

LECTURE 1

- **Cell Membrane:** semi-permeable membrane separating nucleus from cytoplasm; **functions:** compartmentalization, movement: selective permeability, intercellular interactions: communication b/w cells, recognition sites: hormones, proteins, antibodies
- **Nucleus: contains:** chromatin: DNA and proteins, nuclear envelope: double layer membrane surrounding nucleus separating it from cytoplasm, nucleolus: command center, RNA synthesis; **function:** stores genetic info, cell division
- **Ribosomes: contains:** RNA and proteins; **function:** protein synthesis
- **Endoplasmic Reticulum: two types: RER:** manufactures and transports protein; **SER:** lipid production, metabolism and calcium storage
- **Golgi Apparatus:** protein storage
- **Mitochondria:** cellular respiration, ATP production
- **Microtubules:** continuous through cytoplasm
- **Centrioles:** there's two, near nucleus, cell division
- **Microfilaments:** thin proteins, provides support for cytoskeleton
- **Microvilli:** located and increase surface space of membrane, transports
- **Cilia:** located in microtubules, moves mucous
- **Tight Junction:** contracts b/w tight cells
- **Desmosomes:** contracts b/w welded together cells
- **Gap Junction:** exchange and communicates of cells

LECTURE 2

- **Interphase: G1:** 8 or more hrs: protein synthesis; **S:** 6-8 hrs: DNA replication; **G2:** 2-5 hrs: protein synthesis
- **Mitosis: Prophase:** nucleus membrane disappears; **Metaphase:** chromosomes lines up in middle; **Anaphase:** chromosomes are pulled apart on opposite sides of nucleus; **Telophase:** two nucleus/daughter cells form
- **Mitosis:** two parent cells, two daughter cells; 23 pairs or 46 chromosomes;
- **Meiosis:** cell division b/w sex cells; 23 pairs, $\frac{1}{2}$ DNA from parent cell; 2 parent cells; 4 daughter cells
- **Specialized cells that lost ability to divide:** muscle cells, nerve cells, mature red blood cells
- **Cells that normally don't divide:** liver cells, white blood cells (lymphocytes)
- **Cells that divide continuously:** skin cells, cells in intestinal linings, bone marrow cells
- **Chromatin:** duplicated chromosomes
- **Chromatid:** DNA and protein
- **Chromosomes:** contains genetic info
- **Centrioles:** represents what's happening in cell; organization center for mitotic spindle
- **Mitotic Spindle:** spindle fiber that separates chromosomes into daughter cells
- **Hypertrophy:** increases in size of cell; resistance training
- **Hyperplasia:** increase in mitotic activity
- **Atrophy:** decreases in cell size
- **Metaplasia:** changes in cell response to disease or chronic irritation which causes transformation of cell type
- **Neoplasm:** new cell mass; rapid multiplication; **two types: benign:** not cancerous, does not spread, not invasive; **malignant:** cancerous

LECTURE 3

- **Tissue:** group of cells that work together to perform a specific function; **contains:** cells and intercellular matrix
- **Four basic types: epithelium, muscle tissues, CT, nervous tissues**
- **Epithelium** (most simple): **consists of:** cells held closely together by cellular adhesions at basement membrane; highly cellular, very little intercellular material; avascular (not penetrated by blood vessels): receives nutrients by diffusion from underlying tissue
Function: membranous: kidney filtration; lines body cavity; protects body surface; contains sensory cells; absorbs and secretes nutrients; **glandular:** protects and secretes hormones
- **Cell Layers: simple:** one cell layer; **stratified:** many cell layers; **pseudostratified:** considered single layer b/c cells contact at basement membrane but appears to be multiple layers b/c cell size and nuclear position varies
- **Cell Shapes: squamous:** flat cells; **cuboidal:** cube-shaped cells; **columnar:** rectangular-shaped cells
- **Cilia:** hair-like substances on surface that secretes nutrients and other fluids
- **Keratin:** outer layer of skin; key structural component: hair and nails
- **Endocrine Gland:** secretes hormones directly into bloodstream; very vascular
- **Exocrine Gland:** secretes products through duct (tube) to action site; saliva and sweat glands; **unicellular:** produces mucous; **multicellular:** simple tubular, simple alveoli, compound tubular of alveoli
- **Cuboidal:** in glands; **columnar:** in tracts; **squamous:** used for exchange and transport
- **Types of Epithelium: simple cuboidal, stratified cuboidal:** located in glands; **simple squamous:** used for exchange in lining of blood vessels and alveoli of lungs; **stratified squamous:** tubes used for transport in anus, vagina, skin; **simple columnar:** used for exchange in digestive tract, stomach; **pseudostratified ciliated columnar:** in respiratory tract, bronchi, nasal cavity, trachea; **transitional:** in bladder, uterus, urinary tract

LECTURE 4

- **Connective Tissue** (most abundant): highly vascular; **composed of:** an abundant amount of intercellular material: **collagenous:** contains protein collagen, flexible; **elastic:** contains protein elastin, capable of stretching; **reticular:** thin mesh-like threads;
Function: protection; supports and binds other tissues together; provide metabolic needs for other tissues;
Types: CT proper, cartilage, bone, blood
- **CT Proper** (fibrous CT): loose, dense, elastic, adipose
Loose (areolar): intercellular space; flexible, very vascular; distributed throughout body; surrounds muscle and blood vessels around organs; binds skin to underlying muscle
Dense: located in ligaments, tendons, outer covering of eye; **two types: irregular:** large number of collagenous, fibers packed closely together; **regular:** poor blood supply, strong and flexible
Elastic: contains irregularly arranged elastic fibers; easily stretched and returned to original size/state; located in walls of arteries, larynx, trachea, bronchi
Adipose: composed of fat cells distributed throughout body

- **Cartilage:** avascular; **composed of** intercellular material: **chondroitin sulfate:** semisolid gelatin-like substances, white rubbery part at ends of bones; cells: **chondrocytes:** located in lacunae; fibers; **perichondrium:** tough, outer covering;
Hyaline Cartilage: forms cartilage skeleton during fetal development; covers surface of long bone; located in respiratory tract
Fibrocartilage: contains fibers; able to withstand compressions and an increase in tensile strength; found in intervertebral disc and symphysis pubis
Elastic Cartilage: contains elastic fibers for flexibility; found in ears, larynx

LECTURE 5

- **Skin: functions:** protection: physically prevents dehydration, chemically melanin protects against UV light, biologically keeps foreign material and bacteria out; regulates body temperature; absorbs O₂ CO₂, Vitamins A, D, E, K, steroids; salt lost in sweat excretion; contains sensory cells; secretion communication through color change
- **Epidermis:** outermost layer of skin; 30-50 cell layers; composed of stratified squamous epithelium, mostly keratinocytes
Stratum Germinativum: single layer of cells, deepest layer; undergo mitosis
Stratum Spinosum: few layers of squamous cells; prickled cells; attached to spine-like process
Stratum Granulosum: contains dark granules; abundant number of keratin; cells begin to die
Stratum Lucidum: clear layer, cells appear to be empty; only found in thick skin
Stratum Corneum: superficial layer; dead keratinized cells
- **Dermis:** deep in epidermis; contains blood vessels for diffusion of nutrients to epidermis; composed of CT, mast cells, nerve fiber, blood vessels, hair follicles, sweat and sebaceous glands; **two layers: papillary:** most superficial, surface layer forms friction ridges: elevation of epidermal surface patterns; **reticular:** regular dense CT, elastin and collagen fibers, provides skin tone
- **Melanin:** yellow-brown-black pigment
- **Carotene:** yellow-orange pigment
- **Hemoglobin:** iron containing pigment in red blood cells used to transport O₂
- **Sebaceous Glands: function:** produces sebum, oily substance that lubricates hair shaft; located all over body except palm of hand and sole of feet
- **Sweat Glands:** tubular glands that reach surface to release secretions; **two types: eccrine:** produces sweat, consists of mainly water, salt and waste products; **apocrine:** secretes sweat and lipoproteins which produces odor caused by bacteria, puberty
- **Hypodermis:** deep in skin; composed of loose CT and adipose tissues; acts as an anchor for skin to underlying tissue

LECTURE 6

- **Bone: function:** provides structural framework, supports soft muscle tissues and CT; protection: protects internal organs from injury; movement: binds together with muscle tissues, produces movement; storage: fat stored in medullary cavity of long bone, minerals stored in matrix of bone tissue; blood cell production: red bone marrow in spongy bone produces new blood cells; **consists of:** intercellular matrix, osteocytes, osteoblast and osteoclast