

EZorb Calcium® - Calcium Aspartate Anhydrous

Bone and Joint Overview

In this article you will find the answers to the following questions:

What are bones and joints?
How do the parts of the body fit together?
What can go wrong?



What are bones and joints?

Bone is a constantly changing bodily tissue that has several functions. All the bones together make up the skeleton. The skeleton, muscles, tendons, ligaments, and other components of joints make up the musculoskeletal system. The skeleton provides strength, stability, and a frame for muscles to work against in producing movement. Bones also serve as shields to protect delicate internal organs.

Bones have two main shapes: flat bones, such as the plates of the skull and the vertebrae, and long bones, such as thighbone and arm bones. But their internal structure is essentially the same. The hard outer part consists largely of proteins, such as collagen, and a substance called hydroxyapatite. Hydroxyapatite is composed mainly of calcium and other minerals; in fact it stores much of the body's calcium and is largely responsible for the strength of bones.

The marrow in the center of each bone is softer and less dense than the rest of the bone and contains specialized cells that produce blood cells. Blood vessels run through a bone, and nerves surround it.

Bones come together to form joints. The configuration of a joint determines the degree and direction of possible motion. Some joints, such as those between the plates of the skull, called sutures, don't move in adults. Others allow a range of motion. For example, the shoulder joint, which has a ball-and-socket design, allows inward and outward rotation as well as forward, backward, and sideways motion of the arm.

Hinge joints in the elbows, fingers, and toes allow only bending (flexion) and straightening (extension).

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Other joint components provide stability and reduce the risk of damage from constant use. In a joint, the ends of bones are covered with cartilage, a smooth, tough, protective tissue that acts as a shock absorber and reduces friction. .

Joints also have a lining (called synovial tissue) enclosing them to form the joint capsule. Cells in the synovial tissue produce a clear fluid (synovial fluid) that fills the capsule, which further reduces friction and aids movement.

Muscles are bundles of fibers that can contract, or tighten. Skeletal muscles, which are responsible for posture and movement, are attached to bones and arranged in opposing groups around joints. For example, muscles that straighten the elbows (triceps muscles) counter muscles that bend them (the biceps muscles).

Tendons are tough bands of connective tissue, attaching each end of a muscle to a bone. Ligaments, which are similar tissues, surround joints and connect one bone to another. They help strengthen and stabilize joints, permitting movement only in certain directions.

Bursas are fluid-filled sacs that provide extra cushioning, usually between adjacent structures that otherwise might rub against each other and as a result might cause wear and tear - for instance, between a bone and a ligament.

How the body parts fit together

Joint components work together to facilitate balanced movement that causes no damage. For example, when the knee is bent to take a step, the hamstring muscles on the back of the thigh contract and shorten, pulling the lower leg in and bending the knee. At the same time, the quadriceps muscles on the front of the thigh relax, allowing the knee to bend.

Within the knee joint, the cartilage and synovial fluid minimize friction. Five ligaments around the joint help keep the bones properly aligned. Bursas provide cushioning between structures such as the shinbone (tibia) and the tendon attached to the kneecap (patellar tendon)

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Things that can go wrong

Disorders of the musculoskeletal system (muscles, bones, and joints) are major causes of chronic pain and physical disability. Although the components of the musculoskeletal system thrive on use, use can lead to wear, injury, or inflammation.

Injuries to bones, muscles, and joints are very common, ranging in severity from mild pulled muscles to strained ligaments, dislocated joints, and broken bones (fractures).

Although these injuries are generally painful and might lead to long-term complications, most of them heal completely.

Inflammation is a natural response to tissue irritation or damage and causes swelling, redness, heat, and loss of function. Inflammation of a joint is called arthritis and inflammation of a tendon is tendonitis. Inflammation may be confined to a small part of the body (i.e., localized), such as in a single joint or an injured tendon, or it may be widespread, as in certain inflammatory diseases such as rheumatoid arthritis.

Inflammation can become chronic and persistent, sometimes because of continuous movement and mechanical stresses, and sometimes because of immune reactions, infections, or deposits of abnormal materials.

Bone and joint infections can be crippling. Immediate treatment can prevent permanent joint damage.

Benign tumors and cancers can originate in bone, and cancers can spread to bone from other locations in the body.

Metabolic or hormonal imbalances can also affect bones and joints. An example is osteoporosis, a thinning of bone resulting from the excessive loss of minerals in bone. Another example is gout, in which crystals develop in the joints of susceptible people whose blood has an abnormally high concentration of uric acid.