What is Compact and Spongy Bone?

Worksheet

Compact bone is a dense, solid tissue arranged in cylindrical osteons that forms the hard outer shell of bones, while spongy bone is a lighter, porous lattice of trabeculae found inside bone ends and flat bones, housing marrow and reducing weight.

Questions

1. What is the structural unit of compact bone called?

A) Trabecula
B) Osteon
C) Lamella alone
D) Canaliculus

2. Roughly what fraction of the skeleton is compact bone?

A) 20%
B) 50%
C) 80%
D) 100%

3. Where in a long bone is spongy bone mainly located?

A) Along the diaphysis
B) At the epiphyses (ends)
C) In the periosteum
D) In the medullary cavity wall

4. What passes through the central canal of an osteon?

A) Muscle fibers
B) Blood vessels and nerves
C) Cartilage
D) Synovial fluid

5. Explain how osteons give compact bone its strength.

6. Why does spongy bone appear at the ends of long bones instead of along the shaft?

7. A flat bone like the sternum is sandwiched compact-spongy-compact. What does each layer contribute?

8. Define: What percentage of the skeleton is compact bone?

9. Define: What is an osteon?

10. Define: What are trabeculae?

Answer Key

1. B) Osteon - An osteon (Haversian system) is the cylindrical structural unit of compact bone.

2. C) 80% - Compact bone makes up about 80% of total skeletal mass.

3. B) At the epiphyses (ends) - Spongy bone fills the epiphyses, absorbing forces from nearby joints.

4. B) Blood vessels and nerves - The Haversian canal at the center of each osteon carries blood vessels and nerves.

5. Each osteon is a cylinder of concentric bone layers called lamellae A central Haversian canal in each osteon carries blood vessels and nerves Collagen fibers alternate direction between lamellae, resisting stress from multiple angles Thousands of tightly packed osteons make the shaft of a long bone extremely strong

6. The ends of long bones absorb compressive forces from joints during movement Trabeculae align along stress lines, spreading force efficiently without needing solid bone This lattice structure saves significant weight compared to filling the space with compact bone The open spaces between trabeculae also hold red bone marrow for blood cell production

7. The two outer compact bone layers give the sternum rigidity and protect the tissue underneath The spongy bone core between them keeps the sternum lightweight The spongy layer also contains marrow, making the sternum a site for blood cell production This compact-spongy-compact sandwich is typical of flat bones like the skull and ribs

8. About 80% of skeletal mass is compact bone; the remaining 20% is spongy bone.

9. The structural unit of compact bone - a cylinder of concentric lamellae surrounding a central Haversian canal.

10. Thin, branching struts of bone tissue that form the lattice structure of spongy bone.