



The Forgotten Secret to Jumping Power

How shock training can jumpstart your athletes

BY KIM GOSS

For more than 32 years BFS has promoted plyometrics for all levels of athletes. The reason is that plyometrics is a powerful training tool that can significantly improve speed, power and overall athleticism. Unfortunately, many athletes don't see these results from plyometrics, and some have even become injured from such training. What's going on?

The major problem with many coaches who prescribe plyometrics to their athletes is that they underestimate the intensity level of this type of activity. For example, last year I tested an elite female athlete just before she participated in a summer conditioning program. That workout schedule involved performing plyometrics up to five days a week, with some workouts requiring her to perform hundreds of repetitions in

various forms of jumping. Compare that to the plyometrics component in the BFS program, which has athletes perform box jumping for about 10 minutes twice a week.

By the end of this program this young women's vertical jump had decreased by three inches and she had developed overuse injuries in both knees that required numerous physical therapy treatments. The lesson to be learned from this unfortunate experience is not only that better results can be achieved with very brief sessions of plyometrics but also that overdoing plyometrics can decrease performance and increase the risk of injury.

Learning from the Russians

One reason for the confusion about plyometrics is that it has been difficult

to absorb practical information from the classic research published in this area. For example, Soviet sport scientist Yuri Verkhoshansky is considered the founder of modern-day plyometrics. Here is a passage from his textbook *Programming and Organization of Training*:

"Indispensable conditions of training organization which provide extensive and relatively prolonged disturbance of homeostasis, are the precise dosage of loading, as well as rehabilitation stages necessary for triggering a compensatory reaction, elimination of the hetero-chronicalness phenomenon in the dynamics of the various functional indicators and stabilization of the organism at the new functional level." *Say what?*

To be fair, much of Verkhoshansky's work was being translated from Russian by college students or other

individuals with little background in sport training. Fortunately, in the early '90s Verkhoshansky decided to work with Mel Siff, PhD, a sports scientist from South Africa who later moved to the US. Siff was able to translate Verkhoshansky's work on plyometrics so that it could be better understood by non-sport scientists.

The Science of Shock Training

I first met Dr. Siff in the late '80s when I was a strength coach at the Air Force Academy. We became close friends, and I wrote numerous articles about Siff's training ideas and consulted with him on many projects I had been working on. We eventually decided to write a series of books that would focus on the practical aspects of his and Verkhoshansky's training ideas; tragically, Dr. Siff died unexpectedly in 2003 before we could complete them. One of the books that we had made considerable progress on was called *Shock Training*. We decided on this title because the term *plyometrics* had been so maligned in the US.

Siff says that shock training is “a method of mechanical shock stimulation that forces the muscles to produce as much tension as rapidly as possible. It is characterized by an intense muscular contraction that is preceded by a relaxed state.” Jumping rope does not produce a high-enough level of muscle tension to be

classified as a shock training exercise; and although the squat produces a high level of muscle tension, there is no mechanical shock stimulation. Thus, although the squat is a great exercise, it would be more appropriately called “preparatory” exercise for shock training.

Stepping off a box (not jumping, as the thigh muscles must be relaxed during the fall) and immediately rebounding upward upon landing is considered an example of a shock training exercise for the lower body. This exercise is commonly called a *depth jump*, and it is included in the BFS box jumping program. Performing Marine Corps push-ups, in which you clap your hands, land and then immediately perform another repetition, is an example of shock training for the upper body. This exercise is commonly called a *plyometric push-up*.

Verkhoshansky's research has revealed that shock training, used intelligently, is the most effective type of plyometrics. In one 12-week study Verkhoshansky divided track-and-field athletes into two groups. The first group performed 1,472 low- and medium-level plyometric activities, including squats. The other group performed 475 jumps using the shock training method. Although the shock training group performed a third less work, these athletes showed statistically significantly greater

improvement in reactive ability than the group using traditional methods.

Shock training is a powerful tool for athletic training, but because it places such high levels of tension on the muscles and stress on the nervous system, it must be approached with caution. In this regard, Siff believed that many US athletes were relatively weak eccentrically, which means they had a



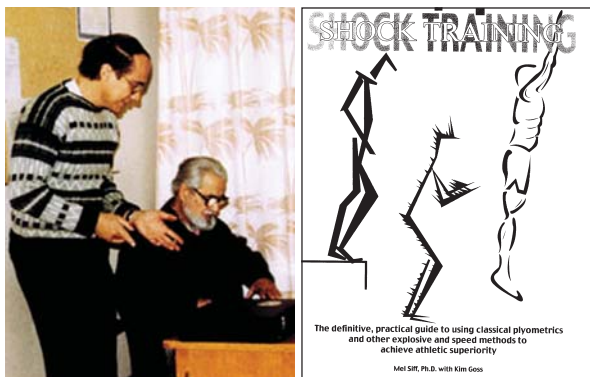
Accurate testing of the vertical jump can be accomplished easily and accurately with the BFS Just Jump testing system.

difficult time controlling the disrupted forces that occur to the body during the landing phase of jumping. In fact, what I found when testing gymnasts using the BFS Just Jump force plate is that often they can jump as high without a step as with a step. I believe this phenomenon occurs because in their sport there is little eccentric loading other than the athlete's bodyweight.

In addition to reinforcing how important it is for all athletes to perform squats, which train the muscles eccentrically as the athletes bend their legs, Siff introduced to me several drills that will help athletes prepare for the more advanced shock training exercises. I'd like to share a few of these with you.

Shock Training with Squat Jumps

The exercises Siff taught me involve a rapid deceleration of eccentric movement, as opposed to the slow eccentric movements recommended with most weight training exercises. The drop snatch, in

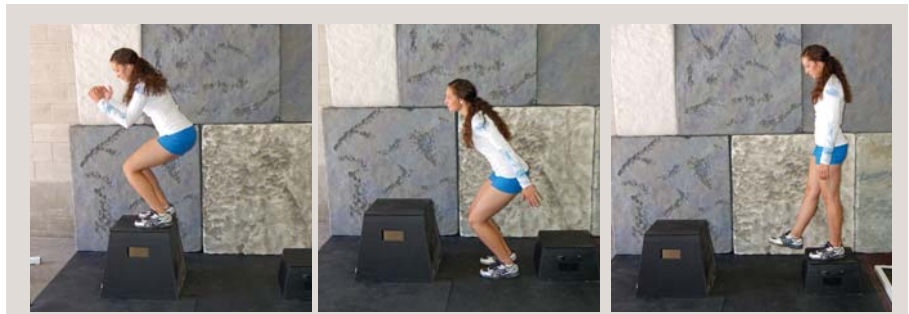


At left, sport scientists Dr. Mel Siff (standing) and Yuri Verkhoshansky were pioneers in plyometric training. Prior to his death, Dr. Siff was working on a book about shock training, a form of plyometric training that is described in this article.

which an athlete places a barbell behind the neck and suddenly drops into a full-squat position, is one such movement. Another is the squat jump, which is best performed with a Hex bar.

A Hex bar is a type of barbell that has a hexagonal shape that allows you to stand inside the apparatus as you exercise. Rather than having your hands in front of you when you perform exercises such as deadlifts, with the Hex bar your hands are at your sides, a design that encourages you to stay more upright as you exercise and keep your shoulders back. This is a great advantage, because when you perform squat jumps with a barbell, there is a tendency to lean forward as you fatigue. In contrast, with the Hex bar that momentum results in a shoulder shrug, giving your traps a good workout. Siff would always point out that when athletes jump with a barbell on the shoulders, as was often performed by Russian athletes, the bar separates from the body and crashes on the shoulders, placing considerable compression forces on the spine.

Siff taught me two types of squat



Depth jumps and plyometric push-ups are forces of plyometrics Dr. Mel Siff referred to as shock training, which are intense forms of training that develop power.



jumps. In one type of squat jump, you rise up on your toes, drop rapidly into a quarter (or even a parallel) squat, and repeat. This is the type of squat jump that can be performed by beginners or as a warm-up before more-advanced shock training exercises. The second type of squat jump is to simply jump as high as possible, land in a quarter squat,

and immediately rebound. Examples of these exercises are provided in the photos accompanying this article.

The focus in both these exercises is a rapid eccentric contraction and a brief transition phase. As such, heavy weights are not necessary. For my high school girls' weight training class, I often use no more than the weight of the empty Hex

Hex Bar Squat Jumps

Hex bar squat jumps are a great shock training exercise to develop eccentric strength, which is an important aspect of athletic performance.



Squat Jump, *Beginner*



Squat Jump, *Advanced*



bar (45 pounds) or the Youth Hex bar (15 pounds). As a comparison, Siff told me that Serge Reding, the great Belgian superheavyweight weightlifter who was the first man to snatch 400 pounds, could jump 16 inches off the ground while holding a barbell that weighed 286 pounds!

It would be difficult to prescribe exact sets and reps, but for high school athletes one effective protocol I've used is a warm-up of one set of 12-15 reps without leaving the ground, followed by two sets of 8-10 reps leaving the ground – that's all! At most, such workouts could be performed twice a week, but advanced athletes would need to cease such high-level workouts about 10 days before major competitions to peak properly.

I used squat jumps last year with one 14-year-old Level 10 gymnast who had a 22-inch standing vertical jump, both without and with a step. In two months of appropriate plyometric training she added 3.7 inches to her standing vertical jump and added 4.2 inches to her vertical jump with a step. Again, this was an elite athlete who already had an exceptional vertical jump. I also introduced this training to a high school volleyball team and noted great improvements in both types of jumps just a few weeks after introducing squat jumps; the volleyball coach told

me recently that over the course of the semester her best athlete added 8 inches to her vertical jump with a step! Likewise, I had good success with such training methods when I trained figure skaters at my private gym in Dallas, and these results have encouraged me to continue using shock training with my athletes.

Plyometrics are included in the Tuesday and Thursday workouts of the BFS program, but often I've found that with many coaches I've interviewed they only perform the off-season weight training workouts with their athletes due to time restraints. This is unfortunate, because to be effective, plyometric training should be performed year-round – and again, *the BFS box jumping program takes only 20 minutes a week!* But for those programs that simply can't fit in time for plyometrics, performing some Hex bar squat jumps as an auxiliary exercise could be a practical alternative to keeping athletes plyometrically fit.

I regret not finishing that series of books during Dr. Mel Siff's lifetime, but I hope that this article will give you a clearer picture of what shock training is and how Hex bar squat jumps can be a valuable auxiliary exercise for athletes. I've found this training method invaluable for my athletes, and I also urge you to use it to great advantage. **BFS**



Lusia Angilau plays basketball and volleyball at Hunter High School in Salt Lake City, and this year her club team competed in the Junior National Championships in volleyball. Lusia has a 27.1" vertical jump and is also a promising weightlifter.

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