

Muscles & Joint Actions: Elbow, Knee, Ankle Video Transcript

Welcome to the AFLCA Exercise Theory video series supplementing Chapter 7, Basics of Anatomy. In this video, we're going to cover the muscles and joint actions of the elbow, knee, and ankle. Every muscle and joint action that we discuss is in relation to the concentric phase, the up phase of an exercise against gravity.

Note that some of these muscles we've seen in the shoulder and hip videos, because they cross those joints as well. But here we are only focusing on the elbow, knee, and ankle.

First, let's start with the elbow. Here's **elbow flexion**. From anatomical position, the joint angle between the radius and ulna (or forearm arm bones) bones and the humerus (or upper arm bone) decreases. Movement occurs along a sagittal plane. The agonist (or prime mover) of elbow flexion is the biceps brachii. This is a two-headed muscle that crosses over the front of the elbow.

Synergists, or assisting muscles, are the smaller biceps muscles, brachialis and brachioradialis.

Now, here's **elbow extension**. The joint angle between the upper and lower arm increases. Movement occurs along a sagittal plane, back to anatomical position. The agonist or prime mover of elbow extension is the triceps brachii. This is a three-headed muscle that crosses over the back of the elbow.

The part of the ulna that the triceps brachii attaches to is called the olecranon process. This is the bony process that you can feel on your elbow. It prevents the joint from hyperextending, or moving beyond anatomical position.

Let's move onto the knee. Here's **knee flexion**. From anatomical position, the joint angle between the tibia and fibula (or the lower leg bones) and the femur (thigh bone) decreases. Movement occurs along a sagittal plane.

The agonist (or prime mover) of knee flexion is the hamstrings. The three hamstring muscles are semitendinosus, semimembranosus, and biceps femoris. All three cross the back of the knee and attach at the lower leg bones.

Synergist is the sartorius. This is a long, thin muscle that begins at the pelvis, runs diagonally along the front of the thigh and attaches to the tibia.

Now, here's **knee extension**. The joint angle between upper and lower leg increases. Movement occurs along a sagittal plane, back to anatomical position.

Agonist of knee extension is the quadriceps. The four quadriceps muscles are rectus femoris, vastus lateralis, vastus medialis, and vastus intermedius. All four cross the front of the knee joint. You can see in this image that the rectus femoris is cut, showing the deeper vastus intermedius.

All right, so we've looked at the elbow and the knee. Now let's move on to the ankle.

Sometimes these movements are described as flexing and pointing the toes, which is correct, but it can be confusing. We're not talking about the toes. We're focused on what's happening at the ankle joint.

First, **ankle dorsiflexion**. The joint angle between the foot and lower leg decreases. Agonist is the tibialis anterior, which crosses over the front of the ankle. Synergist is a deeper muscle called the extensor digitorum longus.

And **Ankle Plantar Flexion**. The joint angle between the foot and lower leg increases. Agonist is the gastrocnemius. Synergists are the deeper soleus and tibialis posterior.

Those are the joint actions and muscles of the elbow, knee, and ankle. All of the actions were in relation to anatomical position and along a sagittal plane. Practice them, thinking about the context of muscles crossing joints and pulling on bones. Then, can you think of exercises that use each these joint actions?

Thanks for watching.