

False color scanning electron micrograph of normal bone.
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Overview of the Skeletal System

Center for
Educational Outreach
Baylor College of Medicine



Overview of the Skeletal System

Image Reference

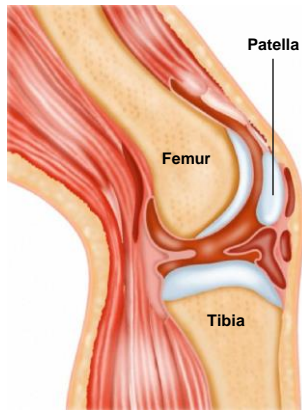
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Key Words

skeletal system, bones, skeleton, human body

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Major Components of the System



Sagittal section of the knee joint, showing femur, patella, tibia, tendons and muscles.

- The human skeleton is divided into two categories:
 - Axial skeleton
 - Appendicular skeleton
- Bone is a living tissue that repairs itself.
- Joints allow the skeleton to move.
- The composition of bone allows it to be flexible, yet strong.



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Major Components of the System

The human skeleton is divided into two categories: axial and appendicular. The axial skeleton consists of bones that make up the body's central core, such as the skull, spinal column and rib cage. The appendicular skeleton consists of all bones in the arms and legs, along with bones in the shoulder and pelvic girdles.

Bone is a dynamic tissue that is constantly growing and repairing itself, and reinforcing where there is additional stress. Bone derives its strength from minerals and collagen fibers that are woven into a resilient fabric. Minerals provide bone strength and rigidity. Collagen, an elastic protein, gives bone flexibility.

Joints where bones meet allow for movement of the skeleton. Each type of joint is designed precisely for a specific movement.

Reference

Clark, Joe O.E. (1999). *A Visual Guide to the Human Body*. London: Barnes and Noble, Inc.

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Key Words

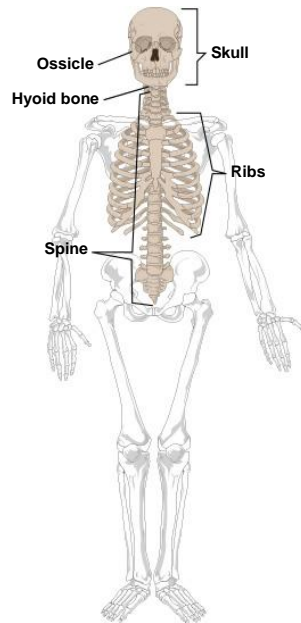
skeletal system, skeleton, bone, joints, axial skeleton, appendicular skeleton, movement

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Axial Skeleton

The axial skeleton consists of bones of the head and trunk:

- Skull
- Ossicles (inner ear)
- Hyoid bone (above the larynx)
- Spinal (vertebral) column
- Ribs



Axial Skeleton

The skull is comprised of 22 bones. All but the mandible (jaw) are connected in a jigsaw fashion, interlocked at immovable joints called sutures.

The spinal column is divided into cervical, thoracic and lumbar vertebrae, along with the sacrum and the coccyx. The 35 vertebrae provide strength and flexibility, while intervertebral disks cushion the spine from everyday jolting and jarring.

There are 12 pairs of ribs, all joined to the thoracic vertebrae. The upper seven pairs are referred to as “true ribs,” since they attach directly to the sternum via costal cartilage. The lower five pairs are called “false ribs” because they attach indirectly.

Reference

Clark, Joe O.E. (1999). *A Visual Guide to the Human Body*. London: Barnes and Noble, Inc.

Image Reference

Illustration courtesy Mariana Ruiz Villarreal. Public domain.

http://commons.wikimedia.org/wiki/File:Axial_skeleton_diagram.svg

Key Words

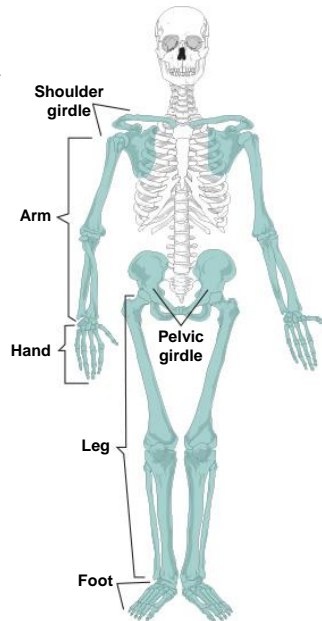
skeletal system, axial skeleton, skull, ossicles, hyoid, spinal cord, spine, ribs, bone

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Appendicular Skeleton

The appendicular skeleton consists of:

- Shoulder girdle
- Arm bones
- Hand bones
- Pelvic girdle
- Leg bones
- Foot bones



Appendicular Skeleton

The humerus is a long bone in the upper arm with a rounded head that fits into the socket of the shoulder blade. This structure allows the arm to move at many angles. The two bones of the forearm, the ulna and radius, meet with the humerus to form the elbow joint. The wrist consists of eight carpal bones; beyond them, five metacarpal bones fan across the hand. There are three phalanges in each finger, and two in the thumb.

The pelvic girdle connects the legs to the rest of the skeleton. Consisting of two heavy hip bones joined by the sacrum at the back, the pelvic girdle is able to bear much of the body's weight, help hold it upright, and move it forward.

The leg bones are stronger than those of the arm, but capable of less movement. The femur (thighbone) is the largest, strongest, heaviest bone in the body. The main bone of the lower leg, the tibia, is located at the front of the leg. The other bone of the lower leg is the fibula. The two ankle bones actually are the ends of the tibia and fibula. Seven tarsal bones in each foot connect to the metatarsals. There are three phalanges in each toe, and two in the big toe.

Reference

Clark, Joe O.E. (1999). *A Visual Guide to the Human Body*. London: Barnes and Noble, Inc.

Image Reference

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http://commons.wikimedia.org/wiki/File:Appendicular_skeleton_diagram.svg

Key Words:

skeletal system, appendicular skeleton, bone, shoulder girdle, arm bones, hand bones, pelvic girdle, leg bones, foot bones

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Functions of the System

- Provides support for the body
- Surrounds and protects organs
- Provides a base for attaching and enables movement
- Conducts vibrations important for hearing (inner ear)
- Produces red and white blood cells marrow
- Stores minerals, such as calcium and phosphorus
- Removes and stores heavy metals and toxins from blood.



Section through the head of the femur, showing the cortex, the red bone marrow and a spot of yellow bone marrow. Specimen obtained after total hip replacement surgery, left hip.



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Functions of the System

The skeleton's most important function is to provide support. Bones, with the assistance from the muscles, hold the body upright.

The skeleton protects the body's vital organs. For example, the skull and spinal column protect the brain and spinal cord, while the rib cage protects the heart and lungs.

Muscles attach to the skeleton, providing leverage for the pulling of the bones. Joints where the bones meet allow the skeleton to move.

There are two types of bone marrow, red (primarily blood cellular components), and yellow (primarily fat cells). Red marrow, found in the center of the ribs, vertebrae, and pelvic and skull bones, delivers millions of erythrocytes, leukocytes and platelets into the bloodstream each minute. Long bones, such as the femur, are filled with yellow bone marrow, consisting primarily of fat cells. Yellow marrow can be transformed into red marrow if there is a need for more red blood cells.

Reference

Clark, Joe O.E. (1999). *A Visual Guide to the Human Body*. London: Barnes and Noble, Inc.

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http://en.wikipedia.org/wiki/File:Caput_femoris_cortex_medulla.jpg

Key Words:

skeleton, skeletal system, bone, muscle, function, support, movement, bone marrow

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