

Anatomy of a Typical Long Bone

1. Describe the organic and inorganic components of bone—which components provides strength? Which provide flexibility?
2. Comparison of proportion of bone makeup in: rickets, osteopenia/osteoporosis, Brittle bone disease.
3. Names for ends of bone and shaft of bone.
4. Purposes of bone marrow.
5. Hormone that stimulates red blood cell formation.
6. Name the hormone that stimulates mitosis in the growth plate. What is another name for the growth plate? What type of tissue is it composed of? What is it called after the tissue ossifies when adult height is reached?
7. Two reasons the epiphyseal plate may fuse early.
8. Comparison of spongy bone and compact bone with regard to density and locations.
9. Where are hematopoietic stem cells found? What do they divide to produce?
10. What is leukemia and why might a bone marrow transplant cure it?
11. Name the membranes that line the inside and the outside of the bone.
12. Compare the cellular origin of osteoblasts and osteoclasts.
13. Which hormone stimulates osteoclasts? Which hormone inhibits osteoclasts?
14. Which type of activity inhibits osteoclasts and stimulates osteoblasts?
15. What happens to bone matrix, over time, if blood calcium is chronically low?
16. Lamellar and trabecular bones are other names for....
17. The joint capsule is continuous with which membrane?

Answers:

Anatomy of a Typical Long Bone

- Describe the organic and inorganic components of bone—which components provides strength? Which provide flexibility?
Organic: collagen fibers—provide flexibility
Inorganic: calcium salts—provide strength
- Comparison of proportion of bone makeup in: rickets, osteopenia/osteoporosis, Brittle bone disease.
 - Rickets: during bone development, a lack of calcium (dietary deficiency or vitamin D deficiency) can lead to a deficiency in calcium salts in the bone. Osteomalacia is the general term for soft bones.**
 - Osteopenia/osteoporosis: deficiency in calcium salts and collagen fibers that causes overall loss of bone mass. This may lead to an increased incidence of fractures.**
 - Brittle Bone Disease: Mutation causes lack of collagen in the bones, they are too hard and not flexible enough; hence “brittle”.**
- Names for ends of bone and shaft of bone.
Epiphysis; diaphysis
- Purposes of bone marrow.
 - Hematopoiesis: Blood Cell production (RBCs, WBCs, platelets) occurs in red bone marrow**
 - Fat storage (yellow bone marrow)**
- Hormone that stimulates red blood cell formation.
Erythropoietin (EPO)
- Name the hormone that stimulates mitosis in the growth plate. What is another name for the growth plate? What type of tissue is it composed of? What is it called after the tissue ossifies when adult height is reached?
 - Growth Hormone**
 - Epiphyseal Plate/Growth Plate**
 - It is composed of hyaline cartilage connective tissue**
 - Epiphyseal Line**
- Two reasons the epiphyseal plate may fuse early.
Trauma (break); or malnutrition
- Comparison of spongy bone and compact bone with regard to density and locations.
Spongy bone/Trabecular/Cancellous: less dense, found within epiphysis and flat bones
Compact bone/Lamellar/Cortical: More dense, found in shafts and encasing all bone
- Where are hematopoietic stem cells found? What do they divide to produce?
Generally, Epiphysis of Long Bones and within flat/irregular bones
Divide to produce RBCs, WBCs, and platelets
- What is leukemia and why might a bone marrow transplant cure it?
Cancer of the cells that differentiate into white blood cells (WBCs). A bone marrow transplant may replace the faulty cells with functional ones.
- Name the membranes that line the inside and the outside of the bone.
Periosteum
Endosteum
- Compare the cellular origin of osteoblasts and osteoclasts.
Osteoprogenitor cells in the periosteum produce osteoblasts. Osteoblasts produce collagen fibers and calcium salts of the matrix. Osteoclasts are produced by hematopoietic cells in the bone marrow that are similar to white blood cells.
- Which hormone stimulates osteoclasts? Which hormone inhibits osteoclasts?
 - Parathyroid hormone (PTH) stimulates osteoclasts to break bone down (and thereby increase blood calcium levels)**
 - Estrogen inhibits osteoclasts and thereby help preserve bone mass in women before menopause.**
- Which type of activity inhibits osteoclasts *and* stimulates osteoblasts?
Weight-bearing activity
- What happens to bone matrix, over time, if blood calcium is chronically low?
Calcium salts are removed from the bone to maintain blood calcium levels, potentially leading to osteoporosis.
- Lamellar and trabecular bones are other names for....
Compact (lamellar); spongy (trabecular)
- The joint capsule is continuous with which membrane?
Periosteum