Five Steps to Running

By **Robert Gailey,** *PhD, PT*

Learning how to run with a prosthesis can be very challenging, yet, when simplified into series of relatively basic elements, it can be much easier to learn. The following are the five easy steps that have made it possible for me to teach hundreds of people to relearn the skill of running, and enabled them to benefit from the ability to move fast when necessary. Initially, for safety reasons, I strongly suggested that skilled clinicians work with their clients and use a gait belt.

Figure 1. Prosthetic Thrust—reaching out with the prosthetic limb and knowing it will be there

Step 1: Prosthetic Trust

Step One requires gaining trust in the prosthesis, or instilling the confidence of knowing that the prosthetic limb is going to be there and not collapse when the amputee's prosthetic limb strikes the ground. This is accomplished by reaching out with the prosthetic limb and landing squarely on the foot. The runner should ignore everything else and know that the prosthetic limb will be there.

Step 2: Backward Extension

Step Two, the runner reaches out with the prosthetic foot during swing. Just prior to striking the ground, the prosthetic leg pulls back forcefully creating a backward force. As a result, the ground will produce a forward force accelerating the body forward. This movement has two effects: First, it will accelerate the body forward causing an increase in speed and, second, this movement will give you the power to shift your body weight over the prosthesis and fully load your prosthetic foot resulting in maximum prosthetic foot performance as you load the forefoot.

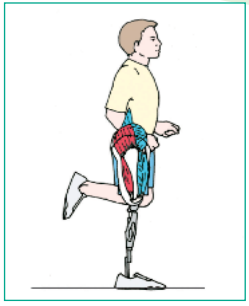

Figure 2. Backward Extension – pushing back against the socket wall exerting a forward force

Step 3: Sound Limb Stride

During Step Three, the focus now shifts to the sound limb. The runner should concentrate on taking a longer stride with the sound limb. This can be easily accomplished by continuing to pull down and back through the prosthetic limb. Pulling back

Running

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Figure 3. Sound Limb Stride – reaching out with sound limb for an equal stride length

Figure 4. Arm Carriage – moving the arms in opposition to the movement of the legs

during the prosthetic foot's initial contact with the ground initiates the movement pattern. The runner should continue to extend the hip by pulling down and back into the socket. This will generate more power and a stronger push off with the prosthetic limb, which will, in turn, enable the sound limb to reach out to complete a full stride.

Step 4: Stride Symmetry

Step Four is really a phase designed to decrease the enormous effort that is being exerted and to simply relax and jog a little. Therefore, the runner should choose a comfortable jogging pace that produces an equal stride length for both limbs. There should not be any concern for the arms, concentration should be focused on maintaining stability over the prosthetic limb using the muscles of the hips to create equal and relaxed strides.

Step 5: Arm Carriage

Finally, Step Five is focused on arm swing. The arms and legs move in opposition to each other, so, as the right leg moves forward, so will the left arm. The elbows should flex to about 90 degrees and the hands should be loosely closed and rise to just below chin level when brought forward. Just as in walking, arm swing is really the result of trunk rotation, as the trunk and pelvis rotate in opposition to each other for balance, momentum and economy of effort.

Putting It All Together

Finally, the runner should be ready to put all the individual elements of running together. The runner should relax and think about only a couple of elements of running with each pass. Many long distance runners augment their endurance training program by utilizing low impact activities such as swimming, stationary biking or stair climbing machines. In time, the runner will develop his/her own comfortable running style, depending on the sports or recreational activities chosen for participation.

Learning to run can take place on just about any type of prosthesis, and initially the prosthetic foot is not critical. However, if the amputee decides that running is going to be a part of his active lifestyle they should discuss with their prosthetist the various available prosthetic options. Classically, the Flex-Foot has been considered the foot of choice for higher level activities, with the Flex-Sprint foot worn by most competitive athletes. Currently, there is also a relatively new design, the Flex-Run, which is engineered for recreational jogging and longer distance training. The same principles of running apply regardless of the prosthetic foot; however, prosthetic feet designed for running can reduce the effort and improve performance.

To learn more about gait training, exercise and basic running techniques, visit www.advancedrehabtherapy.com for the Functional Training Series book and DVD collection.