

ANATOMY OF A TYPICAL LONG BONE

Compact Bone: Hard outer layer of bone, very dense and heavy.

Spongy Bone: Inner spikes of bone, found in the heads of long bones and throughout flat and irregular-shaped bones. Lighten the bone. Gaps are filled with bone marrow, cells that make blood cells.

Diaphysis: shaft of a long bone

Epiphyses: ends of the bones, both proximal and distal; covered with articular cartilage. The epiphyseal line is the demarcation between the diaphysis and the epiphysis. In children, this area is a thin plate of cartilage. The chondrocytes divide to add length to the bone. In time this cartilage ossifies into bone. During childhood, if the plate is damaged in a long bone on one side of the body but not the other, then one limb may continue to grow but not the other. This can result in one leg being longer than the other. At the end of adolescence, hormonal changes cause the plate itself to ossify and adult height stops increasing. In Giantism, large quantities of growth hormone (usually due to a pituitary tumor) prevent the epiphyseal plates from ossifying and the person will continue to grow.

Membranes

Periosteum—covers outside (peri means “around”). Osteoprogenitor cells differentiate into osteoblasts “bone bud”. These osteoblasts migrate (moving like an amoeba) to areas that need to thicken in the bone. There they begin producing collagen fibers and calcium salts into the surrounding area. This is how the bone matrix is built. Once the matrix is in place, the osteoblasts stop producing matrix and are referred to as osteocytes. Osteoclasts are another type of cell produced in bone marrow; they are very closely related to monocytes/macrophages. They are responsible for dissolving and breaking down bone in a constant remodeling that happens throughout our lives.

Endosteum—lines medullary cavity, composed of similar cells as the periosteum.

Bone Marrow

Red bone marrow is found in the epiphyses of long bones, and throughout flat bones and many irregular bones. It is red because of the red blood cells being produced there. White blood cells and platelets are also produced by the bone marrow. Hematopoiesis is the term for blood cell production. Erythropoiesis specifically refers to red blood cell production. Leukopoiesis specifically refers to white blood cell production.

Yellow bone marrow is in the medullary canal of the diaphysis, at least in adults. It is a site for fat storage, so it is often still red marrow in children.