

Names of Bones

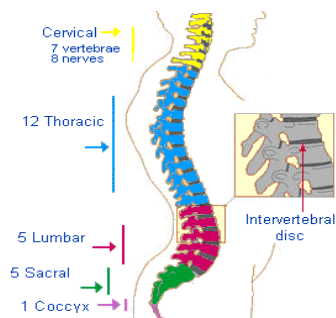
The average human *adult* skeleton consists of 206 bones, attached to the muscles by tendons. Babies are born with 270 soft bones - about 64 more than an adult. These will fuse together by the age of twenty or twenty-five into the 206 hard, permanent bones.

The skeleton has two main parts: the *axial* skeleton and the *appendicular* skeleton. The axial skeleton consists of the skull, the spine, the ribs and the sternum (breastbone) and includes 80 bones. The appendicular skeleton, consisting of 126 bones, includes two limb girdles (the shoulders and pelvis) and their attached limb bones.

Axial Skeleton (80 bones)

- skull - consisting of 1) the cranium (which encloses and protects the brain) and 2) the facial skeleton. The upper teeth are embedded in the maxilla; the lower teeth, in the mandible.
- mandible (jaw) - the only freely movable bone of the skull
- ribs, sternum (breastbone) - comprising the "thorax"/thoracic cage, protecting the heart and lungs
- vertebral column - the "spine"

The vertebral column (illustrated below and to the left) transmits the body weight from the head, thorax, and abdomen to the lower extremities and encloses and protects the spinal cord. Each vertebra has essentially the same basic components, with some variation based on location and allowed movements.



The **vertebral body** and the **neural arch** encircle the vertebral foramen. Stacked one on top of the other, these foramina form the **vertebral canal**, where the spinal cord resides.

Several structures strengthen the attachments between vertebrae: 1) *anterior longitudinal ligaments* in front of vertebral bodies and discs; and 2) *posterior longitudinal ligaments* behind bodies and discs; 3) the compact bone of the disc itself; 4) the interlocking hyaline cartilage surfaces of the neural arch joints; and 5) the ligaments attaching **spinous processes** to **transverse processes**. The **intervertebral discs** provide shock absorption.

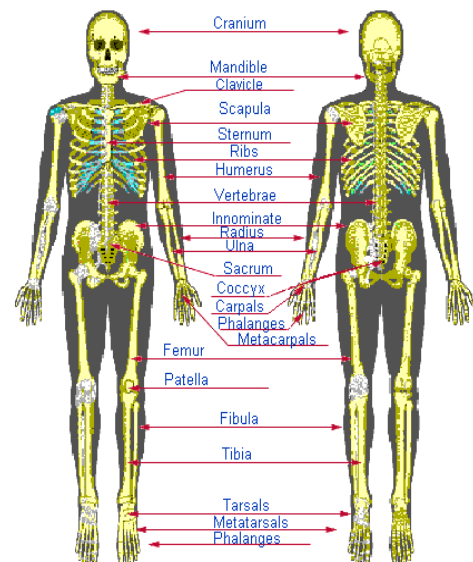
The orientation of the neural arch joints determines allowable motions: 1) the **cervical spine** to rotate, flex forward, flex sideways, and extend backward; 2) the **thoracic spine** to rotate; and 3) the **lumbar spine** to flex forward, flex sideways, and extend backward. The **sacrum** has a dual character, being part of both the vertebral column and pelvis. As such, it

transmits the upper body weight to the lower extremities.

Appendicular skeleton (126 bones, 64 in the shoulders and upper limbs and 62 in the and lower limbs)

- **Upper Extremity** - The arms (*humerus* - upper arm bone) are ultimately attached to the thorax, via synovial joints, at the collarbone (*clavicle*) and shoulder bone (*scapula*) (shoulder joint). The scapula is attached to the thoracic cage only by muscles. The elbow joint unites the humerus with the two lower arm bones - the *ulna* and *radius*. Three sets of joints connect the radius and ulna to the bones of the palm (*metacarpals*), via the eight small wrist *carpals*. Further, the knuckles (*metacarpophalangeal*, or MCP, joints) connect the metacarpals to the proximal *phalanx* of the fingers. Each finger has 3 phalanges (proximal, middle, distal), except the thumb which has only two.
 - shoulder / scapula
 - arm and forearm, elbow
 - hand
- **Lower Extremity** - The pelvis transmits the upper body weight from the sacrum (at the sacroiliac joint) to the legs. It begins as 3 hip bones (*ilium*, *ischium*, and *pubis*) which fuse together when growth is completed. The hip joint unites the pelvis to the thigh bone (*femur*); the knee joint, which includes the knee cap (*patella*), links the femur to the lower leg bones - the *tibia* and *fibula*. The ankle joint links the lower leg bones to the *talus*. The body weight is then transmitted to the heel (*calcaneous*) and to the balls of the feet via the *tarsal* and *metatarsal* foot bones. The toes have a phalangeal structure like the fingers.
 - pelvic girdle
 - thigh and leg / knee
 - foot/ ankle / toe

pelvis



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Acknowledgments:

1. Joel DeLisa and Walter C. Stolov, "Significant Body Systems," in: *Handbook of Severe Disability*, edited by Walter C. Stolov and Michael R. Clowers. US Department of Education, Rehabilitation Services Administration, 1981, pages 30-36.
2. Catherine Parker Anthony and Gary A. Thibodeau, *Textbook of Anatomy & Physiology*. St. Louis: Mosby, 1983, pages 88-166.
3. J. Crimando, Anatomy and Physiology Tutorials (Maricopa)

