



# ATHLETE'S EDGE



## Bump, Set, Jump!

### An Explosive Way To Increase Your Vertical!



Increasing the height of your vertical jump can result in tremendous benefits in the sport of volleyball. Jumping is an essential component to nearly all aspects of volleyball – blocking, spiking, and serving. Jumping requires the explosive use of the large muscles of the legs, mainly the quadriceps muscles in the front of the thigh, and the gluteal muscles in the back of the hip, over a short period of time. Strength is an essential component to the development of power but represents only part of the equation.

$$\text{Power} = \frac{\text{Force} \times \text{Distance}}{\text{Time}}$$

Plyometrics is one training method that helps to develop explosive strength. Based upon Latin origins, **plyo + metrics** is interpreted to mean “measurable increases.”<sup>1</sup>

#### Muscle Mechanics

Normally, a muscle shortens when it contracts (**concentric contraction**). An **eccentric contraction** occurs when the muscle lengthens under tension. In the skill of jumping,



eccentric contractions are rapidly followed by concentric contractions. The muscles surrounding your hips, knees, and ankles contract in order to prepare your body for the upward

thrust of the jump. This type of contraction can develop a tremendous amount of force very rapidly, and is the basis of plyometrics.

#### Plyometric Guidelines

**Age** - Plyometrics can be appropriate for all ages. It is important to continuously monitor the athlete for pain, proper form, and strict adherence to the program.

**Strength** – Plyometrics can be extremely hard on muscles and connective tissue (especially tendons). Athletes should have a strong base of strength before attempting a plyometrics program. Form is critical during the exercises to minimize injury. A thorough understanding of the body's physiological adaptations to resistance exercise is important in the development of a plyometric training program.

**Specificity of Training** - There are many different plyometric exercises and variations. The key is to develop a program that works the muscles, and simulate movements, used during the sport of volleyball.

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*The sports medicine newsletter for the Region of Waterloo, supporting the safe pursuit of sports and physical activity*

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### **Training Variables**

**Intensity** - The difficulty of the activity can be increased or decreased by changing the type of jumping, the height from which an athlete jumps, and by adding or removing resistance.

**Volume** - The total amount of work performed in a training session, and over a period of time, is critical. Beginners should begin with between 60-100 foot contacts in a session with lower intensity exercises to develop power and proper form.

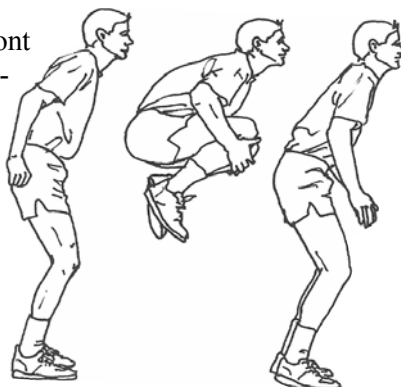
**Frequency** - Most experts agree that the muscles require between 48-72 hours of recovery time before the next bout of plyometric training. This generally dictates that you can only perform plyometric sessions 2 times per week.

**Recovery** - As with any training program, rest and recovery are crucial to allow the body to repair tissue, retain the benefits of exercise, and prepare for another session. This recovery period does not have to mean complete rest from exercise, as active recovery can include endurance training, weight training, or flexibility training.

### **Plyometric Exercises**

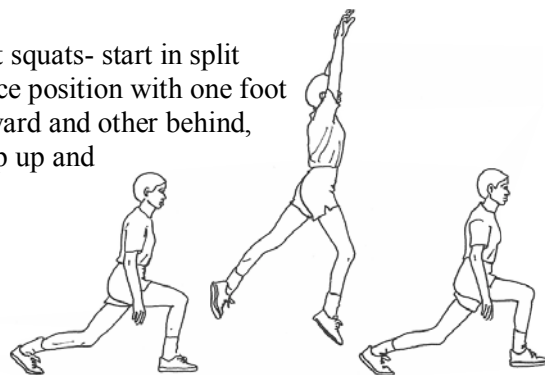
Developing a plyometric program as a part of an overall training program takes time, planning and research. These types of programs are not to be 'jumped' into, without previous experience, expertise and training. For volleyball, where the key is to be able to jump higher to block and spike, the majority of exercises will be jumping oriented. Upper body exercises are also helpful but beyond the scope of this article.

1. Tuck jumps in front and behind- front-start from standing position, jump up and pull knees up toward chest, land with control and quickly jump



again; behind- jump up and pull heels up toward buttocks.

2. Two foot static vertical jumps- stand facing the wall or net, bend down to the point where knees are flexed to 90°, arms by side, propel arms forcefully upward and jump up and touch wall as high as possible, repetitions based upon goals.
3. Box jumps (start with a box or step height of 6-8") up and down- two foot hop up onto a box, turn around and jump down, landing on two feet with control.
4. Split squats- start in split stance position with one foot forward and other behind, jump up and



simultaneously switch foot position, moving forward to back position and vice versa.

It is important to consult someone with expertise in developing a plyometric program. Injury can occur if the program is too difficult, form is not monitored, or if the program is not well prepared. You might see some improvements with a poorly developed program but you will not achieve your optimal performance. Feel free to contact S.T.A.R.S if you are interested in a plyometric training program or for any of your fitness related needs.

#### References

1 Chu, D.A. (1991). *Jumping Into Plyometrics*. Champaign, IL: Leisure Press.



# Why Do I Keep Spraining My Ankle?!



There is nothing more frustrating than returning to play after suffering an ankle sprain and getting re-injured! The re-injury rate following a lateral ankle sprain has been reported to be as high as 80%.<sup>1</sup> The key to preventing recurrent ankle sprains is proper treatment and rehabilitation of the initial injury.

Ankle sprains involve the stretching or tearing of 1 or more ligaments surrounding the ankle. The majority of ankle sprains suffered by volleyball players are lateral or inversion ankle sprains, which may involve up to 3 different ligaments (see Figure 1). The most common mechanism of injury is landing on an opponent's foot following a block or spike. The athlete "goes over" on the ankle and immediately feels pain. Some athletes may report a cracking or tearing sound at the time of injury.<sup>2</sup> There are 3 classes of ankle sprains:

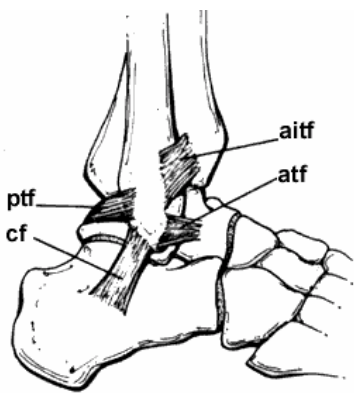


Figure 1: Lateral ankle ligaments

**First degree** – stretching of 1 or more ligaments

**Second degree** – incomplete tear of 1 or more ligaments

**Third degree** – complete tear of 1 or more ligaments

Immediate management involves R.I.C.E. (rest, ice, compression,

elevation) and consulting a sports medicine physician to



properly diagnose the severity of the injury. The diagnosis may include an x-ray to rule out bone damage.

Proper rehabilitation is crucial in preventing recurrences of ankle sprains. Many athletes complain of a "weak ankle" following a sprain, which is often the result of incomplete post-injury rehabilitation. Most athletes are prescribed a rehabilitation program to follow at home, but many who are excited to return to play forget to continue to strengthen their ankle. The key to preventing recurrent sprains is **functional rehabilitation**.

Prolonged immobilization of ankle sprains is a common treatment error. Rest (the "R" in R.I.C.E.) does not mean complete immobilization of the ankle. Functional rehabilitation can begin immediately in first and second-degree sprains, as these sprains are considered stable (since there is no rupture of ligaments).<sup>3</sup> Pain and swelling should dictate the amount of exercise performed. Listed below are a few exercises that can be started

## Lateral Ankle Ligaments

AITF: anterior inferior tibiofibular ligament  
ATF: anterior talofibular ligament  
CF: calcaneofibular ligament  
PTF: posterior talofibular ligament

## Did you know...

That most injuries in indoor volleyball occur during blocking or spiking and result most frequently in acute ankle and finger injuries?



## Editor

Nancy Habermehl  
nancy@wsm.ca  
Research & Educational  
Consultant



WATERLOO SPORTS MEDICINE CENTRE

Waterloo Sports Medicine  
Centre  
65 University Avenue  
East, Unit 12  
Waterloo, ON, N2J 2V9

Phone: 746-2220  
Fax: 746-2295

Email: info@wsm.ca



at RIM Park

Waterloo Sports Medicine  
Centre at RIM Park  
2001 University Avenue  
East, Suite 104  
Waterloo, ON, N2K 4K4

Phone: 885-5684  
Fax: 885-6123

Email:  
wsmrimpark@wsm.ca

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immediately following the diagnosis of a first or second-degree sprain. These exercises are also beneficial for anyone who has previously sprained an ankle or wants to prevent an ankle sprain.

1. Ankle alphabet. Using the ankle and foot only (keep your heel on the floor), trace the letters of the alphabet from A to Z in the air: 3 times with capital letters, and 3 times with lowercase.
2. Achilles tendon stretching. Begin with non-weight bearing stretching – sit on the floor with a towel wrapped around your foot and pull your foot towards your face. Hold a pain-free stretch for 15-30 seconds, for five repetitions. This can be repeated 3-5 times/day.



As strength and stability in the joint increases, the following exercises may be added.

3. Tubing exercises. Secure the tubing (around your other foot or a table leg) and do resisted dorsiflexion (pull foot upward toward head), plantar flexion (push foot downward toward floor), inversion (push foot inward toward midline of body), and eversion (push foot outward away from midline of the body).
4. Heel walks and toe walks. Alternate between walking on your toes and heels.



Remember that these exercises are strictly guidelines. It is important to have your injury diagnosed by a sports medicine professional prior to beginning any rehabilitation program.

Taping the ankle or wearing an ankle brace can also provide additional support once the athlete has regained sufficient balance and strength to return to the game. It is extremely important that only a qualified trainer or coach perform the taping procedure as improper taping can actually do more harm than good. Please call the clinic if you are interested in learning more about supportive ankle taping. Remember that nothing can replace a strengthened and completed rehabilitated ankle—it is worth the extra time and effort!

Nancy Habermehl, B.Sc. (Kinesiology)

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2. Anderson, M.K. & Hall, S.J. (1995). *Sports Injury Management*. Media, PA: Williams & Wilkins.
3. Wolfe, M.W., Uhl, T.L., Mattacola, C.G. & McCluskey, L.C. (2001). Management Of Ankle Sprains [Electronic Version]. *American Family Physician*. 63(1), 93-104.

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