



# Study Of “*Soleus Muscle*” In Human Anatomy And Its Importance -A Literature Review.”

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## Abstract:

The **soleus** is a powerful muscle in the back part of the lower leg (the calf). It runs from just below the knee to the heel, and is involved in standing and walking. It is closely connected to the gastrocnemius muscle and some anatomists consider them to be a single muscle, the triceps surae. The soleus muscle is a wide flat leg muscle found on the posterior leg. It runs from just below the knee to the heel and lays immediately deep to the gastrocnemius. These two muscles, along with the plantaris muscle, belong to the group of superficial posterior compartment calf muscles. Soleus' contraction results in strong plantar flexion. It also allows us to maintain an upright posture due to its important role as an antigravity muscle.

The calf muscles (soleus muscles) are known as the "second heart" because they are important for returning venous blood from the periphery to the heart. It is also known as peripheral heart. So this article focusing the peripheral heart i.e. soleus muscle.

**Key words:** *Soleus muscle*, Anatomy.

### **Introduction:**

**Duct: Definition:** in upright posture, the soleus is responsible for pumping venous blood back into the heart from the periphery, and is often called the skeletal-muscle pump, peripheral heart or the sural (tricipital) pump. Soleus muscles have a higher proportion of slow muscle fibers than many other muscles.<sup>1</sup>

The soleus muscle is the second heart of the human body. Our calf veins function as a reservoir for blood that our body does not need to circulate at the moment. The veins that function as reservoirs are known as muscle venous sinuses.

In humans and some other mammals, the **soleus** is a powerful muscle in the back part of the lower leg (the calf). It runs from just below the knee to the heel, and is involved in standing and walking. It is closely connected to the gastrocnemius muscle and some anatomists consider them to be a single muscle, the triceps surae. Its name is derived from the *solefish* whose shape it resembles. The soleus is located in the superficial posterior compartment of the leg.<sup>2</sup>

### **Objectives:**

To study the anatomy of Soleus muscle and its applied anatomy ( Clinical Significans).

### **Methods:**

Manual searching and collection.

Soleus muscle:

### **Structure & Function:**

#### **Origin & Insertion<sup>3</sup>:**

It originates from the posterior (back) surfaces of the head of the fibula and its upper third, as well as the middle third of the internal border of the tibia.

Its other end forms a common tendon with the gastrocnemius muscle; this tendon is known as the calcaneal tendon or Achilles tendon and inserts onto the posterior surface of the calcaneus, or heel bone.

**Structure:** <sup>4</sup>

The soleus is located in the superficial posterior compartment of the leg.

The soleus exhibits significant morphological differences across species. It is unipennate in many species. In some animals, such as the rabbit, it is fused for much of its length with the gastrocnemius muscle.

In humans, the soleus is a complex, multi-pennate muscle, usually having a separate (posterior) aponeurosis from the gastrocnemius muscle. A majority of soleus muscle fibers originate from each side of the anterior aponeurosis, attached to the tibia and fibula.

**Relation**<sup>5</sup>:

Superficial to the soleus (closer to the skin) is the gastrocnemius muscle.

The plantaris muscle and a portion of its tendon run between the two muscles. Deep to it (farther from the skin) is the transverse intermuscular septum, which separates the superficial posterior compartment of the leg from the deep posterior compartment.

On the other side of the fascia are the tibialis posterior muscle, the flexor digitorum longus muscle, and the flexor hallucis longus muscle, along with the posterior tibial artery and posterior tibial vein and the tibial nerve.

**Function:** <sup>6</sup>

The action of the calf muscles, including the soleus, is to plantar flex the foot (that is, they increase the angle between the foot and the leg).

They are powerful muscles and are vital in walking, running, and dancing.

The soleus specifically plays an important role in standing; if not for its constant pull, the body would fall forward.

Also, in upright posture, it is responsible for pumping *venous* blood back into the heart from the periphery, and is often called the *peripheral heart* or the *sural (tricipital) pump*

**Discussion:****Clinical significance:****Applied anatomy:<sup>7</sup>****• To act as skeletal muscle:**

- Along with other calf muscles it is powerful plantarflexor and has a major contribution in running, walking and dancing.
- It is also a major postural muscle designed to stop the body from falling forwards at the ankle during stance.
- In the seated calf raise (knees flexed approximately 90°), the gastrocnemius is virtually inactive while the load is borne almost entirely by the soleus.
- In moderate force, the soleus is preferentially activated in the concentric phase, whereas the gastrocnemius is preferentially activated in the eccentric phase.
- Human soleus muscle tissue consists predominantly of slow twitch fibers, though the composition can range between 60 and 100% slow fibers.

**• To act as muscle pump:**

- The soleal pump assists with venous return from the periphery to the heart when upright as the venous circulatory system passes through the muscle tissue.
- Soleus muscle stabilizes the tibia on the calcaneus limiting forward sway.

**A gradual onset of pain is commonly reported during soleus strain and often with no specific mechanism of injury (MOI).**

**Conclusions:**

1. The soleus acts on venous return from the muscles to the heart.
2. The Soleus lowers blood sugar by its' inability to store glycogen or significantly reduced levels, so it gets its source of energy/fuel directly from the bloodstream, the glucose, lowering it as it consumes the excess blood sugar.

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