-RNA polymerase catalyses formation of an mRNA chain using DNA as a template and following the rules of complementary base pairing: A-U, C-G

-Transcription ends at a terminator sequence [STOP codons] : UAA, UAG, UGA

-Translation [outside of nucleus]

-process that occurs on ribosomes

-Turns mRNA into a polypeptide

-Involves rRNA (ribosomes), tRNA (cytoplasm), and mRNA (from nucleus)

-tRNA anticodons match w/mRNA codons, and the rRNA catalyzes formation of a peptide bond between the a.a. at the opposite end of the tRNA

-Regulation of gene expression:

-all nucleated cells except germ cells [sperm in males, eggs in females] have the full complement of DNA

-During development, differentiation occurs and some segments of DNA are turned off in some cells while those segments remain "on" in other cells

-During lifetime of a cell, the rate of protein synthesis varies depending upon chemical signals that reach the cell

-Cell Division. **[SEE TXTBK PICS]** -Interphase Mitosis [division of nuclear material]: -Prophase -Metaphase -Anaphase -Telophase -Cell Life Cycle *Interphase: G=growthtS=suthesis -phase hold een cell divisions + onsting cell activity GT -S - repleation yiDNA -G2 *Mitosis {small compared to interphase} -series of events that leads to production of 2 cells by division of mother cells are genetically identical -prophase

-propriase -metaphase -anaphase -telophase *Cytokinesis - division of cell cytoplasm

Replication of DNA:

-DNA strands separate

-Old strands become templates for new (complementary) strands to form (A-T, C-G)

-2 identical DNA molecules formed by 2 nucleotide strands

Cell Division

-Interphase - DNA replication [if look @ nucleus, see chromatin

-Mitosis

-prophase - nuclear envelope disintegrates, chromatin condenses, spindles attach to kinetochore

-Metaphase - chromosomes are aligned at nuclear equator

-secreting substances e.g. pancreas [secrete digestive enzymes for food breakdown] -absorbing substance e.g. lining of small intestine

-microvili increase surface area for absorption [small intestine] - made of epithelial tissue

-Classification of Epithelium

-# of layers of cells

-simple - one layer - each extends from basement membrane to the free surface -allows diffusion of gases, filtration of blood, secretion, absorption [Easy

to pass through]

-stratified - more than one layer - shape of cells of the apical layer used to name

the tissue

-protection, particularly against abrasion

-pseudostratified - tissue appears to be stratified, but all cells contact basement membrane so it is in fact simple

-shape of cells

-squamous - flat, scale-like

-allows diffusion or acts as filter [bc flat/not much surface area to go

through]

-cuboidal - about equal in height and width; resemble cube shape -secretion or absorption. May include goblet cells that produce and se-

crete mucous

-columnar - taller than wide; resembles a columnar - taller than wide; resembles a columnar -secretion or absorption. May in the produce and se-

crete mucous

our skin is stratified squamous epithe a ussue

Free surfaces

-free surfaces on phnelium

smoom: reduce friction. age 21 of 4 -microvilli: increase surface -stereociti -microvilli: increase surface area for absorption or secretion

-stereocilia: elongated microvilli for sensation and absorption

-Cilia: move materials across the surface

-Folds: in transitional epithelium where organ must be able to change shape .

-i.e.Urinary system

Simple squamous epithelium

-structure: 1 laver of flat cells

-Location: simple squamous: lining o blood and lymphatic vessels (endothelium) and small ducts, alveoli of lungs, loop of Henle in kidney tubules, lining of serous membranes (mesothelium) and inter surface of eardrum

-Function: diffusion, filtration, some protection against friction, secretion, absorption

Lecture 3 - simple and stratified tissue types -simple cuboidal epithelium

-locations: kidney tubules, glands and their ducts, choroid plexus of brain, lining of terminal bronchioles of lungs, and surface of the ovaries

-structure: single layer of cube-shaped cells; some types have microvilli (kidney tubules) or cilia (terminal bronchioles of lungs)

-functions: secretion and absorption in kidney; secretion in glands and choroid plexus; movement of mucous out of terminal bronchioles by ciliated cells

-consists of cells separated by extracellular matrix -many diverse types -performs variety of important functions

-functions:

-encloses organs as a capsule and separate organs into layers

-connect tissues to one another. ex. Tendons and ligaments

-support and movement. ex. Bones [are solid connective tissues] -storage. ex. Store fat

-cushion and insulate. ex. Fat does this

-transport. Move via Blood [blood is a liquid connective tissue]

-protect. Cells of immune system [blood carry antibodies]

-cells of connective tissue:

-specialized cells produce the extracellular matrix

-descriptive word stems:

-Blasts: create the matrix (developing), ex. Osteoblast [bone forming cell] -cytes: maintain the matrix (mature), ex.chondrocyte [mature cartilage cell]

-clasts: break the matrix down for remodeling, ex. Osteoclasts [break down

bonel

-adipose or fat cells (adipocytes): common in some tissues (dermis of skin) grare in some (cartilage)

-Mast cells: common beneath membranes; along small blood v star release heparin (blood thinner), histamine (stimulate immune system), and here of the enzymes in response to injury

-WBCs/Leukocytes: respond to injury entitle bion -Macrophages: phagocytize one Cytick protection

-fixed: stay in position in connective tissue -wandering move by amoeboid movement thru connective tissue

-platelets: in galents of hematen detic cells involved in clotting and is creatiated mese prime stem cells): have potential to differentiate into adult cell types

Extracellular matrix

-protein fibers of the matrix:

-collagen: most common protein in body; strong, flexible, inelastic

-reticular: fill spaces b/t tissues and organs. Fine collagenous, form branching networks [build up strength in complex way]

-elastic : returns to its original shape after dissension or compression. Contains molecules of protein elastin that resemble coiled springs; molecules are cross-linked

Adult Connective Tissues

-connective tissue proper

-loose (areolar). Collagenous fibers are loosely arranged

-Dense. Fibers form thick bundles that nearly fill all extracellular space -supporting connective tissue

-cartilage

-bone

-fluid connective tissue

-blood

-axon: cell process; conducts impulses away from cell body; usually only 1 per

neuron

-dendrite: cell process; receive impulses from other neurons; can be many per

neuron -types:

-multipolar, bipolar, and unipolar [where process come off from main body] -nervous tissue: neuroglia

-support cells of brain, spinal cord and nerves

-nourish, protect and insulate neurons

Tissue Membranes

-combo of epithelial and connective tissue w/one exception (synovial CT)

-cutaneous membrane=skin. [membrane b/c have epidermis-made of epithelial tissues & grow off basement membrane and dermis-in connective tissue]

-mucous -line cavities that opens to the outside of the body i.e. oral, nasal. anal, vaginal; secretes mucus, contains epithelium w/goblet cells, basement membrane, lamina proprietary CT (sometimes w/smooth muscle), found in respiratory/digestive/urinary/repro systems

-serous - simple squamous epithelium called mesothelium, basement membrane, thin layer of loose CT; line cavities not open to exterior: pericardial, pleural, peritoneal -synovial CT — all moveable joints have synovial fluid; line freely movable joints;

Module 5 Lecture 1 - intro to integumentary system Integumentary system: Some of it: -skin Duportaneous region 3.96 Structures:

structures:

- -skin
- -hair -nails
- -glands

functions:

- -protection
- -sensation
- -temp regulation (sweat glands)
- -vit D production
- -Excretion [this is an excretory organ]
- -immunity

Skin/cutis

-epidermis: superficial layer of epithelial tissue

- -Dermis: deep layer of connective tissue
 - -structural strength

-subcutaenous tissue

- -NOT part of skin
- -loose connective tissue that connects skin to underlying structures

-lanugo hair (lana means wool): fifth or sixth month of fetal development.

The fine hair that covers the fetus and is usually shed prior to birth

-vellus hair (fleece): replaces lanugo

colorless, small hair covering almost entire body

-terminal hairs: coarse, visible seen on eyeborws, scalp, eyelashed, after puberty in axially and genital regions and facial area of male

-hair color:

-caused by varying amts, types of melanin

-melanin can be black-brown or red

-primarily formed in hair bulb (due to down growth of folli-

cle - stratum basale - melanocytes)

-hair pigments produce varying shades of color

-dark hair (black - brown share) produced by Eumelanin

-light hair (blonde-red shade) produced by Pheomelanin

-graving of hair: decrease in pigment caused by inability of melanocytes

to produce

-white hair: results from leakage of air into hair shaft. [muscle under scalp and as lose tone, can lose integrity of hair follicles]

-red hair: produced as result of iron containing pigment a.a. Tri-

chosiderin

Lecture 6 - Accessory structures: glands and nails

Glands:

-sebaceous glands

ceous glands -holocrine (death of secretory ets -oily secretion -prevents dvins and mails most enult) noto hair follicle -exceptions: life mail sudoriferous) offerences

-sweat (sudoriferous) glands

-2 types traditionally called apocrine and merocrine , but apocrine may secrete in a merocrine or holocrine fashion

-merocrine or eccrine . Most common

-simple coiled tubular glands

-open directly onto surface of skin. Have own pores.

-coiled part in dermis, duct exiting thru epidermis

-produce isotonic fluid (water and NaCl but also excretory bc sweat in-

cludes ammonia, urea, uric acid and lactic acid) as fluid moves thru duct, NaCl is moved by active transport back in the body. Final product is hyposmotic (hypertonic). Sweat

-numerous in palms and soles. Absent from margin of lips, labia minora, tips of penis, clitoris

-Apocrine . Active @ puberty [deeper in subcutaneous tissue]-produce more viscous excretion

-compound coiled tubular, usually open into hair follicles

-secretion: organic compounds that are odorless but when acted upon by Bacteria, may become odiferous

-found in axillae, genitalia (external labia, scrotum), around anus -Ceruminous glands/wax glands : modified merocrine sweat glands, external auditory meatus (ear canal)

-earwax (cerumen). Composed of a combo of sebum and secretion from ceruminous -function: in combo w./hairs prevent dirt, insects from entry. Also keep eardrum supple Herniation: bulge

Structure of Atypical vertebrae:

-first cervical vertebra Atlas. -doesnt have items of typic vertebra - No body , just ring of bone -second cervical vertebrae Axis —has body But has a odontoid process(off of top), no other vertebra has this

Lecture 8 - sacrum and thoracic cage [axial skeleton] -sacrum comes from 5 fused vertebrae [1 bone]

-sacral promontory -allows it to assist w/curvature , transition b/t lumbar and sacral curvature

-anterior sacral foramina. - some branches of spinal cord nerves exit here

-posterior sacral foramina - some branches of other spinal cord nerves exit here

-median sacral crest — remnant of spinous process

-vertebral canal - entrance of bone

-saccral hiatus - exit of bone

-coccyx comes from 4 fused vertebrae [1 bone]

-thoracic cage: protects vital organs

-12 pairs of ribs [24 ribs total]. - attach posteriorly to vertebrae and anterior to sternum sale.co.uk -sternum: breastbone - 3 parts: -top=menubrium -body of sternum -xyphoid process = inferior tip -true ribs: attach directly to sternum the -false ribs: attach indirectly to en indirectly to end to be a state of the indirectly to end -floating ribs: net at ached to sterpum Lecture 9 - appardicular skeleton, pectoral girole, upper limb. [appendicular] Pector P Grass support upper D n 2 scapula: 2 shoulder blades -acromium process (posterior) -coracoid process (anterior) -glenoid cavity/fossa - where head of humerus goes -clavicle: 2 collar bones -middle portion=body -proximal [assoc w/breastbone/sternum] and distal [assoc w/scapula] ends Upper limb bones: -humerus: upper limb/Arm[shoulder to elbow] -proximal is the head (rounded) -anatomical neck -surgical neck -greater tubercle (lateral) -lesser tubercle (medial) -diaphysis : raised area = deltoid tuberosity (for deltoid muscle) -distal posteriorly: olecranon fossa [specific part of elbow joint- give strength and stability] -ulna: part of forearm [medial] -proximal: olecranon process - fit into humerus olecranon fossa -distal: head - styloid process -radius: part of forearm [lateral] -head (proximal)

-raised area= radial tuberosity [biceps attach here] -distal=styloid process -carpals (8): wrist -have a proximal and distal row -metacarpals: bones in hand -thumb side to pinky side -phalanges: bones in fingers -thumb side first (each has proximal, distal)[non-thumb also has middle] to pinky side Lecture 10 - pelvic girdle, lower limb Pelvic girdle -where lower limbs attach to body -pelvis: includes pelvic girdle and coccyx -Ischium: inferior and posterior region -Ilium: most superior region -acetabulum: hip socket (joint), where femur fit, made of some of ilium, ischium and pubic bones *iliac crest - upper ridge /hands on hips Differences b/t male and female pelvis: -female: lighter in weight, wider laterally but shorter superiorly to inferiorly; sactual n opader in female w/inferior portion directed more posteriorly; sacral promontory rejectives anteriorly -pelvic inlet:heart shaped in male. oval in female -subpubic angle: less than 90 degrees in male, 90 degrees of ore in female -ilium: flared laterally in female and more share of the accommodate fetus more easily 44 of 4 Lower limb bones: -femur: singular V one side. Thi e al l egreater trocha -lesser trochanter [medial] -Epicondyles -chondyles:(rounded) -lateral condules -medial condyles -patella/sesamoid bone: knee cap -convex anterior surface -concave posterior surface -tibia: larger medial lower leg - weight bearing -medial bone -medial condyle

-lateral condyle

-raised area=tibia tuberosity

-raised area (distal)=medial malleolus

-fibula: smaller lateral lower leg

-lateral bone

-proximal head

-distal lateral malleolus

-tarsals: ankle [7 bones]

-1tallus (atop calcaneus)

-1calcaneus = heel bone

-1medial: navicular bone

-1lateral: cuboid bone