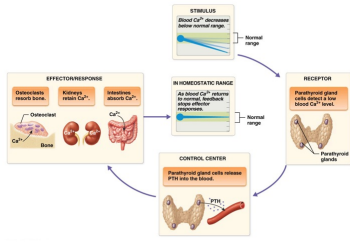


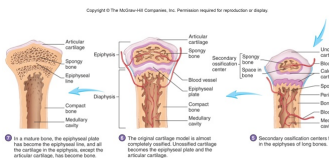
PTH and Calcium



Musco skeletal system

the muscular and skeletal systems work together to support and move the body. The bones of the skeletal system serve to protect the body's organs, support the weight of the body, and give the body shape. The muscles of the muscular system attach to these bones, pulling on them to allow for movement of the body.

epiphyseal plate



compact bone

location makes up 80% of bone in body, Under the Periosteum: It lies just beneath the periosteum, the outer membrane covering bones. In the Diaphyses of Long Bones: The diaphysis refers to the shaft of long bones, where compact bone provides support and protection

function Strength and Rigidity

histology

Terminology

Sagittal plane a vertical plane which passes through the body longitudinally. It divides the body into a left section and a right section

median sagittal plane passes down the midline of the body, separating it into equal halves

Terminology (cont)

Coronal plane a vertical plane which also passes through the body longitudinally – but perpendicular (at a right angle) to the sagittal plane It divides the body into a front (anterior) section and back (posterior) section

Transverse planes a horizontal plane. It is perpendicular to both the sagittal and coronal planes, and parallel to the ground. It divides the body into an upper (superior) section and a lower (inferior) section.

Transverse planes are also known as transaxial planes or axial planes.

Medial towards the midline

Terminology (cont)

Lateral away from the midline

Anterior to the front

Posterior to the back

Superior Higher

Inferior lower

Proximal Closer to origin (of limb)

Distal further away (of limb) from origin

The integumentary system and other systems

Immune system it's the first line of defense against bacteria and infection. It also sends white blood cells to injuries to begin the healing process.

Endocrine system helps you absorb vitamin D, which acts as a hormone and is crucial to your bone health because it affects calcium absorption.

Connective Tissue Proper

CONNECTIVE TISSUE PROPER	COMPONENTS	FUNCTION	LOCATION
Loose CT	Fibroblast Ground substance Protein fibers	• Support • Protection • House blood vessels supplying epithelium	• Deep to epidermis • Walls of hollow organs • Membranes lining body cavities
Dense CT	Fibroblast Collagen fibers Ground substance	• Strength • Resistance to stress in all three planes	• Deepest layer of skin • Around joints, organs
Irregular	Fibroblast Collagen fibers Ground substance	• Strength • Resistance to stress in all three planes	• Tendons, ligaments
Regular collagenous	Fibroblast Collagen fibers Ground substance	• Strength • Resistance to stress in one plane	• Large blood vessels • Certain ligaments
Regular elastic	Elastic fibers Ground substance	• Allow tissue to stretch and recoil	• Lymph nodes, spleen, liver, mesentery, etc.
Reticular CT	Reticular fibers Lymphocyte	• Form internal structure of many organs • Transporter of water, nutrients and waste • Immune response	• Deep in the skin to characteristic wavy pattern • Surrounds the heart and abdominal organs
Adipose CT	Adipocyte Protein fibers	• Storage, insulation • Shock absorption • Protection • Major energy reserve in the body	



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Published 23rd February, 2024.

Last updated 23rd February, 2024.

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The integumentary system and other systems (cont)

Respiratory system: nose hairs filter out dust and other particles before you inhale them into your lungs

Function of skeletal system

Protection

Blood cell formation-Red blood marrow is the site of blood cell formation

Mineral storage- calcium, phosphorus, and magnesium salts

Fat storage-yellow bone marrow

Movement-provide movement from the muscles attached to the bones

Supports the weight of the body

Osteoporosis

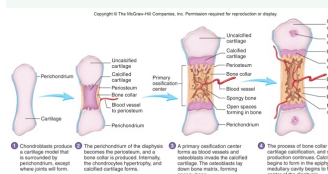
A disease that causes bones to become weak and brittle.

Osteoporosis (cont)

More prevalent in females, older and slender, thin boned people, if someone in your family had it, a diet low in calcium and vitamin D, Long-term use of certain medications, Not getting enough exercise and being inactive for long periods of time, Long-term heavy drinking of alcohol, Smoking

To prevent osteoporosis-intake the recommended amount of calcium, exercise regularly, add more lean protein to diet, get enough vitamin D, Limit your alcohol consumption, Maintain a healthy weight, If you smoke, quit,

Intramembranous Ossification Process



Ossification

Intramembranous ossification: built on a model (starting material) made of a membrane of embryonic connective tissue

Ossification (cont)

endochondral ossification: built on a model of hyaline cartilage

Yellow bone marrow

Location: Yellow bone marrow is located in the cavities of long bones.

Function: It stores fat (adipocytes) and contains mesenchymal stem cells. Yellow bone marrow can convert to red marrow if needed

What and functions

Organ System	Function	Organ System	Function
Digestive	- Esophagus - Stomach - Liver - Small intestine - Large intestine	Cardiovascular	- Heart - Blood vessels
Urinary	- Kidney - Ureter - Bladder - Urethra	Endocrine	- Pituitary gland - Thyroid - Parathyroid - Thymus - Gonads (ovaries)
Respiratory	- Trachea - Bronchi - Lung	Nervous	- Brain - Spinal cord - Nerves
Skeletal	- Cartilage - Bone	Lymphatic and Immune	- Thymus - Lymph nodes - Lymphatic vessels - Spleen
Muscular	Skeletal muscle	Reproductive-Female	- Ovary - Uterus - Cervix - Vagina
Integumentary	- Hair - Nails - Skin	Reproductive-Male	- Prostate - Testis - Penis

Simple epithelial tissue

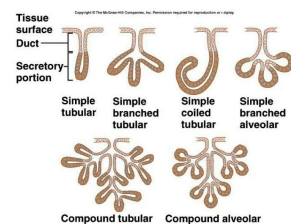
SIMPLE EPITHELIAL TISSUES CONSIST OF ONE LAYER OF CELLS	COMPONENTS	FUNCTION
Simple squamous epithelium	Single layer of flat cells	- Provides a barrier through which gases and fluids can be exchanged - Produces serous fluid
Simple cuboidal epithelium	Single layer of cube-shaped cells	- Absorption - Secretion of mucus and other substances
Simple columnar epithelium	Single layer of rectangular cells	- Absorption - Secretion of mucus and other substances - Propulsion of egg through uterine tube
Pseudostratified columnar epithelium	Single layer of columnar cells of different heights, giving a stratified appearance	- Secretes mucus and propels it with ciliary motion - Cilia

Stratified Epithelial Tissue

STRATIFIED EPITHELIAL TISSUES CONSIST OF MORE THAN ONE LAYER OF CELLS	COMPONENTS	FUNCTION	LOCATIONS
Stratified squamous epithelium	Multiple layers of epithelial cells	- Protection from mechanical stresses and chemical irritants - Apical cells shed, kept and shed again - Cells are constantly being replaced	Epidermis
Stratified cuboidal epithelium	Two or more layers of cuboidal cells	- Protection from mechanical stresses and chemical irritants - Apical cells shed, kept and shed again - Cells are constantly being replaced	Some glands
Stratified columnar epithelium	Two or more layers of columnar cells	- Protection from mechanical stresses and chemical irritants - Apical cells shed, kept and shed again - Cells are constantly being replaced	Some glands
Transitional epithelium	Multiple layers of cells	- Apical cells elongate when relaxed and flatten when contracting - Cells are constantly being replaced	Urinary bladder

Exocrine glands

Structures of Exocrine Glands



Endocrine vs Exocrine Glands

Endocrine Glands: secrete hormones; ductless; secrete hormones directly into the bloodstream

Endocrine vs Exocrine Glands (cont)

Exocrine Glands secrete substances like enzymes, digestive juices, sweat, saliva, etc.; contain ducts; release substances through ducts onto surfaces or into cavities

Spongy bone

location usually located at the ends of the long bones (the epiphyses), with the harder compact bone surrounding it. It is also found inside the vertebrae, in the ribs, in the skull and in the bones of the joints

function deal for making and storing bone marrow within the lattice-like trabeculae network, Spongy bone contains red bone marrow that is used in erythropoiesis.

Spongy bone (cont)

histology contains osteocytes housed in lacunae, but they are not arranged in concentric circles. Instead, the lacunae and osteocytes are found in a lattice-like network of matrix spikes called trabeculae

Joint classification

Summary of Joint Classification

Structural Class	Characteristics	Types	Mobility
Fibrous	Bones united by collagen fibers	1. Suture 2. Symphysis 3. Gomphosis	1. Immobile 2. Slightly movable 3. Immobile
Cartilaginous	Bone with united by cartilage	1. Synchondrosis 2. Symphysis 3. Epiphyseal (Pneumatized)	1. Immobile 2. Slightly movable 3. Slightly movable
Synovial	Bone ends covered with articular cartilage and enclosed within a synovial membrane	1. Plane 2. Hinge 3. Pivot 4. Ball-and-socket 5. Saddle 6. Ball and socket	1. Freely movable 2. Slightly movable 3. Slightly movable 4. Freely movable 5. Freely movable 6. Freely movable

Joints, bones, and movement

Your joints, connective tissue and muscles all work together to push and pull parts of your body every time you move

Depending on how much a joint moves, it fits into one of three categories-Synarthroses, Amphiarthroses, Diarthroses

Specialized Connective Tissue

CONNECTIVE TISSUES

SPECIALIZED CONNECTIVE TISSUES	CHARACTERISTICS	FUNCTIONS	LOCATIONS
Adipose	Composed of adipocytes (fat cells) and connective tissue fibers	Stores energy in the form of fat	Subcutaneous layer of skin, around organs, in bone marrow
Cartilage	Composed of chondrocytes and extracellular matrix (collagen and proteoglycan fibers)	Provides support and flexibility	Articular surfaces, intervertebral discs, ear of nose
Epithelium	Composed of epithelial cells and connective tissue fibers	Provides a barrier and protection	Outer layer of skin, lining of organs
Bone	Composed of osteocytes and extracellular matrix (collagen and mineral salts)	Provides support and protection	Skull, ribs, vertebrae, long bones
Blood	Composed of red blood cells, white blood cells, and platelets	Transports oxygen and nutrients	Throughout the body

FIG 4.20 Summary of connective tissues.

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Membranes

SKIN AND BODY MEMBRANES

Membrane	Tissue type	Location	Function
Mucous	Top layer: Epithelial Bottom layer: Connective	Respiratory, Digestive, Urinary, and Reproductive tract	Protect, lubricate, secrete, and absorb
Serosa	Top layer: Epithelial Bottom layer: Connective	Ventral body cavities and organ linings	Lubricate
Cutaneous	Top layer: Epithelial Bottom layer: Connective	Body's exterior	Protects deeper body tissue from external hazards
Synovial	Connective tissue	Joint cavity linings and bone ends	Lubricates to reduce friction

Muscle tissue

	Main features	Location	Type of cells	Histology
Skeletal muscle	- Fibers: striated, tubular and multi nucleated - Voluntary - Usually attached to skeleton			
Smooth muscle	- Fibers: non-striated, spindle-shaped, and uninucleated. - Involuntary - Usually covering wall of internal organs.			
Cardiac muscle	- Fibers: striated, branched and uninucleated. - Involuntary - Only covering walls of the heart.			

Bones classifications

Bone Types	Appearance	Function	Picture	Example(s)
Long Bones	Longer Than They Are Wide	Mechanical Strength		Femur Tibia Humerus Ulna Radius
Short Bones	Cube-shaped	Multi-directional Motion		Carpal Bones (Of The Hand/Wrist) And The Tarsal Bones (Of The Feet/Ankles).
Flat Bones	Thin And Flat Has Large Surfaces For Muscle Attachments	Mechanical Protection To Soft Tissues Beneath		Cranial Bones Sternum Ribs Scapulae
Irregular Bones	Complicated Shapes that cannot be Classified as "Long", "Short" or "Flat".	Provides Major Mechanical Support for the Body		Hyoidbone Hyoid Bone Sphenoid Bone Facial Bones
Sesamoid Bones	Most Sesamoid Bones Are Un-named.	Protects From Additional Friction And Use - can form in Palms And Soles		Only One Type Of Sesamoid Bone Is Present In All Normal Human Skeletons So It Has A Name: The Patella.

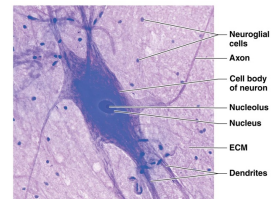
Red bone marrow

consists of loose connective tissue that supports islands of blood-forming hematopoietic cells,

Amount of red marrow decreases as a person ages

Nervous tissue

NEURONS



Tissue repair

Regeneration Replacing cells, Epithelium tissue, most connective tissue, smooth muscle tissue

Fibrosis Divide by mitosis, collagen that fills in gap and tissue loses some level of functional ability, End result of fibrosis is development of scar tissue composed of dense irregular connective tissue, cartilage (connective tissue), skeletal and cardiac muscle tissue, nervous tissue

Sensory receptors

Lamellated (Pacinian) corpuscles found embedded within reticular layer; sensory receptors that respond mainly to changes in pressure and vibration associated with skin

Tactile (Meissner) corpuscles also found in dermal papillae; sensory receptors that respond to light touch stimuli; more numerous in regions of body where sensation is a primary function; skin of fingertips, lips, face, and external genitalia

Bone terms

Articular cartilage specialized connective tissue present in synovial joints that does not ossify, and persists through life, to provide an optimal surface for enabling movement in the joint. More specifically, it prevents friction between the bones and facilitates the transmission of loads to the underlying bone.

Bone terms (cont)

periosteum Fibrous sheath that covers bones, Supplying blood and nourishment to the bone, Giving the bone and the surrounding area sensation, Protecting the bone from damage, Growing and repairing the bone when needed

Medullary cavity The medullary cavity (medulla, innermost part) is the central cavity of bone shafts where red bone marrow and/or yellow bone marrow (adipose tissue) is stored; hence, the medullary cavity is also known as the marrow cavity

Bone terms (cont)

endosteum The endosteum (pl.: endostea) is a thin vascular membrane of connective tissue that lines the inner surface of the bony tissue that forms the medullary cavity of long bones.[1][2] This endosteal surface is usually resorbed during long periods of malnutrition, resulting in less cortical thickness

Osteo-

- clasts break down and reabsorb bone
- blasts bone-forming cells
- cytes mature bone cells

3 layers

Epidermis Structure: superficial layer that consists of keratinized stratified squamous epithelium resting on a basement membrane
Function: It protects your body from harm, keeps your body hydrated, produces new skin cells and contains melanin, which determines the color of your skin.

3 layers (cont)

Dermis Structure: deep to epidermis and basement membrane; consists of loose connective tissue and dense irregular connective tissue
Function: to cushion the body from stress and strain, and to also provide: elasticity to the skin, a sense of touch, and heat.

Epidermal derivatives

Thermoregulation

How does the skin regulate the body's temperature?
sweat glands, accessory structures to the skin, secrete water, salt, and other substances to cool the body when it becomes warm,