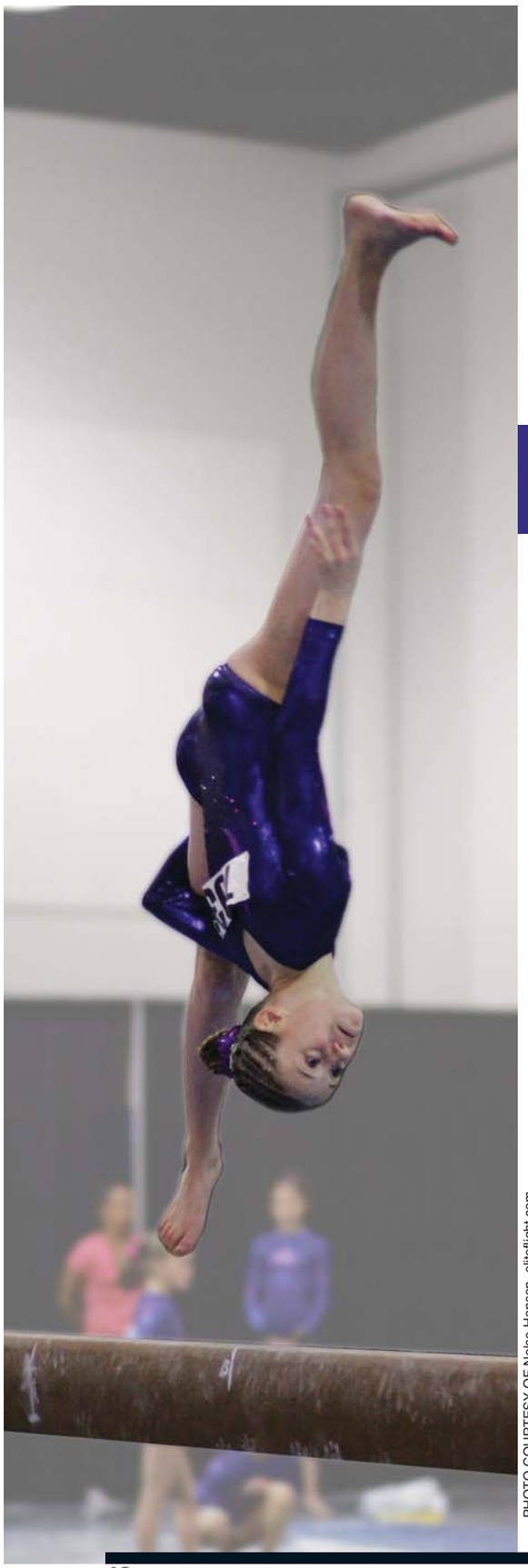

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Practical Steps to Prevent Ankle Injuries Part I

BY **KIM GOSS**

Don't let ankle injuries sideline you from achieving your goals

Ankle injuries—is there another type of injury that gets any less respect? If an athlete goes down grasping their knee in pain, time is stopped as players and fans alike look on in concern while coaches and trainers rush to lend support. But if an athlete twists an ankle and has to hop off the field or court, there's a collective sigh of relief that "it's probably just an ankle sprain." In no time at all the athlete will be back in the game after a good taping job, or at worst, the next game after a little rest and ice. But the reality is that ankle injuries need to be taken seriously, not just for their effect upon performance but also because they can increase the risk of other injuries.

Let's look at some numbers. According to the National Center for Health Statistics, injuries to the feet, toes and ankles accounted for 11 million visits to physicians' offices in 2003. Of those visits 800,000 were for ankle fractures. In fact, because many of these injuries are often treated by coaches and trainers and therefore not reported, the numbers may be greater than this study suggests.

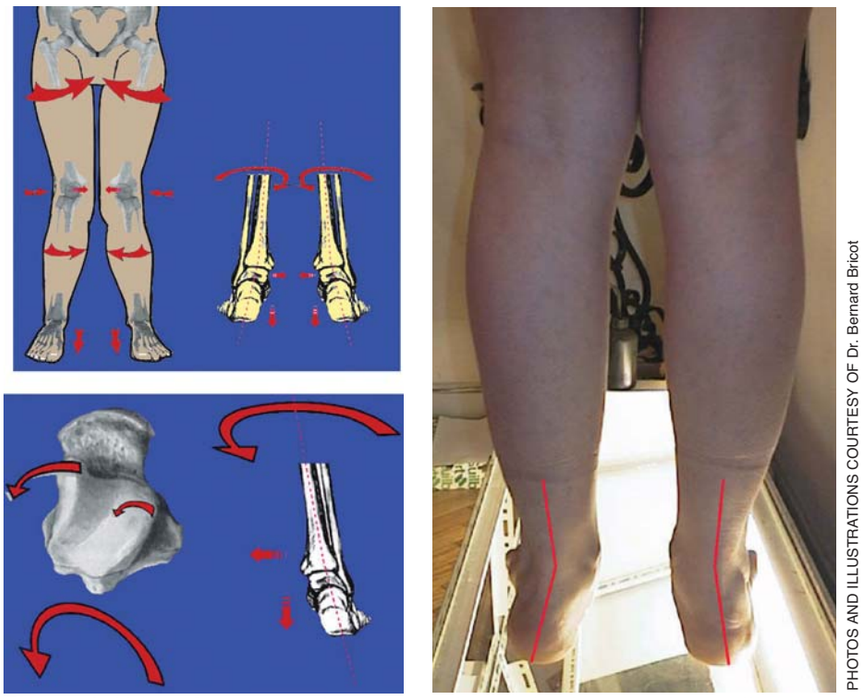
To make matters worse, a study conducted in Australia reported that an athlete who injures an ankle is five times more likely to injure that ankle again. On a personal note, a coach of a high school women's basketball team in Utah recently told me that she spends 45 minutes before practice taping ankles because approximately half the athletes on the team have had repeated ankle injuries!

BEYOND SENSIBLE SHOES

One field of study that addresses issues of the feet is called posturology, developed by Dr. Bernard Bricot of France. One of the practitioners and instructors in this field is Paul Gagné, a strength coach whose clients include two of the best golfers in the world, Michelle Wie and Michael Campbell, as well as numerous professional hockey and football players. Says Gagné, "Posturology is the science of posture. What regulates posture, basically, are the eyes and the feet. They provide information to the brain about body position, the eyes providing the horizontal reference and the feet the vertical reference."

According to Gagné, it's bad enough that ankle injuries stop athletes from participating in their sports, but often these injuries can lead to serious injuries to the knees and spine. "The feet and ankles are the foundation that the body is built upon; so if that foundation is weak, then everything above it is at risk." One example is valgus feet.

Valgus feet, which resembles flat feet because the arches of the feet collapse, occurs when the ankle bones internally rotate. As shown in Figure 1, with a valgus foot the ankle does not rest directly above the foot. Gagné says this condition creates excessive stress on the ligaments of the ankles, stress that is magnified in athletics. "Athletes who have valgus feet are especially susceptible to ankle strains, sprains and fractures because the muscles are not as effective at absorbing force, especially in sports such as basketball where so much jumping occurs." But that's not all.



PHOTOS AND ILLUSTRATIONS COURTESY OF Dr. Bernard Bricot

Figure 1: Valgus feet causes the upper and lower leg bones to internally rotate, placing excessive stress on the knees.

VALGUS FEET

With valgus feet, Gagné says the upper and lower leg bones internally rotate, placing excessive stress on the knees and thereby significantly increasing the risk of injury to this area. "Women have an intrinsically higher risk than men for such injuries, as they have wider hips and thus their leg bones come inward, making them less structurally stable compared to men." Further, as shown in Figure 2, Gagné says that the rotation of the upper leg bones causes the lower back to arch excessively, a condition that increases the risk of lower back injury as the spine loses much of its ability to absorb shock.

In the past, valgus feet was a relatively rare occurrence – the only attention it seemed to merit was as a diagnosis that could excuse someone from military service. However, Gagné says that now approximately 75 percent of Americans suffer this condition to some degree. The reason so many of us have flat feet is that we wear shoes. "The arch of the foot was not meant to be in constant contact with a surface such as the arch of a shoe. The skin on the feet has very sensitive receptors, and the constant pressure on the arch will cause the muscles of the arch to relax, in effect to become lazy."

To correct valgus feet, the most common solution is to wear orthotics, such as

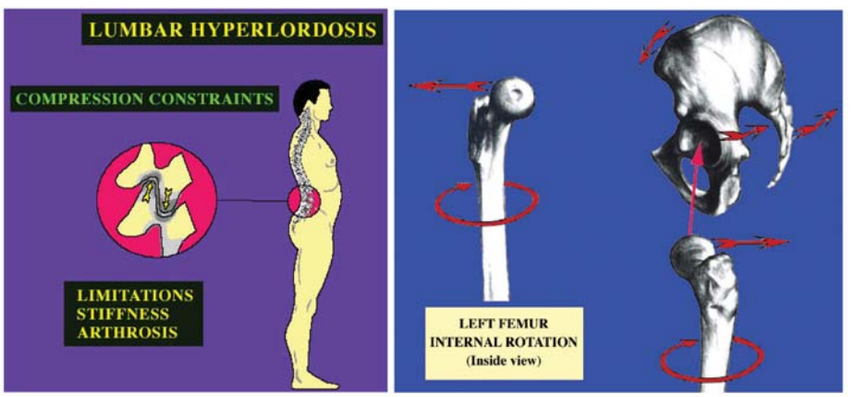


Figure 2: Valgus feet results in not only a buckling of the knees but also an excessive arching of the lower back.

Figure 3: Orthotics

those shown in Figure 3. However, these do nothing to strengthen the muscles of the arch, says Gagné. "First, you need to see a foot doctor who can assess you to determine if you need orthotics – just going to a local drugstore and picking up a cheap pair of arch supports may make the problem worse. And if orthotics are prescribed, they should be worn only when performing a sport, and when performing plyometrics or lifting heavy weights, to ensure proper positioning of the foot.

"Take, for example, the squat," says Gagné. "If an athlete with a valgus foot squats and does not have a good arch support in their shoes, it can be hard on the knees because the foot will rotate outward and the knees will buckle in. It's not that the squat is a bad exercise but that the weakness of the muscles of the feet can predispose an athlete to injury when performing this exercise. The same holds true for plyometrics, perhaps even more so, as the forces in these activities can be far greater than those that occur in squatting and other weight training exercises."

Although Gagné sees the benefit of using orthotics during athletics and conditioning, he doesn't believe they should be used continuously: "Unless a doctor

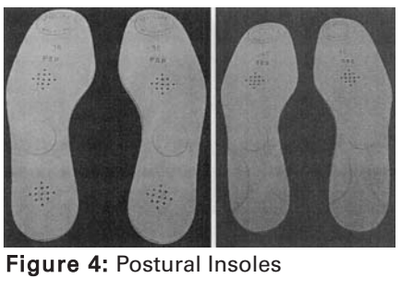


Figure 4: Postural Insoles

Figure 5: An example of the improvement that can occur to dysfunctional feet after 10 months of training and proper foot care.

prescribes otherwise, orthotics should not be used in your regular shoes because they are like a crutch – your feet become used to having the support, and the arches get weaker. What can be used in place is a special type of therapeutic postural insole [Figure 4] that will stimulate the receptors of the feet to reform the arch [Figure 5], but these should only be prescribed by a foot doctor or someone trained in posturology."

In addition to appropriate use of orthotics and therapeutic insoles, Gagné believes it's also important that athletes perform specific exercises to ensure maximum prevention of ankle injuries.

STRENGTH TRAINING FOR ANKLES

Just as athletes perform weight training exercises to strengthen the major muscles used in their sport, they should also direct adequate attention to special exercises for the feet and ankles. "The purpose of these exercises is not only to strengthen the muscles of the feet that have become weakened through the use of shoes but also to increase the proprioception, or awareness, of the lower extremities," says Gagné.

Although Gagné says that it's best to consult a posturologist as to the best approach to correcting foot problems, he was willing to share a few of the exercises he uses to correct valgus feet. Gagné credits his colleague Dr. Guy Voyer for developing many of these exercises. Here are three of the exercises Gagné uses: a single-leg support, a Hex bar deadlift and a step-up with the big toes lifted.

Figure 6: Single-Leg Support, Beginner's Version

Single Leg Support. Although this appears to be a simple exercise, it can be extremely difficult for many individuals to perform; therefore, beginners should perform it while standing next to a wall. Says Gagné, "Even if you perform it correctly, you will be pretty wobbly; and being able to rest one hand on a wall will help your balance."

Standing next to the wall, with one hand resting on the wall for support, bend your right knee so that it is not touching the floor. Now tighten your left glute muscle, then lift only your big toe off the floor, pressing the other toes to the floor. Hold for 30-60 seconds, then repeat with the other leg. When this becomes easy, perform it without touching the wall, but instead hold your arms out to the side. The next progression is to perform it with your hands at your sides, then with your eyes closed. After you've mastered this exercise, repeat the sequence (with wall, without wall, etc.) but with your working leg slightly bent.

Figure 7: Hex Bar Deadlift, Big Toes Up

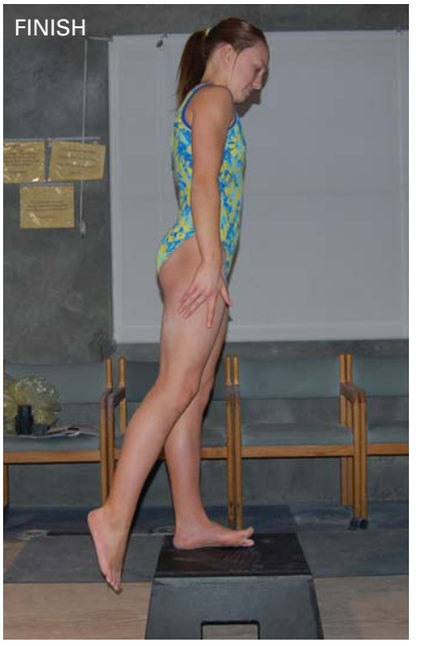


Figure 8: Low Step-Up, Big Toe Up

The reality is that ankle injuries need to be taken seriously, not just for their effect upon performance but also because they can increase the risk of other injuries.

Hex Bar Deadlift, Big Toes Up. This exercise is simply the standard BFS Hex bar deadlift, but performed with your big toes off the floor. As you perform the exercise, you'll find that lifting your big toes dramatically increases the tension on the arches of the feet.

To save time, an athlete can perform this variation as part of their regular Hex bar deadlift program. Simply perform the same weight, sets and reps as you normally would, but lift the big toes on the first or second warm-up sets.

Low Step-Up, Big Toes Up. This exercise is performed on a low, sturdy platform. Because of its stable pyramid design, a 10-inch Readiness Plyo Box is perfect for this exercise. Also, its solid base will prevent the athlete from catching the foot of the non-working leg under the top of the platform.

Stand in front of the platform and place one foot on top of it, with the foot pointed straight ahead. Place the other leg against the edge of the platform. In this starting position and throughout the entire exercise the posture is upright, keeping the hips under the shoulders as much as possible, with the chin held slightly up. To ensure proper neck alignment, the eyes should be focused on a point on the wall that is slightly higher than eye level.

To begin the exercise, lift up the toes of the trailing leg; this will prevent you from pushing off with the back leg. Now lift the big toe of the forward leg and stand up until the knee is straight, then return to the start. Rather than thinking about stepping up with the trailing leg, focus on pushing down with the front leg. It is not necessary to place the foot of the trailing leg on the platform, and you should keep this leg slightly flexed, as locking it can make it too difficult to balance. Perform this as you would any standard auxiliary exercise, such as 2-3 sets of 10 reps with each leg.

Finally, Gagné says that it's impor-

Raising the Bar in Strength

The models selected for this article are Mary Beth Lofgren (above, right) and Chloe Van Tussenbroek (above, left), both gymnasts who train at the Olympus School of Gymnastics in Sandy, Utah. They are coached by Mary Wright, the owner of Olympus, who meticulously details every aspect of her athletes' training and conditioning. Coach Wright showed me her yearlong periodization program – it was so complex it made my brain hurt!

Mary Beth and Chloe are among the best gymnasts in Utah, and they train about 30 hours a week. I wanted to use gymnasts for this article because the stresses associated with their training make these athletes extremely susceptible to ankle injuries, and as such their training includes specific exercises to help condition this area. In fact, when I asked Chloe to perform a single-leg squat, she whipped out several reps effortlessly with an expression that seemed to convey, "Like, is this supposed to be hard?"

Mary Beth is an 8th grader who attends Wasatch Junior High School in Salt Lake City, Utah, where she carries a 4.0 GPA. Last year Mary Beth was the 2005 Utah State Level 10 Junior Champion. She took the silver medal in the Region 1 Championships and also competed in the Junior Olympic National Championships, where she placed 22nd in the all-around. Her nicknames are "Biz" and "MB."

Chloe is an 8th grader who attends West Jordan Junior High School in West Jordan, Utah. Chloe took up gymnastics upon the recommendations of doctors to correct benign hypermobile joint syndrome, a medical condition in which joints easily move beyond the range of motion usually associated with those joints. A natural dancer whose floor routine captivates audiences, Chloe won her first Utah state championship when she was seven years old, and has won that title annually ever since.

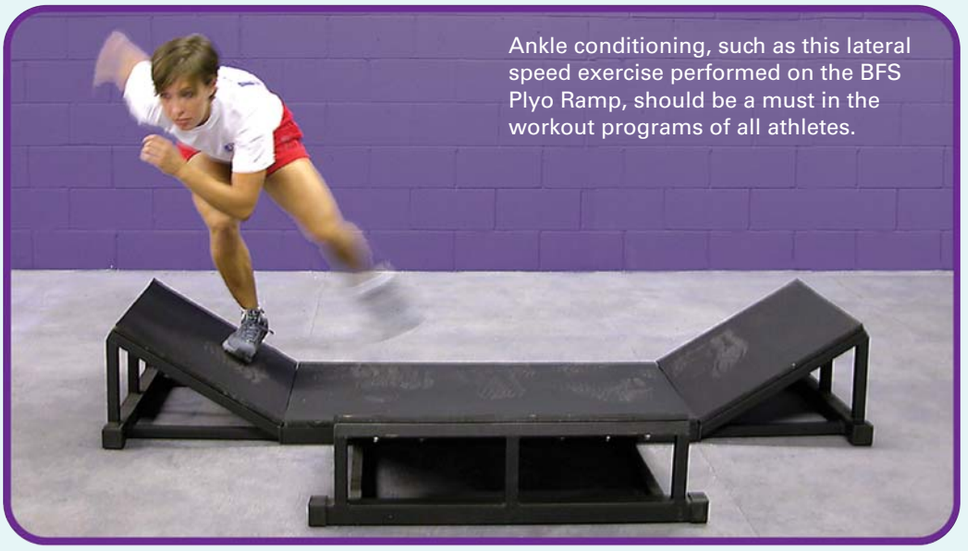
Figure 9: Stretching the calves can be performed with one leg in front of the other, or on the edge of an angled box. To stretch the upper calf, the knees should be straight; to stretch the lower calf, the knees should be slightly bent.

tant to stretch the calves to prevent ankle injuries (Figure 9), as these muscles affect the biomechanics of the foot. Standing on one of the side platforms on a BFS Plyo ramp (first with both legs straight to work the upper calf, then with the legs the slightly bent to work the lower calf) is a good stretch, as is the calf stretch used in the BFS Readiness program. However, with the wall stretch Gagné recommends you occasionally vary the exercise by pointing the front foot outward and then inward.

You can also increase the effectiveness of the stretch by lifting the toes of the trailing leg up and by tightening the glute of that leg; however, you should be very conservative with these variations for the first several weeks (such as by only taking the stretch to a 5-level on a scale of 10), as the increased intensity of these variations can easily cause injury. Stretching the calves should be performed daily, as it can be difficult to increase the flexibility of calves and maintain it as well.

Next issue we'll conclude our current look at preventing ankle injuries. Hopefully, the ideas presented in this two-part series will encourage you to devote serious attention to posture and the proper training for the muscles of the feet and ankles.

Part II of this series will explore many more-advanced exercises that can be performed to not only prevent ankle injuries but also dramatically improve athletic performance. BFS



Ankle conditioning, such as this lateral speed exercise performed on the BFS Plyo Ramp, should be a must in the workout programs of all athletes.

Practical Steps to Prevent *Ankle Injuries* PART 2

Our second installment on how to take ankle conditioning to the next level

BY **KIM GOSS**

Approximately one third of all sports injuries involve the ankle or foot, and any weakness here can contribute to poor posture and injuries to other areas, especially the knees. Further, an athlete who injures an ankle is five times more likely to injure it again. With these alarming statistics, it is vital that coaches take an aggressive approach to conditioning the lower extremities and wearing proper footwear.

To demonstrate the effectiveness of ankle conditioning, earlier this year I asked Heather Sonne, the women's basketball coach at Hunter High School in Salt Lake City, Utah, if I could have her athletes try several of the ankle exercises described in Part I of this series (March/April 2006). I had a special reason for selecting this group of athletes.

The majority of Coach Sonne's players had been suffering recurring ankle injuries to the point where the coach had to spend approximately 45 minutes before every practice taping ankles. The results of my limited experiment, although certainly not typical, were amazing. Says Sonne, "After about six weeks using these exercises, my athletes' conditioning improved so dramatically that I no longer had to tape any ankles. In fact, the only ankle injury we suffered since performing these exercises occurred in the final playoff game of the year, and it was an unavoidable accident that happened when one of our players' feet landed on top of the foot of one of the opponents."

Posturology Makes Perfect

Last issue I introduced the science of posturology and how it can help prevent and resolve ankle injuries. Based on revolutionary research in neuroscience, the

FIGURE 1

Jay Kiss (sunglasses) and Paul Gagné perform a posturology exam on weightlifter and gymnast Maegan Snodgrass. The exam evaluates how the feet, jaw and muscles of the eyes affect postural alignment.

practical aspects of posturology were developed by Dr. Bernard Bricot, one of the most respected orthopedic surgeons in Europe. Although posturology is relatively unknown in the US, thousands of medical practitioners (especially those in orthodontics) have taken extensive courses in posturology in Europe.

Two of the foremost practitioners and instructors of posturology are from Canada, strength coach Paul Gagné and podiatrist Dr. Michel Joubert. Gagné has gained an impressive reputation in the golf world with his work with Michelle Wie, Michael Campbell and a long list of other professional golfers. In 2004 I had the opportunity to take a course in posturology from Gagné and Dr. Joubert. Although their lecture on neuro-anatomy made my brain hurt, the practical portion of their seminar made me appreciate the application of this field in preventing injuries and improving athletic performance.

FIGURE 2

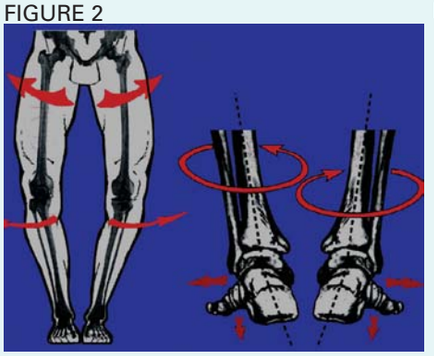


FIGURE 3

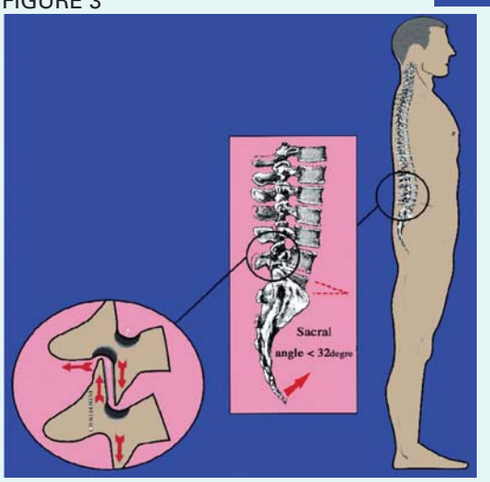
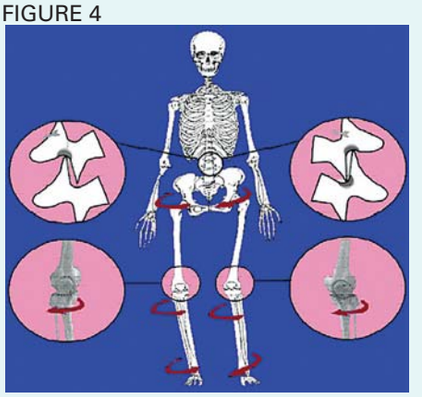


FIGURE 4



In a varus foot (Figures 2 and 3) the lower leg excessively rotates outward, placing unnatural stress on the ankles, knees and spine. Disharmonic feet (Figure 4), involves asymmetrical foot postures that further increase the risk of acute and chronic injuries.

Posturology offers a relatively simple, and quick, method to assess postural problems and prescribe practical ways to permanently correct them. One thing that makes a postural assessment different from a regular postural evaluation that a chiropractor or physical therapist might perform is the special attention that is paid to the muscles of the eyes and the jaw. And in addition to static assessments, athletes perform a few simple movements to determine how their posture changes while in motion.

Earlier this year I visited Gagné at his training facility at the David Leadbetter Golf Academy in Champions Gate, Florida. With me was Maegan Snodgrass, whom I was coaching at the Junior National Weightlifting Championships that same weekend. Gagné agreed to do a posturology assessment on Maegan, who had a stress fracture and a history of tendonitis in her left knee. Figure 1 shows some of the tests Maegan performed for Gagné and his partner, therapist Jay Kiss.

Despite an excellent conditioning program that includes up to an hour a day of both static and dynamic stretching, Maegan had some severe postural problems caused by improperly aligned

FIGURE 5

FIGURE 6

Posture exercises derived from modern dance and single-leg squats are excellent exercises to help prevent and rehabilitate ankle injuries.

feet. (Gagné noted that Maegan's eye muscles were fine, as was her jaw alignment, although he warned her that her persistent gum chewing could cause postural problems in the future – seriously!) Her left foot was *valgus* (for illustrations, see our March/April 2006 issue), which means the bones of the upper and lower leg are rotated excessively inward. Her right knee, in contrast, was *varus*, which means these bones are rotated excessively outward (Figure 2).

A varus foot not only places the ankle in an unnatural position but also creates tremendous stress on the knees, making them more susceptible to ACL injuries. In Maegan's case, Gagné believes this may be responsible for her stress fracture and tendonitis, and he pointed out that when Maegan attempted a single-leg squat on that leg, her right knee immediately buckled inward. Also, the rotation of the leg bones flattens the spine (Figure 3), which reduces the ability of the spine to absorb shock and thereby increases the risk of lower back injuries.

Having both a valgus and a varus foot is a condition Gagné calls *disharmonic feet,* which, as shown in Figure 4, creates an unnatural shift in the spine that makes an individual more susceptible to groin and back injuries. Although Maegan has never had any back injuries, she did have a nasty groin pull that kept her out of gymnastics for several months.

Having completed the posturology assessment, Gagné attached therapeutic insoles to Maegan's feet to see if they would have any effect. These devices, which are worn in shoes, provide a steady electrical current that increases the sensitivity of the feet. After standing on these for just a few minutes, Maegan's body alignment and knee and ankle stability dramatically improved – she could even perform single-leg squats on her right knee without any excessive buckling of the knee! "This is one of the most dramatic cases of postural improvement from these insoles I've ever seen," says Gagné. "If Maegan wore insoles for three weeks, her posture would be close to ideal and after a few months she would no longer need to wear the insoles except on a very infrequent basis."

One Step Beyond

Although postural insoles will help improve alignment and stability, as will eye and jaw exercises if indicated (the eye and jaw provide the brain with sensory input that will affect body alignment), an athlete needs more to gain maximum protection from ankle injuries. Exercises that strengthen the muscles that lift the arch of the foot and increase body awareness are especially important. One sports medicine doctor in the US who heartily concurs with this belief is Dr. Michael Ripley.

Dr. Ripley has worked with 25 world and Olympic medalists in sprinting, long jumping and triple jumping. In addition to his medical background, he has a degree in dance. He uses many modern dance and Tai Chi exercises, such as the one in Figure 5, with his elite athletes to strengthen the ankles and improve performance.

However, because he strives for maximum performance, Ripley will take the exercises a step further, such as by having the athletes hold dumbbells and barbells while performing them, then progressing to single-leg variations of the movements. "These exercises must be done with heavier loads when appropriate and, depending on the exercise performed, on just one leg, to approximate the stresses on the body that occur in sprinting and other ballistic activities that occur in sport," says Ripley. "However, many of the elite athletes I work with have to start with only bodyweight activities, or even simpler toe flexor exercises with manual resistance or tubing."

After developing a base of strength with specialized foot exercises, athletes can take it to the next level. The plyo ramp is a great next step for beginners, as the angle of the box makes it easier for those who have valgus feet, which account for about 75 percent of the population, Gagné says. Single-leg squats (Figure 6) are excellent, as they involve the leg and hip muscles that help stabilize the knee and ankle. Also, Gagné says warming up with the BFS Dot Drill will help prevent injuries by increasing body awareness.

These measures might seem like a lot of work to do to prevent ankle injuries, but actually their importance cannot be emphasized enough. Prevention is undoubtedly the best medicine, and the steps you can take to prevent ankle injuries are certainly far easier than dealing with the consequences of neglect. BFS