

# The Importance of Shin and Ankle Strength for Racewalkers

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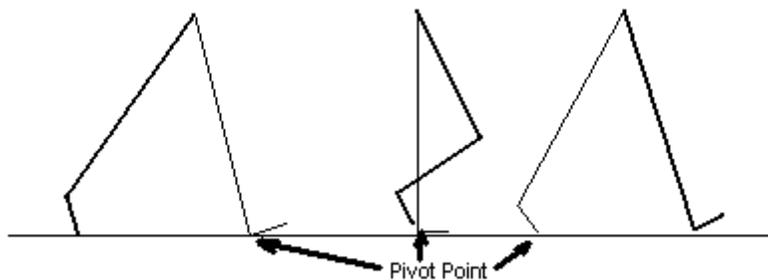
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Nearly every beginning racewalker has experienced the intense burning in the shins that signals the awakening of long-dormant, even vestigial, anterior tibialis muscles. These muscles are rarely, if ever, activated in any other sport but racewalking, so such pain, although often quite severe, is not surprising. Novice racewalkers are also frequently frustrated by an inefficient, "stumpy" walking style that prevents them from competing with comparably fit, but more economical athletes.

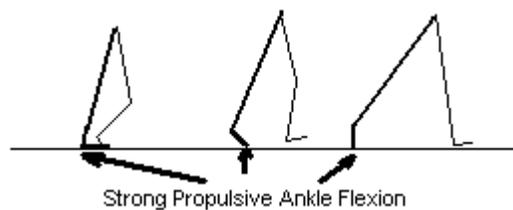
Despite the emphasis many walking coaches and athletes put on hands, arms, elbows, and even noses (!), the feet are the only parts of the body that are in contact with the ground during the walking gait--they play a vital role in both providing propulsive force, and in allowing this force to be transferred into forward momentum. This article will describe how strengthening the muscles of the foot and lower leg can help to eliminate shin pain, and improve walking efficiency, legality and speed.

## The Driving vs. Vaulting Phases of the Walking Gait

The stride of a racewalker in motion can be logically broken down into two distinct--albeit intimately connected--phases. These are the driving and vaulting phases. (Some authors call the driving phase the "swing" phase, but that has a very passive connotation. The knees should be *driven* forward vigorously. Similarly, *both* phases generate propulsion, so "propulsive" phase is a bit of a mis-nomer. Anyway, the driving phase begins as soon as the rear foot loses contact with the ground. The knee of the rear leg bends to allow the advancing foot to clear the ground, and the leg drives forward. The momentum of the leg's mass driving forward causes the walker's body to fall forward, pivoting about the stationary foot of the other leg:



The vaulting phase, which occurs concurrently with the driving phase, begins as soon as the advancing foot contacts the ground in front of the body. As the heel is "planted," the gluteal muscles contract, helping the body to pivot over the leg. After the body's center of gravity passes over the "planted" foot, the calf muscles contract, flexing the ankle. The rearward drive of the leg, coupled with this explosive ankle plantarflexion provides a strong propulsive force which helps to "vault" the body forward. Pushing off strongly from the rear in this manner allows for a momentary lag in the stride cycle which causes the opposite side of the hip to swing forward, thus extending the walker's effective stride length, and helping to align the feet "on a line," one in front of the other. The explosive push-off also helps to initiate a strong driving phase of the next stride:



Removing Barriers to Fast Racewalking

In addition to necessitating the generation of a great deal of explosive power, high-speed racewalking requires that the athlete remove any barriers that may prevent this power from being translated into forward motion. There is no single "optimum" racewalking style--each walker does the best he or she can given the constraints of their level of conditioning, body type and degree of muscular flexibility. Consequently, video analysis shows that different racewalkers can utilize a variety of different driving-to-vaulting phase ratios in their stride cycles. That is, some walkers tend to generate more power via a strong driving phase, while others benefit from a very strong ankle plantarflexion. Although different coaches may favor one approach over another, all walkers can benefit from improving ankle strength and flexibility because strong foot action is required during all phases of the walking gait:

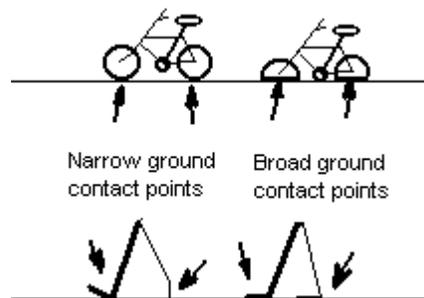
- A. Heel Plant- Racewalkers must possess sufficient shin strength to hold the toes up during heel plant, otherwise the foot will flatten out due to strong levering forces acting on the heel. If the shins are too weak to hold the toes up, the flattened foot acts a lot like the broad base of a floor lamp. The base imparts stability to the lamp, preventing it from toppling over, but stability is the last thing a walker needs. The walker actually wants to fall forward, pivoting around the small contact point that the outside edge of the heel provides. A flattened foot will create friction with the ground and a resulting braking effect that causes a momentary interruption in forward momentum. This braking effect tends to cause a very "percussive" stride--the foot hits the ground with excessive downward force, causing a noticeable jolt. A great deal of this force is transferred directly to the knee, which often causes a less than solidly locked knee to collapse. Many

older walkers have been able to cure this kind of creeping problem by simply strengthening the shin muscles.

- B. Single Support Phase- After heel contact the walker should roll smoothly on the outside edge of the shoe until the body passes directly over the foot. The foot should not flop down before this point. If the foot does flatten out prematurely, braking forces will again interrupt forward momentum. Strong ankle and peroneal muscles will prevent the foot from collapsing at this point of stride, allowing a fluid, efficient rolling motion.
- C. Toe Off- Once the road blocks have been removed, a racewalker can utilize his foot, ankle and lower calf muscles to generate forward momentum. The walker should begin flexing the calf muscles as soon as the body passes directly over the foot, and continue until the toes push off the ground far behind the body. To maximize propulsive power, the foot should roll completely up to the toes, but many walkers begin the driving phase too early, punching the knee forward while the ball of the foot is still on the ground. Doing so is counterproductive, because power is dissipated as soon as the knee begins to collapse. Always strive to fully flex the ankle behind the body while the rear leg is still straight to maximize the effect of the vaulting phase.

### Pump up Those Tires!

Strong shins and ankles throughout the foot's entire range of motion allow the body to pivot very smoothly over the ankle joint--much like a bicycle tire rolling about the axis of its hub. Racewalking without sufficient shin and ankle strength is like trying to ride a bicycle with two very flat tires--it still works, but you can't "roll" forward very smoothly:



To effectively maintain proper foot placement throughout the stride cycle, shin and ankle strength is imperative. But how can a walker strengthen these muscles? There are a number of drills, resistance training exercises, and other techniques that can be used to build up lower leg and foot strength. Try the following:

- Walk on your heels with straight knees to strengthen the shin muscles; on the outsides of the feet to work the peroneal muscles on the outside of the lower leg. Continue for about 30 seconds, then stretch and repeat.
- Perform toe raises for shin strength; calf raises for calf/ankle strength: Stand on the edge of a step with the front 3/4 of the foot hanging over the edge. Slowly dip the feet down, then all the way up. Repeat until fatigue is felt in the shin, then stretch the shins and repeat several times. For calves/ankles repeat with the back 3/4 of the foot hanging off the step.
- To strengthen the bottoms of the feet use toe grip exercises. Repeatedly pick up a towel or other soft object with your foot by curling your toes.
- Racewalk slowly up a gradual incline to strengthen the ankles and calves. Hill work will also help to ingrain proper heel placement. Somewhat faster hill repeats may be used to develop an explosive toe-off.
- Specific range of motion exercises with some form of elastic band or tubing are excellent for isolating weak areas of the shins and ankles. Simply loop a heavy elastic band (theraband, surgical tubing, bungee cord, etc.) around the foot and work the muscles against the resistance provided by the elastic.
- Finally, avoid wearing "fat" shoes: The thicker the midsole, the greater the levering force imparted to the heel. "Real" racewalking shoes or running flats with a low heel will help to keep the foot from flattening prematurely.

To reduce "stumpiness," your feet must be strong, and an active part of the walking motion. Racewalking will eventually strengthen the feet and lower leg muscles, but by adding some of these extra exercises to your daily routine you will be able to drastically reduce the time required to build up these muscles. Reduced shin pain, and more efficient, legal walking technique may be just a couple of feet away!

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