5. Golgi complex (apparatus)

a. series of flattened, membrane-enclosed sacs stacked upon each other

b. receives proteins from the rough ER

c. modifies, sorts, and packages these proteins (and lipids) into vesicles for delivery to lysosomes, the plasma membrane or to be secreted

6. Lysosomes

a. spherical membrane-enclosed sacs

b. contain numerous digestive enzymes for intracellular digestion of other old organelles and materials that have been brought into the cell or for extracellular digestion

7. Peroxisomes

a. small, spherical membrane-enclosed sacs

b. contain enzymes that use molecular oxygen (oxidases or catalases) to oxidize various organic molecules

c. important in liver and kidney cells where they detoxify toxic substances

8. Mitochondria

a. membrane-enclosed organelles that are often sausage-shaped

b. double membrane, inner cavity called matrix, inner membrane folds celled crista

c. described as the "powerhouses" of the cell because they produce large quantities of energy-rich ATP molecules that are subsequently used throughout the cell to provide energy for cellular processes

d. self-replicating organelles that contain their own (mitochondrial) DNA

9. Cytoskeleton

a. network of three types of protein filaments that provide shape to the cell and play roles in cell movements as well as in movements of organelles within cells:

i. microtubules are long, thin, cylindrical structures that also participate in these functions (transport of organelles and vesicles

therefore heals slowly) and lacks nerves. Chondrocytes are found in cavities of the matrix called lacunae. Cartilage is usually covered with dense irregular connective tissue called perichondrium except at articular surfaces of joints. There are three kinds of cartilage based on type and amount of fibers embedded in the matrix.

I. Hyaline cartilage
- has fine collagen fibers
- is most abundant type of cartilage
- located on ends of long bones, nose, trachea, etc.
- provides movement at joints, flexibility, and support

ii. Fibrocartilage
- contains dense bundles of collagen fibers
- located in intervertebral discs, knee menisci, symphysis pubis,etc.
- provides strength and rigidity

iii. Elastic cartilage
- contains network of elastic fibers
- located in epiglottis, external ear, etc.
- maintains shape and provides strength and elasticity

Bone (osseous) tissue contains **osteocytes** embedded in a rigid, calcified matrix that includes collagen fibers; it is classified as:

i. **Compact (dense) bone** composed of **osteons (Haversian systems)**

ii. **Spongy (cancellous) bone** consisting of **trabeculae**.

1. Bone (osseous) tissue forms most of the skeleton, the framework that supports and protects our organs.
2. Bone tissue and the skeletal system perform a variety of major functions:

i. support

ii. protection

iii. movement

iv. mineral storage and release (calcium and phosphate)

F. Bone Growth

1. Lengthening of a bone occurs at an epiphyseal plate.
2. Growth in bone diameter occurs as osteoblasts from the periosteum add new bone tissue to the outer surface.
3. Ossification of most bones is usually completed by age 25

G. Bone Replacement

1. Remodelling is a continuous process in which worn and injured bone tissue is replaced by new bone tissue.
2. Osteoclasts resorb old bone tissue and osteoblasts form the new bone tissue.

H. Blood and Nerve Supply

1. Bones have a rich blood supply; portions of bone containing red bone marrow have an especially rich supply of blood vessels.

2. Nerve supply to a bone is not extensive, consisting primarily of vasomotor nerves to blood vessels, and sensory nerves (concerned with pain) supplying the periosteum.

MODULE REVIEW QUESTIONS

A. What are the main components of cartilage?

B. What is the difference between hyaline, fibrous and elastic cartilage?

C. List five functions of the skeletal system.

D. What is the difference between compact bone and spongy bone? Where is each one located?

E. What are the main parts of a typical long bone.

F. What is the difference between osteoblasts, osteoclasts and osteocytes?

MODULE REVIEW QUESTIONS

A. Describe the pectorial girdle and where are the different bones joined.

B. Name the bones of the arm and forearm.

C. Name the bones of the pelvic girdle and describe the function of the acetabulum.

D. Describe the structure and function of the arches of the foot.