

Calf Muscle Pump, or “Second Heart”

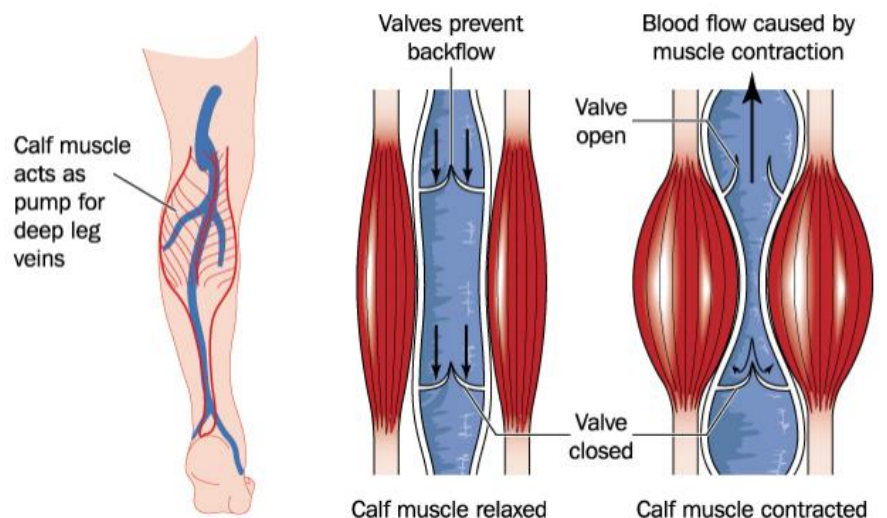
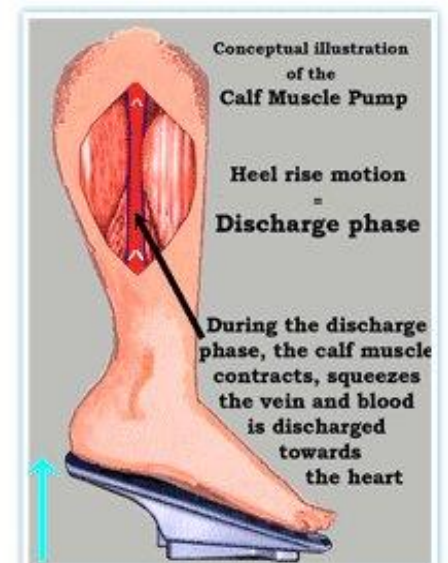
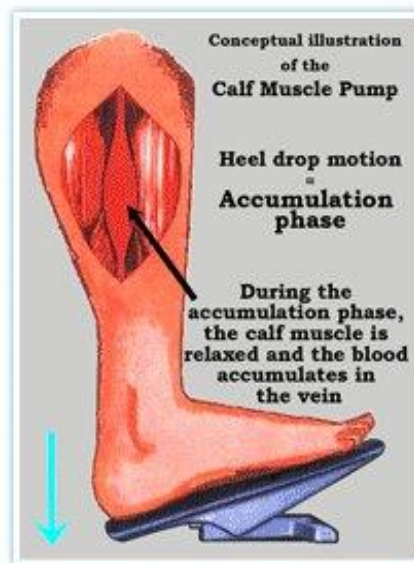
Leg muscles provide an important pump action designed to recirculate venous blood to the heart; this pump action is referred to as the veno-muscular pump or calf muscle pump (*or sometimes the “second heart”*).

Any health concern that affects the foot, ankle, calf, knee, thigh, or the network of veins in the leg, may lead to impairment of the calf muscle pump, and reduce venous return to the heart (*eg., vascular, musculoskeletal or neurological injury or disease; prolonged bedrest*). Wearing high heels has been shown to interfere with the calf muscle pump function and reduce venous return (*Tedeschi-Filho, W., et al. J Vasc Surg, 2012*).

Orthoses are indicated for conditions that affect calf muscle pump function in order to activate the muscles (*eg., compression hose for venous insufficiency; ankle foot orthotic for foot drop; functional brace for ankle sprain*).

Calf Muscle Pump Overview

1. The foot pump initiates venous return of deoxygenated blood with each step; when the heel touches down, blood is pooled in the veins, and as the foot rolls forward the pooled blood is pumped upwards.
2. Blood pumped from the foot enters veins in the soleus and gastrocnemius muscles; the calf muscle pump applies pressure to the veins to push venous return to the knee, or popliteal pump.
3. The knee pumps blood into veins in the upper leg, where the thigh muscle pump pushes it further toward the groin and abdominal cavity, and on to the lungs and heart.



Graphics from healthtide.com and blog.taedu.org

Calf-strengthening exercises can improve calf muscle pump function:

- walking, toe-walking, calf raises, lunges, or foot pumps (*flexing the foot and ankle*);
- a foot stepper machine simulates walking and may be used while sitting.