

# Postural Considerations for Rifle and Pistol Shooters

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Physical therapy interventions can be very beneficial for the shooting athlete. Physical therapy evaluation includes assessment of postural alignment, flexibility, strength, postural stability, biomechanics and the evaluation and treatment of acute and chronic musculoskeletal impairments.

Postural alignment is very important. Certain body type variations can predispose you to injury. For example, misalignment of your foot and ankle can lead to disorders of the ankle, shin, knee, hip and lower back. The most common misalignment is "flat foot" or pes planus. Typical treatment for flat feet includes assessment of muscle length, flexibility exercises and the fabrication of orthotics to correct the flattened arch.

Flexibility assessment is critical for the standing shooter. For instance, a right handed rifle shooter must have enough extensibility of the hip flexors, the left iliotibial band, right hip adductors, spinal musculature and left wrist flexibility to assume a position that is relaxed and requires the minimal amount of muscle activation. Ideally, shooters should be able to completely relax in their standing position. Tightness in any of these areas can result in unnecessary and unwanted activation of trunk or lower extremity muscles to maintain a balanced standing position. As an overall assessment tool, I routinely check the flexibility of the hamstrings, deep hip flexors (the iliopsoas), quadriceps, hip extensors (gluteus maximus), hip internal and external rotators, iliotibial band, calf muscles (gastrocnemius/soleus), the chest muscles (pectorals), shoulder rotators (rotator cuff), biceps, triceps, wrist and finger muscles. Very little research has been conducted on rifle shooters and injury prevention. One study performed in the 1980's found a positive correlation between having a tight iliotibial band and lower back pain. Therefore, I give ITB stretches to all rifle shooters.

Rifle shooter and 2008 Olympian, Jamie Beyerle believes strongly in the importance of flexibility and shooting. "Many people believe shooting is all about just standing still, and being tight is a good way to do that. This

statement is not completely true," commented Beyerle. "Flexibility and relaxation go hand in hand. Stretching before shooting is just as important as stretching for a physical sport. If you are not stretched out before shooting, your body loosens up and your position changes the longer you shoot. If you stretch, this change is much smaller if any there is any change at all."

Photo by David Labrozzi



Strength is another important consideration. For rifle and pistol shooters, endurance and isometric strength are more important than "bulking up." Strength training that involves high repetition with low weights is preferable than low repetition and higher weights. I assess the strength of each shooter's core muscles (deep abdominal and lower back muscles), arm muscles (deltoid, rotator cuff, biceps, triceps, wrist and hand muscles), trunk muscles (serratus anterior, latissimus dorsi, rhomboids, upper, middle and lower trapezius) and lower body muscles (gluteus medius and gluteus maximus). For pistol shooters it is important to have strength in all of these areas to maintain position for longer periods of time, to maximize stability so that postural sway is minimized and for injury prevention. For rifle shooters strength

and endurance are primarily useful for injury prevention.

Sandra Uptagrafft, the 2007 Pan American Games gold medalist in Women's Sport Pistol, can attest to the importance of having a strong core in order to maximize stability in her shooting. "A strong core is critical for stability, so under ideal training conditions I would work on core strengthening exercises at least three times a week," said Uptagrafft. "I combine low weight and high repetition core strength and balance exercises for general stability and endurance, with pistol holding exercises to work more specific muscles."

Sandra Uptagrafft



Uptagrafft added that being a right-handed pistol shooter, she tends to overwork the right side of her body, so she makes sure to work her left side for symmetry. She also stresses that stretching is key to keeping good balance and should be done after each workout and/or range session. "For me in particular, my cervical spine can get pulled out of alignment from heavy training, so stretching all neck muscles has been very important for me to avoid pain and injury. All this gives me a solid foundation on which to build each shot. The stronger my core, the better my hold will be, and the steadier my hold, the smaller my holding area will be. The smaller my holding area, the less movement I see, and this makes it easier for me to squeeze the trigger."

Balance and coordination are also addressed in physical therapy evaluation. Typically the shooters single-leg balance is assessed with the eyes open and closed. A normal score would be at least 60 seconds. Many of the elite shooters are able to hold a

steady position for over three minutes. If it appears that a shooter has balance deficits, I recommend a series of exercises that include practicing single leg stance and using the Wii Fit. When using the Wii, I calculate their Wii age and then have them progress using the Yoga, Balance and Strength modules. One advantage of using the Wii is that individual progress is easily monitored. As shooters tend to be a competitive group, the Wii is useful in that the shooters can compete against each other. Other ways to enhance stability include training under special conditions: standing on a foam pad instead of the concrete floor, using a narrower stance to increase difficulty and prolonging your hold.

Shooters are prone to a variety of injuries due to the prolonged postural stresses and repetitive nature of the sport. Many rifle shooters have knee, hip, neck, mid and lower back pain from prolonged standing, kneeling and prone positions while supporting the weight of the gun. Pistol shooters are more prone to shoulder, elbow, wrist, hand and neck injuries. Treatment of these injuries can include joint manipulation, soft tissue release, and the

identification of any flexibility, core strength or stability deficits. Many times we will fabricate orthotics to assist with standing stability.



“I’ve suffered chronic back pain for years,” said 1996 Olympian Eric Uptagrafft. “I attri-

bute this to the stress from shooting standing. Through the use of custom shoe orthotics and more recently core stability exercises, I’ve extended my three position shooting career by seven years so far.”

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*Cathy Arnot graduated from Baylor University in 1990 with Masters of Physical Therapy and graduated from the University of St. Augustine with a Doctor of Physical Therapy in 2003. Arnot began working with USA Shooting in 2003 as part of a group of physical therapists who had completed fellowship training under Dr. Bob DuVall at SportsMedicine of Atlanta. The physiotherapist-scal therapists travel with the team to World Cups, World Cup Finals, World Championships, Spring/Fall Selection matches, National Championships and the Olympic Games. Arnot is currently teaching teach mobilization, manipulation, orthopedic lab, ethics and foundations of physical therapy in the Doctor of Physical Therapy Program at the University of South Carolina.*

The soft overcomes the hard,  
The slow overcomes the fast,  
Let your workings remain a mystery,  
Just show people the results.

-Lao Tzu

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**Silvino Lyra** is a 1999 USA/NRA International Advanced Shooting Coach who has coached gold and silver medalists at the Pan American Games and 5 Olympians in the 2000 & 2004 Olympic Games in the 10m air pistol element of Modern Pentathlon.