "I only need five hours a night!"

In the last few years I’ve tried to take a nap every day I’m able. As we age we sleep less at night and get up earlier. I’m not sure if this is a good thing. I know when I’m well-rested I’m a better husband and father than when I’m exhausted at the end of a day that might have begun at 4:45 AM.

There’s no shame in sleep, although I think many would try to make us believe there is.

**Mistake #24: Not giving enough to charity**

Most of us are lucky. Try to think of those who have less than you. I’m not a religious person, but I’ve been blessed with a great life. I try every day to "pay it forward." If you haven’t seen the movie, rent it. The more you give, the more you get.

**Mistake #25: Reading an article like this and thinking it doesn't apply to you**

Trust me, denial is our biggest problem.

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**Anterior Knee Pain - Pain Site versus Pain Source**

Michael Boyle

Anterior knee pain goes by a large number of names but unfortunately seems to have relatively few effective treatments. Chondromalacia Patella, Patella Tendonitis and Patella-Femoral Syndrome are all names used to describe various types of often debilitating anterior knee pain. A large part of the problem in treating anterior knee pain may be that
treatment has often focused on the knee joint or, what would be described as the primary pain site. In reality, the knee may be the repository of pain that emanates from issues at the hip or the foot. A knee-centered approach to treatment of anterior knee pain becomes a symptom-based approach versus a cause-based approach. In other words treatment often focuses on eliminating a key symptom versus trying to eliminate the cause.

Interesting enough current research is leading to the conclusion that many of the overuse conditions of the knee are not conditions of the knee at all. Anterior knee pain may in fact be more of a symptom than a diagnosis. All of the conditions mentioned in the opening sentence may in fact be related to poor stability at the hip but present as knee pain. (Powers, 2003)

The analogy we have frequently used to describe why this occurs is what I refer to as the "rope analogy". If I put a noose loosely around your neck, stood in front of you, and pulled on it you would tell me that the back of your neck hurt. If I simply stopped pulling on the rope your neck pain would disappear. The fact of the matter is that nothing was ever really wrong with your neck. The neck was simply the endpoint at which you felt the pull. This is very similar to the effect of the glute medius and glute max pulling on the IT band and resulting in pain at the knee. The IT band transmits forces from the glute medius to the patella tendon. For some reason the patella tendon feels pain much like the back of the neck feels the pull from the rope.

Another potential cause of anterior knee pain may be an unintentional loss of ankle mobility. The zeal of athletic trainers to stabilize the ankle with shoes, tape and braces has led to many athletes playing with ankle joints that function as if they were fused. The reality is that in the sport of basketball (a leading sport for anterior knee pain) serious ankle sprains are less frequent and patella-femoral pain has reached near epidemic levels.

The desire to over-stabilize the ankle joint has led to a phenomenon we now call the "high ankle sprain" and to an epidemic of patella tendon issues. The high ankle sprain was virtually unknown twenty years ago and may also be a by-product of over-stabilizing the ankle. Interestingly enough soccer has few ankle or patella-femoral problems yet, soccer players use a low cut, lightweight shoe on grass. Training with less artificial stability at the ankle joint probably protects the ankle and the knee.

Over the past decade, Anterior Knee Pain has been blamed on poor VMO development, poor "patella tracking" and numerous other causes. Most treatments have centered on trying to reduce the pain at the pain site with various treatments (ice, taping, ultrasound etc.) The reality is that an aggressive strengthening program aimed from the hip down, particularly the eccentric control of knee flexion, adduction and internal rotation may in fact be more effective.

The Ireland study (Ireland et al. 2003) states clearly that "females presenting with patella-femoral pain demonstrate significant hip abduction and external rotation weakness when compared to non-symptomatic age matched controls". Lower extremity strengthening done with emphasis on hip control in combination with a program of progressive single leg plyometric training to address the eccentric and neural stability components may allow many trainees to experience long-term relief.
Recent research has validated what up until now was an empirical feeling. Beginning three years ago all athletes training in our facility would be evaluated for hip pain (palpation of glute medius) when complaining of anterior knee pain. We found nearly a 100% correlation between Anterior Knee Pain and glute medius tenderness. All of our athletes with anterior knee pain had direct point tenderness in the glute medius of the hip on the effected side.

Soft tissue work to the glute medius (foam roll, tennis ball, massage) caused a significant reduction in the pain at the patella in almost every case. Most also had marked weakness in manual muscle testing for the glute medius. The conclusion is obvious. Weak hip stabilizers cause a lack of control of knee and hip flexion with an additional component of adduction and internal rotation. These control issues result in a painful sensation in the patella-femoral joint or the patella tendon.

Further study in the past year (Summer 2006) has caused us to look at the adductors, another hip stabilizer in the lateral sub-system. In 2006 in addition to looking at lateral hip structures as a potential causative factor in knee pain we also began to look at the strength and over-activity of the adductors. Upon further investigation we found weakness in the adductor muscle group, with a preference to substitute hip flexors for adductors, as well as obvious tender trigger points in the adductors.

The key from a both a cause and a solution standpoint lie in the sagittal plane dominant strength training so prevalent in the American system. Our American strength training system is classically sagittal plane dominant as well as double leg oriented. It seems clear that the key to solving anterior knee pain lies in control of hip, knee and foot movement in the frontal plane and that single leg exercises must be employed in both strength training and power training to address these issues.

In addition the single leg strength training must center on what we have termed single leg unsupported exercises like one leg squats and one leg deadlift variations. Knee dominant single leg exercises like split squats and rear-foot elevated split squats (sometimes referred to as Bulgarian squats from Spassov’s work) may provide adequate stress in the sagittal plane but do not provide adequate stress to the hip structures in the frontal or transverse planes.

The athlete must be standing on one foot with the opposite foot having no contact with either the floor or any other object. In essence the act of standing on one foot and performing a single leg squat becomes a tri-planar exercise even though the athlete is moving in only the sagittal plane. Having only one foot in contact with the ground forces the hip structures (abductors and external rotators) to stabilize against movement into both the frontal and transverse planes. In these single leg unsupported exercises we will allow less than full ROM to develop hip control. This is a major exception in our system of training as we have always used full range of motion exercises. The objective is always to get to a full pain free range (see figure 1) with bodyweight before the addition of any external resistance.

The exception will be the addition of five-pound dumbbells to allow weight shift toward the heel. We have dubbed this concept progressive range of motion exercise. The progression is in range versus load to cause the progressive control of hip motion.
The following treatment program is suggested for patella-femoral pain syndromes:

**Step 1**: Soft tissue work to glute medius with tennis ball and foam roll or by a qualified therapist, trainer etc. if available.

**Foam Rolling Techniques**

**Step 2**: Use of Reactive Neuromuscular Training for the hip abductors in conjunction with a strengthening program for the knee and hip extensors focusing on single leg unsupported exercises and progressive range of motion if necessary.

The term Reactive Neuromuscular Training can be confusing as the same term has been used by two well-respected physical therapists to describe two entirely different thought processes. Mike Clark of the National Academy of Sports Medicine uses the term Reactive Neuromuscular Training for all intents and purposes in place of the term plyometrics. Physical Therapist Gray Cook on the other hand uses the term Reactive Neuromuscular Training to apply to an entirely different thought process. Cook’s concept of Reactive Neuromuscular Training involves applying a stress to a joint in opposition to the action of the muscles. In other words to effectively target the hip abductors a band is placed around the knee and the leg is pulled with an adduction force. The addition of the adduction force will in effect "turn on" the abductors.

**Single Leg Unsupported with Progressive Range of Motion Increases and RNT Emphasis** is a mouthful. The key is that the athlete is standing on one foot. In a therapy or personal training situation the adduction force can be provided by the therapist or trainer with Theraband etc. In a groups situation the adduction force can be provided by a piece of Theratube as indicated in figure 2. In figure 2 the glute medius fires to counter the adduction force of the tubing (idea of courtesy of Shad Forsythe, Performance Specialist, Athletes Performance-Los Angeles)

Check out all video examples here: [http://www.strengthcoach.com/members/1531.cfm](http://www.strengthcoach.com/members/1531.cfm)

**Figure 1 Single Leg Unsupported**

**Figure 2-RNT to Glute Medius**

**Step 3**: Hip Extension Strengthening- strengthening the hip extensors must include three distinctly different patterns. Pattern one is a straight leg pattern as in the one leg straight leg deadlift (actually a misnomer as the knee is intentionally bent to twenty degrees.) Pattern two is a bent leg pattern that incorporates the mechanics learned in the bridging exercises from core training. Pattern 3 is a leg curl pattern incorporating the hip extensor function of the glutes.

**Pattern 1**: Single Leg Good Mornings, 1 Leg SLDL, Low Pulley Anterior Reach (20 degree knee flexion, flat back), Single Leg Pull Through. (Figure 3)

**Pattern 2**: Bridge and Single Leg Bridge Variations beginning floor based and working from a BOSU to a peanut shaped stability ball (1 plane of instability) and finally to a stability ball (multi-planar instability). These exercises target the glutes and with the addition of instability the hip rotator group.
Pattern 3- Slideboard leg curl variations. The key with the slideboard leg curl is that the glutes function isometrically to maintain hip extension while the hamstrings act to flex and extend the knee. Any flexion of the hip negates the effectiveness of this class of exercises. Even one degree of motion at the hip negates the glute function. The best teaching progression is to begin in a bridge with glutes and abs contracted and eccentrically lower into an extended position.

Step 4- Concentric training of Hip Abductors -- although many would argue that isolated single joint training is not functional it is still necessary to train the concentric action of the hip abductors. This can be done with simple side leg lifts or with standing abduction on a Pilates Reformer or MVP Shuttle.

Additional Points of Emphasis
Core-
Core training should always be included in any sound program but, with patella femoral pain both quadruped and bridge variations should be used for emphasis on glute max and glute med function.

Conditioning/ Muscle Endurance-
Retro walking is another excellent exercise for the athlete or client with patella femoral pain. Backward walking provides less stress to the patella-femoral joint and is in fact a series of closed chain terminal knee extensions. Backward walking can begin with a treadmill program of intervals at progressively higher inclines and progress to walking backward with a weighted sled.

Eccentric Strength-
Eccentric strength work should focus on single leg plyometrics with emphasis on landing skills, jumps should be forward as well as medial and lateral. In addition the MVP Shuttle can be used to develop landing skills for athletes returning from injury or athletes with poor strength to bodyweight ratios.

The key to battling patella femoral pain is adopt a well rounded approach that works on the source of the pain versus the site of the pain and takes into account all of the functions of the lower extremity.

Figure 6- Slideboard Leg Curl

Bibliography

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Understanding and Training Hip Flexion?

Michael Boyle

A recent post on my website forum made me realize that often a short answer to a complicated question doesn't work. A few of my readers seemed to think that all of the recent talk about a weak psoas muscle or an under-active psoas muscle might just be people being trendy. I for one strongly disagree.

I think my increased knowledge of the biomechanics of hip flexion is one of the most valuable things that I have learned in the past five years. The problem with understanding hip flexion in general and the psoas muscle in particular is that we use the term "hip flexor" as a generic term to apply to five muscles, four of which have distinctly different leverage positions from the other one. I must admit that, like most of us in the profession, I did not previously make any distinction among members of the hip flexor group. All of the hip flexor muscles seemed to work together to flex the hip and that, at the time, was enough for me.

However, my recent reading into the work of physical therapist Shirley Sahrmann has changed my thinking about hip flexors, as it has about many other muscle groups. The wisdom that Sahrmann shares in her book "Diagnosis and Treatment of Movement Impairment Syndromes" explains many of the injury riddles of the strength and conditioning field, particularly the "hip flexor" or "quad" pull. The key to understanding the motion of hip flexion comes from looking at the anatomical leverages of the different muscles involved. There are five muscles that are capable of assisting in hip flexion; the tensor fascia latae (TFL), the rectus femoris (distinct in that it is both a member of the quadriceps group and a hip flexor), the iliacus, the sartorius, and the psoas. As previously mentioned three of these muscles possess something in common, two are distinctly different.

As is often cliché, the key is in the differences, not the similarities. The TFL, rectus femoris and sartorius, all have insertion at the iliac crest. This means that all of these muscles are capable of hip flexion up to the level of the hip. This is simply a function of the principles of mechanical leverage. The psoas and the iliacus are different. The psoas has its origin on the entire lumbar spine, the iliacus on the posterior of the ilium. This creates two distinct differences.

1- The psoas acts directly on the spine. Possibly as a stabilizer for the iliacus and possibly as a flexor
2- The psoas and the iliacus are the only hip flexors capable of bringing the hip above ninety degrees.

In the case of a weak or under-active psoas or iliacus the femur may move above the level of the hip but it is not from the action of the psoas and iliacus but rather from the momentum created by the other three hip flexors. With this knowledge in hand, I believe
that our knowledge of back pain, "hip flexor strains", and 'quad pulls" is drastically expanded. Before we discuss specific injuries let’s first look at how to assess the function of the psoas and iliacus. Sahrmann’s test is simple. In single leg stance, pull one knee to the chest and release. Inability to keep the knee above ninety degrees for 10-15 seconds indicates a weak psoas or a weak iliacus.

Other signs:
- a cramp at the iliac crest in the region of the TFL
- an immediate backward lean to compensate
- a large pelvic shift to the right or left
- a quick drop from the top with a "catch" at the ninety-degree point

All of these will indicate that the client or athlete is attempting to compensate for the weak or under-active muscles. The TFL cramp is a classic illustration of synergistic dominance. A muscle cramps when attempting to shorten in a disadvantageous position. With the hip flexed above ninety, the TFL is already shortened and unable to produce the necessary force to hold in a position of poor leverage. The attempt results in cramping, much like a hamstring cramp in bridging when the gluts are under-active. The same effects are often seen when attempting hanging knee ups (an exercise we almost never do as it teaches compensation), except the cramp or strain is in the rectus femoris.

If the tester is concerned that the subject is a skilled compensator, we have developed a better test that also has become our favorite psoas/iliacus exercise. The test was actually developed by strength and conditioning coach Karen Wood. Have the client or athlete stand with one foot on a plyo box ( 24” works well for most) that places the knee above the hip. With the hands overhead or behind the head, attempt to lift the foot off the box and hold for 5 sec. Inability to lift and hold is indicative of a weak psoas and or iliacus. To add resistance and use this test as an exercise, lateral resistors or bands can be used to increase the difficulty of the isometric.

It is important to note that any test of the psoas originating from below the hip is inherently invalid as the iliac-originated hip flexors are now at a leverage advantage. Understanding the unique functional contributions of the psoas and iliacus illustrates how a weak or under-active muscle can be a factor in both back pain and in quadriceps strains.

With back pain, inability to flex the hip past ninety degrees will often cause many clients or athletes to flex the lumbar spine to give the illusion of flexing the hips. Watch how many of your clients or athletes will immediately flex the lumbar spine when asked to bring the knee to the chest. There is a clear distinction between bringing the knee to the chest and bringing the chest to the knee.

Attempting to bring the knee toward the chest and above the level of the hip forces the athlete or client to use or attempt to use the psoas and iliacus. If they are unable to do this one or all of three things happen.

1- The athlete or client will flex the spine and bring the chest to the knee. At first observation this seems the same but from a back pain perspective, could not be more different. Flexion of the lumbar spine is the leading cause of disk degeneration. Those athletes or clients that substitute back motion for hip motion get back pain.
2- The athlete or client will use the TFL and the other ischial hip flexors to flex the hip. In this case the athlete or client will begin to complain of a low level strain in the TFL. This is a result of overuse of a synergist and will feed into a synergistic dominance of the TFL and further psoas and iliacus dysfunction. This is what we have classically seen in our hockey athletes who utilize a flexed posture.

3- The athlete or client will use the rectus femoris to create hip flexion. This is the mysterious "quad pull" seen in sprinters or on forty-yard dash day in football. In this case the etiology is the same as above, only the culprit is now the rectus femoris, not the TFL. It should be noted, that most "quad pulls" or "quad strains" are limited to the multi-joint rectus femoris. Soreness will be generally right near the insertion point of the rectus femoris into the quadriceps at about the halfway point of the thigh. The psoas and iliacus are to the anterior hip as the glute is to the posterior hip. A weak glute max will cause synergistic dominance of the hamstrings and extension of the lumbar spine to compensate for hip extension. This will lead to back pain, anterior hip pain (another Sahrmann point, use of the hamstring as the primary hip extensor, changes the lever arm of the femur and can cause anterior capsule pain), and hamstring strains. On the literal opposite side a weak or under-active psoas will cause back pain from flexion rather than extension, TFL strain and rectus femoris strain.

The key to injury prevention and injury rehab is a sound understanding of functional anatomy. We need to stop repeating the mistakes of the past and begin to realize that we all still have a lot to learn from an anatomical and biomechanical perspective. I am amazed at how little anatomy I really know when I look a little deeper. One of the best things I have read in the past three years is Shirley Sahrmann's statement, "when a muscle is strained, the first thing to do is look for a weak or underactive synergistic." When we are looking at injuries, shit does not just happen, it happens for a reason that is governed by the laws of physics and controlled by functional anatomy.
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