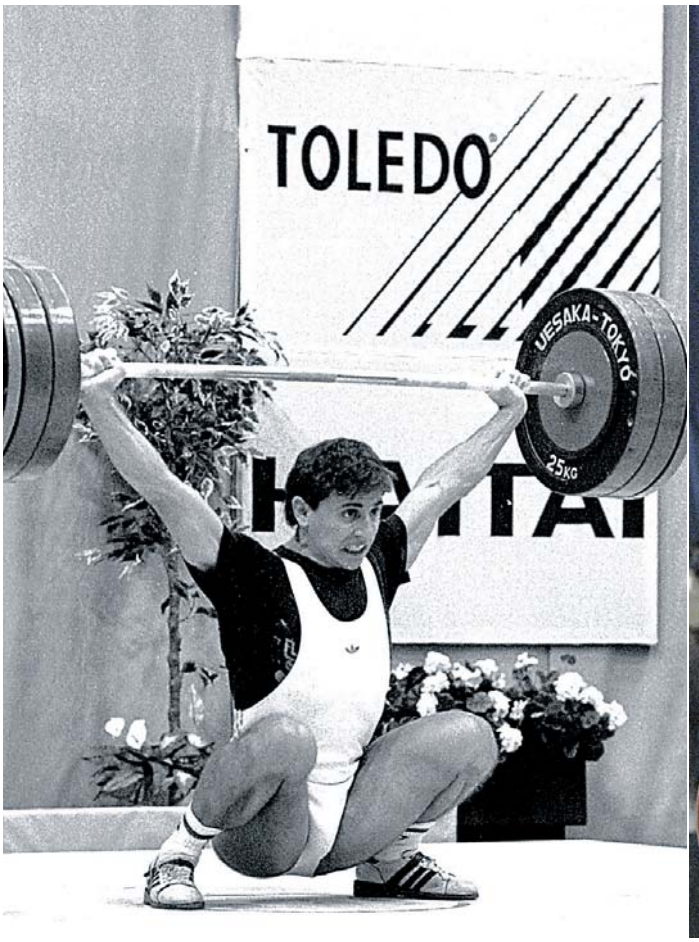
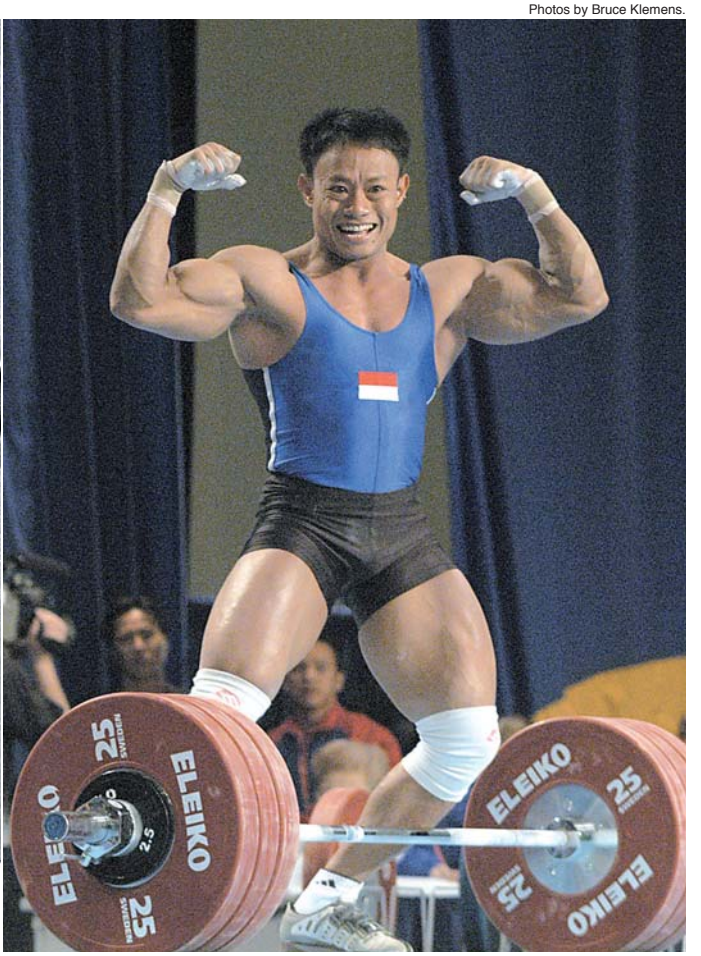
Photos by Bruce Klemens.





Muscle size is not necessarily an indicator of muscle function. Indonesia's Erwin Abdullah and Bulgaria's Yoto Yotov both competed in the lightweight (about 150 pounds) bodyweight division. Abdullah snatched 314 pounds and clean and jerked 418, whereas the more slender Yotov, a two-time Olympic silver medalist, snatched 341 and clean and jerked 424.

The Truth About Functional Training

Dispelling myths about how to train for optimal performance

BY **KIM GOSS, MS**

"I lift things up, I put them down!" is what a massive bodybuilder asserts in a popular ad for the health club chain Planet Fitness. It's an apt description. Too bad some strength coaches insist on complicating strength training by misapplying functional training methods – too often getting stronger seems to be an afterthought.

The idea of functional training is to use workouts that are specifically designed to enhance the performance of athletic pursuits or daily activities. Running uphill is considered a functional training activity to improve a fullback's leg power; running downhill is not. Performing heavy sets of 1-3 reps in the power clean or power snatch is considered functional training to increase vertical jumping ability; performing 10 reps in these exercises with

light weights is not. These examples are fairly clear, so let's explore some ideas about functional training that are not so obvious.

Canadian strength coach and Posturologist Paul Gagné has trained athletes and high-profile clients in the Vic Park Center in Montreal, Quebec, including over 40 NHL players and dozens of professional athletes in golf, MMA and football. In this exclusive interview, I asked Coach Gagné to share his ideas on the current trends in functional training.

BFS: *Do you believe in early sports specialization?*

Gagné: Athletes in some sports, such as gymnastics or figure skating, must specialize early to reach the elite level. The tradeoff is that if you specialize in just one sport, you have to spend a lot more time performing general strength and conditioning outside your sport.

BFS: *With a new client, do you stop sport-specific training and focus on correcting muscle imbalances?*

Gagné: No, I don't agree with some strength coaches who believe you must correct all muscle imbalances first before performing any athletic fitness training. Let's say I have a new athlete and will be able to train them in the off season for 15 weeks. For the first three to four weeks, depending upon the athlete's posture, I will seldom spend more than 20 minutes on corrective exercises, and I will spend the remaining 40 minutes on core lifts such as squats and power cleans. After that initial training phase, I will spend even less time per workout. In the next season if I have the opportunity to work with that athlete again, I may only need to spend 10 minutes on corrective exercises for the first few weeks.

BFS: *What is your take on the importance of single-limb exercises in functional training programs?*

Gagné: What I've seen over the years is that after my athletes perform a training cycle where they emphasize single-leg exercises, when they go back to two-leg exercises they lift much heavier weights. One example is performing three weeks of lunges and step-ups,

Strength coach Paul Gagné has trained over 40 NFL players. Here he is shown spotting Joe Rullier, who was drafted in 1998 by the LA Kings.

then progressing to a cycle of back squats and deadlifts. But I also believe that performing bouts of single-limb training helps keep the athlete healthier.

I'm paid to make my athletes' careers last. I would rather have an athlete squat only 300 pounds and play for 10 years than be able to squat 500 pounds and play for only three years. I've been training professional hockey players for 25 years, and I've never seen a correlation between how much money they make and how much they lift in the weightroom. My strongest hockey player in the weightroom barely played in the NHL, whereas another of my players who can barely bench press 150 pounds makes $6 million a year! It's not that strength training is not important, but you do have to look at the requirements of the sport to determine what to specialize in. In hockey, for example, one of the key requirements is balance – if you don't have balance, it really doesn't matter how strong you are in the weightroom. Likewise, if you don't have exceptional hand-eye coordination, you will struggle in a sport such as baseball.

BFS: *Are muscle imbalances the most likely cause of knee buckling during squats and jumping, putting the athlete at a high risk of tendinitis or ACL injuries?*

Gagné: I've heard therapists and strength coaches say that knee buckling during a squat is a result of weak glutes or excessively strong or tight adductors. Before considering these factors, I would first look at the feet. Often you'll find that if you elevate the heels, such as by putting a small weight plate under each heel, squat form improves immediately and the knees don't buckle. Elevating the heels helps align the ankles with the feet, which is one reason I'm a big fan of weightlifting shoes. The general guideline is that if you try to perform a squat with your big toes elevated and your knees buckle, you need to wear weightlifting shoes, orthotics or postural insoles.

BFS: *Do you have any tips that can help athletes squat better in a classroom setting with a large group of athletes?*

Gagné: First – and BFS has recommended this – have your training partners act not only as spotters but also as coaches providing each other feedback about their technique. I also like the idea of squatting in a power rack in front of a mirror for 3-4 weeks. What you do is make a plumb line (a string with a weight at the bottom) and hang it at the back of the squat rack. That way, when athletes squat, they can see if their knees are buckling or if their weight is shifting to one side. This provides immediate feedback so they can try to self-correct between reps or even during a repetition.

BFS: *When kids squat, they often get pain in one side of the upper thigh, near the hip. What causes this?*

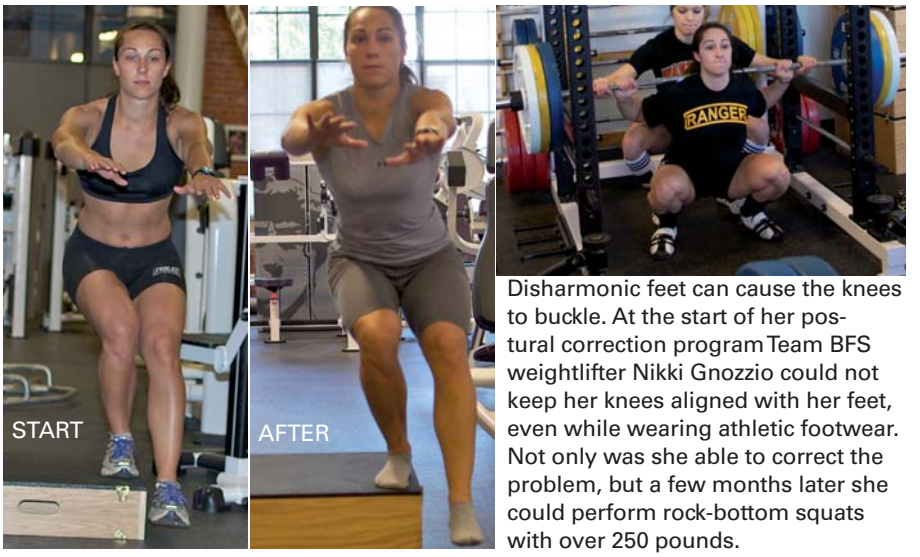
Gagné: Again, this is usually a case of disharmonic feet, which means one foot pronates and the other supinates. This causes rotation of the pelvis so that one hip flexor will be tighter than the other. Getting soft tissue work such as ART® will help with the symptoms and often provide immediate relief, but the condition will most likely come back unless the feet are corrected.

BFS: *What is your opinion of leg curls as a functional exercise?*

Gagné: It's a fine exercise, and one of the few machine exercises that I do like, but the hamstrings do much more than simply flex the knee. They also extend the hip. I often ask, "What is the most important muscle when you kick a soccer ball?" Most people will answer "quads." Certainly, kicking involves hip flexion and knee extension, but the power and precision of these movements are influenced by the hamstrings; that's why these muscles also need to be developed. For this reason I really like the glute-ham raise for athletes. Not only does it develop the strength in hip extension, but it also develops the knee flexion function of the hamstrings.

BFS: *What about this idea of glute activation? Say an athlete sits around all day or hasn't had properly balanced training, does this compromise strength and biomechanics and cause their glutes not to fire?*

Gagné: Unless you have some type of nervous system injury or disorder, the glutes don't shut down with improper training – if they did, you wouldn't be able to walk. I should also mention that the facedown glute activation tests to determine glute activation have limited value, and what happens in a prone position is not really relevant to what is happening in a standing position.



Disharmonic feet can cause the knees to buckle. At the start of her postural correction program Team BFS weightlifter Nikki Gnozzio could not keep her knees aligned with her feet, even while wearing athletic footwear. Not only was she able to correct the problem, but a few months later she could perform rock-bottom squats with over 250 pounds.

The real issue has to do with the function of the pelvis, and structure dictates function. About 95 percent of the athletes I work with have disharmonic feet, a condition that causes rotation of the pelvis, which causes one glute to become stronger than the other.

BFS: *What about chiropractic as a tool to help alignment?*

Gagné: I don't like the idea of adjustments being the sole method of treatment for a misaligned pelvis. Often what happens is that someone gets an adjustment and they feel better immediately, but the next day everything is back the way it was – as they say, "Bones don't have brains!" Having said that, many chiropractors do use soft tissue treatment as their first choice, and then decide if an adjustment is necessary.

BFS: *What is your opinion of glute bridges, which are becoming more popular in functional training?*

Gagné: Glute bridges are good exercises. I've used single-leg variations as a warm-up, but they are just another tool in the toolbox. The problem comes when they are performed by someone who has poor pelvic alignment or who goes into hyperextension, as I've often seen happen in YouTube videos. In these cases this exercise could cause more harm than good, such as by injuring abdominal muscles or the disks of the lower back.

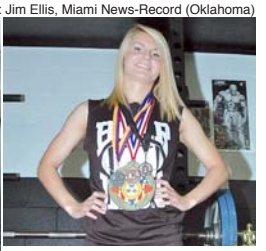
BFS: *In dealing with postural issues, what type of stretching is best?*

Gagné: Static stretching and PNF stretching are good, but when it comes to stretching before training, dynamic stretching is best. Postworkout I like to use a relatively new method called myofascial stretching created by Dr. Guy Voyer. This type of stretching affects not only the muscles but also the fascia, which is the covering around and between the muscles. This type of stretching is extremely difficult to learn solely from books or videos. You really need to have an instructor teach it to you.

BFS: *What is the correct way to prevent hamstring pulls? Is it by stretching the hip flexors and strengthening the hamstrings?*

Gagné: A study performed on sprinters found that hamstring flexibility was statically irrelevant as a risk factor for hamstring pulls; what was relevant was the posture of the pelvis. When a person has excessive anterior

Photo: Jim Ellis, Miami News-Record (Oklahoma)



Jessica Marie Staggs was the recipient of the 2012 BFS High School Female Athlete of the Year. Staggs is an exceptional athlete who excelled at several sports while attending Wyandotte High School in Wyandotte, Oklahoma.

pelvic tilt, the lower abdominals and hamstrings are under continual stress, and that could make an athlete more susceptible to a hamstring pull. Further, having the abdominals always under stress makes it difficult to jump or make a quick stride. That condition could also lead to a hamstring pull.

***BFS**: Would abdominal training help someone who has excess anterior rotation of the pelvis?*

Gagné: Yes. What you want to work on is the section of the abdominals called the subumbilical, the area under the bellybutton. Weak muscles here could contribute to excessive anterior pelvic tilt. What's worse is when just one side of the subumbilical muscles is underdeveloped, as this causes excessive rotation of the spine, which can increase the risk of disk injury.

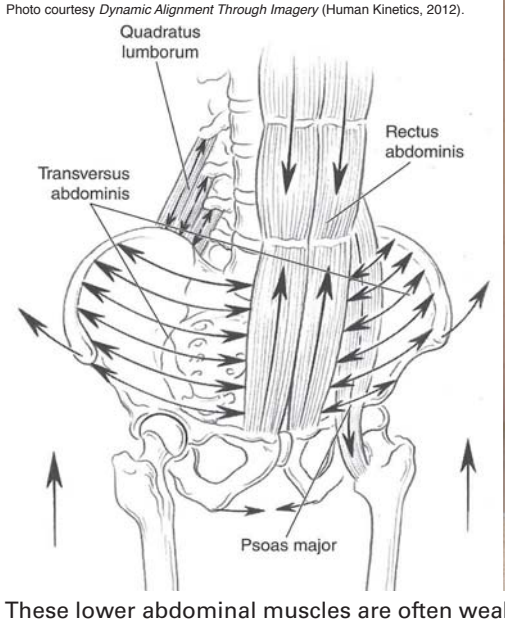
***BFS:** How about standing on stability boards to prevent ankle strains and sprains?*

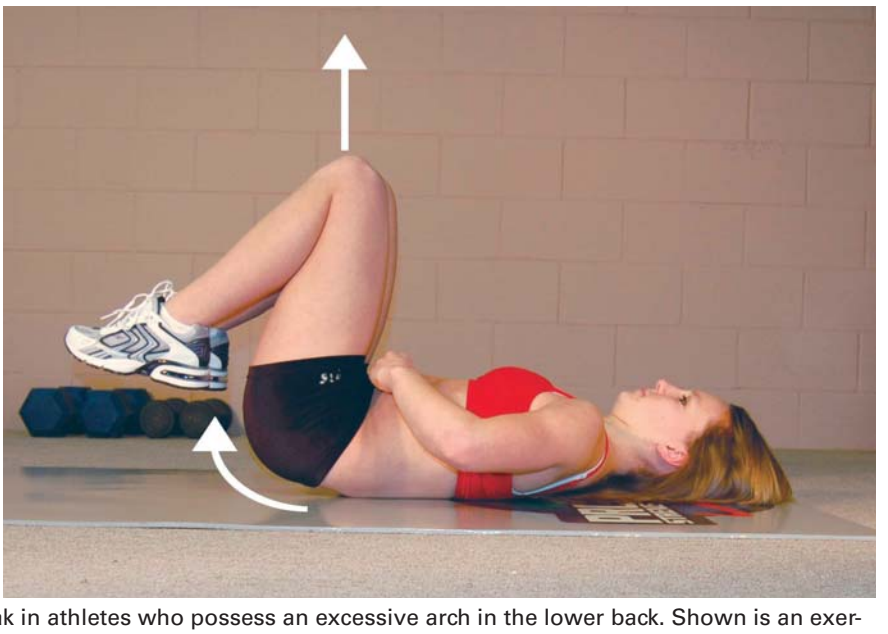
Gagné: It's been shown that these devices mainly destabilize the upper body rather than the lower body. Again, one of the common causes of lower body injury is disharmonic feet. A common scenario is that if someone with disharmonic feet stands on their right leg, they lose their balance to the right; when they stand on the left leg, they lose balance to the right and their knee will buckle inward. This type of posture will contribute to the risk of injury not only to the ankle but also the knee in the ACL and MCL.

***BFS:** Do you believe some athletes are born quad dominant?*

Gagné: I don't like that term, and I would even argue that it does not exist. What you are likely seeing with a quad-dominant person is simply a reaction to valgus [flat] feet. A valgus foot creates more tension on the vastus medialis. Also at work is the "train-what-you-see syndrome," where someone only trains the muscles they can see in a mirror, such as the quads and chest, but neglects the muscles on the back, such as the hamstrings and rhomboids. This is a mistake. To reach your potential as an athlete, your strength and conditioning program needs to be balanced – that's what true functional training is all about! BFS

Photo courtesy *Dynamic Alignment Through Imagery* (Human Kinetics, 2012).

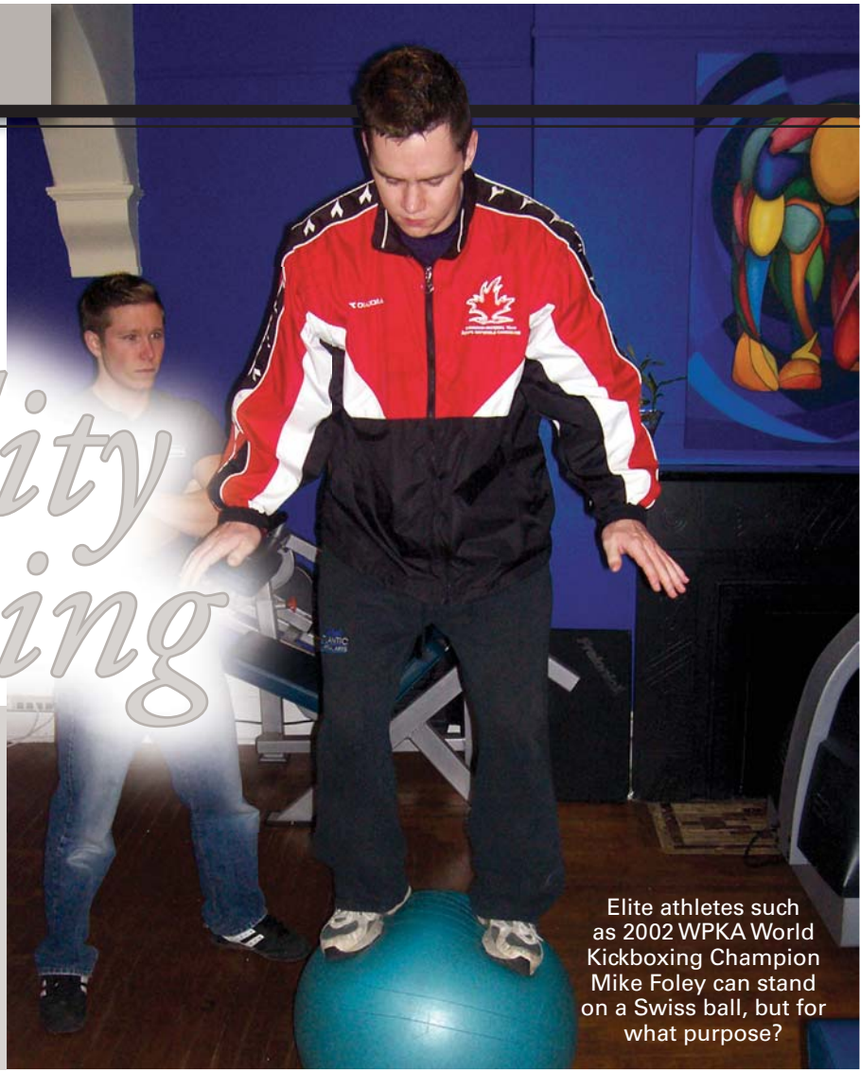




These lower abdominal muscles are often weak in athletes who possess an excessive arch in the lower back. Shown is an exercise that isolates the subumbilical section of the abdominals.

The Case Against *Stability Training*

Research is exposing many fallacies about the value of Swiss balls and other types of unstable exercise equipment



Elite athletes such as 2002 WPKA World Kickboxing Champion Mike Foley can stand on a Swiss ball, but for what purpose?

BY **KIM GOSS**

In one of his trips to Moscow, the late sports scientist Dr. Mel Siff visited the Sport Psychology Institute. Having done his master's thesis on brain waves, Siff was excited to find some of the most advanced and innovative medical equipment in the world for conducting brain research. When Siff asked why the Russians were so concerned with such research, he was told that during the Communist regime the Russian state felt it necessary to "process" dissidents by sending them to special institutions. "If you questioned Communism, the government figured that you had to be psychologically disturbed, neurotic or schizophrenic," says Siff.

Although probing rebellious brains may not seem to have much to do with throwing a baseball or improving your blocking or tackling, neuroscience has much to offer the athlete. One example is using neuroscience research methods to determine the effectiveness of specific types of exercise. In this regard, one area of controversy in the field of strength training is the value of Swiss balls, rocker boards and other equipment athletes use in hopes of improving athletic ability.

One fact that cannot be denied is that the media love stability exercises. Watching an elite athlete trying to get an edge over the competition by performing Cirque du Soleil movements on a Swiss ball simply makes good TV – much more exciting than watching power cleans and deep squats. And what modern gym would be complete without half-moon-shaped BOSU® balls, balance disks and rocker boards? "If you want to train for stability, you have to train on unstable equipment," those who market this equipment will claim. But is this true?

The Science of Stability

Michael Jonathan Wahl is co-owner of Definitions Fitness Company and holds a master's in kinesiology science from Memorial University in Newfoundland. In his master's thesis, "The Effectiveness of Instability Resistance Training Devices for Training," Wahl took a different approach to most of the studies performed on instability exercises.

"A lot of the previous research out there on this subject, from squatting on disks to doing unilateral presses on

Swiss balls, never used elite athletes," says Wahl. "The whole point of science is that you investigate specific things so you can use them for specific audiences. When you look at data from recreationally trained subjects, applying the data to elite athletes doesn't make sense."

In Wahl's stability study, which was supervised by Dr. David Behm from the School of Human Kinetics and Recreation at Memorial University, Wahl selected 16 athletes who were all competitive athletes who played at the college level or higher. A variety of sports were represented, including elite hockey players and a world-champion kickboxer. "We used the ACSM guidelines for exercise prescription, making certain that all the subjects were in the top 10 percentile for strength, for both upper body and lower body." For objectivity, the exercise performance on the various apparatus used in the study was monitored by sophisticated computer analysis equipment, such as an electromyogram (EMG), which can precisely record electrical activity in muscles.

What Wahl discovered during the study was that the brain motor patterns exhibited in performing unstable exercises were exactly the same as those seen in performing exercises on a stable surface. Because the motor patterns are the same, the conclusion is that unstable exercises would be inferior methods of training because they do not allow the exerciser to use as much resistance, and therefore develop comparable strength, as with conventional exercises.

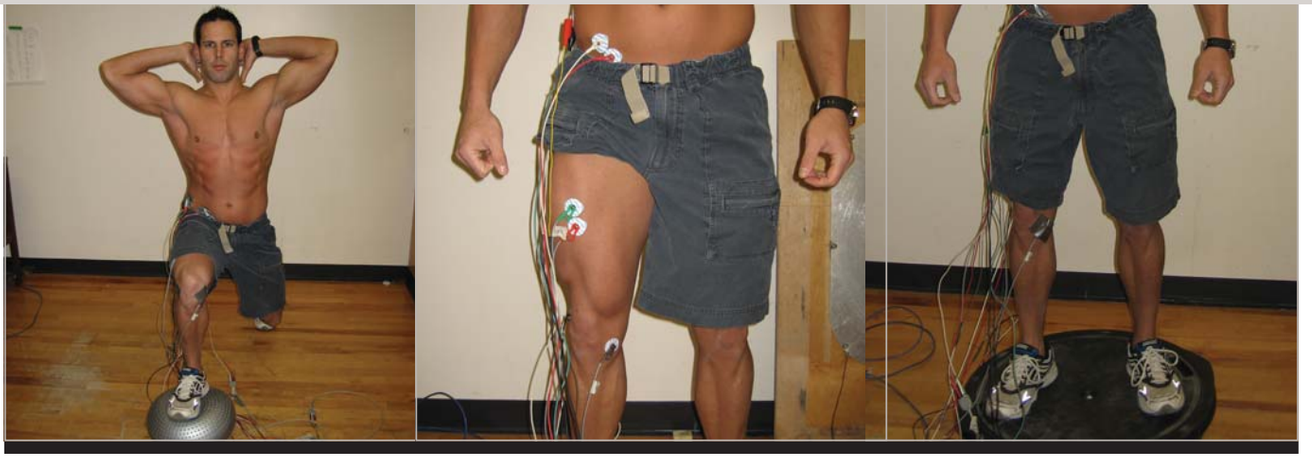
"What you have to consider is that free-weight training is unstable by nature," says Wahl. "Remember the first time you did a bench press and your arms went everywhere and you had trouble stabilizing your joints? Sure, a Swiss ball exercise can be taxing for someone who has never done any exercise before; but get a first-year physics student to explain the disrupted torque on the body that occurs when someone squats 500 pounds and you'll see that the entire muscle system has to work tremendously hard to handle that type of weight. When an athlete turns their ankle, it's often because they are not strong enough to handle the disrupted force of the activity, so why not train to get used to that excessive force using the principle of progressive resistance?"

You can easily make stability exercises harder, Wahl acknowledges, but that doesn't mean it's better. He cites the experience of a strength coach who had produced several popular videos on Swiss ball exercises and was demonstrating his proficiency at a seminar; the coach tried to stand on the ball and fell off and tore his ACL! "If this instructor, who was an elite athlete with a competitive background in Olympic lifting, cannot achieve stability on a ball, what makes a coach think the average high school kid can? It's not safe."

Another popular form of unstable exercise involves exercising on unstable platforms such as rocker boards and

What Coach Mike Wahl discovered during the study was that the brain motor patterns exhibited in performing unstable exercises were exactly the same as those seen in performing exercises on a stable surface.

Coach Mike Wahl's study on the value of unstable exercise used sophisticated computer analysis equipment that can precisely record electrical activity in muscles. Kinesiologist Ross Greene shows how two exercises were evaluated.



rubber disks full of air. They are often used to develop ankle stability and strength and therefore prevent injury. Dr. Siff, whose PhD was in exercise physiology and who had taught many graduate-level classes in biomechanics, said that the problem with these devices is that they do not duplicate the athlete's motion on the playing field. Wahl agrees.

"If any movement deviates 2.5 percent or more from the original motor program, the skills are not going to transfer," says Wahl. "Baseball players and javelin throwers both throw implements, but EMGs show that these movements are not similar, and therefore the skills from performing one of these activities does not transfer to the other." Likewise, balancing on a rocker board while juggling tennis balls might not necessarily improve your footwork in tennis, but it is certainly the best way to get better at balancing on a rocker board while juggling tennis balls!

Acceptable Risks?

It's possible you may not know anyone personally who has been injured on a Swiss ball; nevertheless, many such injuries do happen.

Dr. Marc Rabinoff, a full professor in the Department of Human Performance and Sport at Metro State College in Denver, Colorado, has been an expert witness in nearly 300 litigated cases involving fitness and sports training injuries. In one recent case, a clinically obese woman in her late 50s signed up for a weight-loss class at a hospital. The class used Swiss balls, and there were only two people in this class: a 2-to-1 student-to-instructor ratio.

Says Dr. Rabinoff, "The instructor tells the woman to sit on the ball and has her do exercises in which she has to lift her legs off the floor to work her 'core.' Within the first five minutes the woman falls off the ball and breaks her hip – game over! My first question in the litigation was 'What was the point?'

"This woman has balance issues already and is extremely overweight, so we're going to put a product under her that makes it even more difficult for her to retain balance? How dumb can you be? Interestingly, the instructor's testimony was that the Swiss ball class is good for anyone in any condition for any exercise anytime. She could not conceive that someone might not benefit from the ball class."

As for the potential legal ramifications of Wahl's findings, Dr. Rabinoff says that such research could come up in a case in which someone has been injured while performing stability exercises. "If any athlete got hurt performing these unstable exercises and there is data to support that there is not much value in these exercises anyway, then in a court of law this question would be raised: Is this good practice for a weight training and conditioning coach?

"The importance of good practice," continues Dr. Rabinoff, "unfortunately is overlooked by many sport-training practitioners eager to try new fads in exercise, and I am always amazed at how many claim to know the research. It's dangerous to not understand what each fad can and cannot do. In teaching our students many approaches to training and weight conditioning – because the truth is that 'one size does *not* fit all' – we must also make sure they know both the value and the risks in each approach. The fact is, many times the best exercises are simple free-weight exercises that have been around for more than 100 years."

While the jury may still be out about the value of unstable exercises, the scientific research suggests that this type of exercise has little practical value for an elite athlete and by its very nature these exercises have a high risk of injury. Today's athletes are bigger, faster and stronger, more so than ever before. And they get this way by not just training harder but by training *smarter*. BFS

Coach Wahl works with many elite athletes who agreed to participate in the study. Nationally ranked Kenpo karate athlete Kyle Hickey is shown performing glute-ham raises while Reg Lawrence, ranked #3 in Canada for Tae Kwon Do, demonstrates that he can just about jump on Coach Wahl's shoulders.