The Skeleton

- supports the body, protects internal organs, provides for movement, stores mineral reserves, and provides a site for blood cell formation
- bones protect organs; ex: skull protects brain
- bones provide a system of levers (rigid rods) on which muscles act to produce movement
- bones contain reserves of minerals, calcium salts
- blood cells are produced in marrow tissue
- 206 bones
- bones divided into:
1. axial skeleton: supports central axis of body (skull, vertebral collumn, rib cage)
2. appendicular skeleton: (arms, legs, pelvis, shoulder)

Structure of Bones

- bones are a solid network on living cells and protein fibers that are surrounded by deposits of calcium salts
- periosteum: a tough layer of connective tissue that surrounds the bone (blood vesses that pass thru carry oxygen & nutrients to bone)
- beneath periosteum is a thick layer of compact bone
Haversian canals: a network of tubes running thru the compact bone that contains blood vessels & nerves
- spongy bone: a large dense tissue found inside the outer layer of the compact bone (adds strength w/o mass)
- bone cells:
1. osteocytes: mature bone cells (in bone matrix)
2. osteoclasts: break down bone (in Haversial canals)
3. osteblasts: produce bone (in Haversial canals)
- bone marrow: soft tissue within bone cavities

Structure of Bones (cont)

1. yellow marow: fat cells
2. red marrow: red blood cells, some white blood cells, & platelets

Development of Bones

- cartilage: connective tissue that a skeleton of a ne mbryo is almost entirely composed of
- made up of tough collagen & flexible elastin
- relies on the diffusion of nutrients from surrounding tiny blood vessels b/c does not contain blood vessels
- dense, fiborous, supports weight, flexible
- ossification: when cartilage is replaced by bone
- happens several months before birth
- long bones have bone plates wehre growth of cartilage causes bones to lengthen
- ones bones r completely ossified you stop growing
- cartilage found in ears, tip of nose, ribs

Types of Joints

- joint: place where one bone attatches to another
- depending on its type of movement, a joint is classified as immovable, slightly movable, or freely movable
- immovable: fixed joints, interloched; ex: bones in skull
- slightly movable: restricted movement, joints seperated; ex: joints btwn lower leg & vertabrae
- freely: movement in one or more direct-ions:
1. hinge joints: back & forth
2. pivot: rote around
3. saddle: slide in 2 directions

Structure of Joints

- cartilage covers bones where they move against each other -> prevents damage
- ligaments: strip of connective tissue that holds bones together
- synovial fluid: enables the surfaces of the joint to slide over each other smoothly
- small sacs of synovial fluid called bursa form
they reduce friction btwn bones

Skeletal System Disorders

- excessive strain -> inflammation
- arthritis (inflammation of joint)
- osteporosis

Types of Muscle Tissue

- there are three different types of muscle tissue: skeletal, smooth, & cardiac
- skeletal: ussually attatched to bones
- voluntary movements
- have altrenating light & dark bands called striations
- consciously controlled by the nervous system
- large, have many nuclei, & 1-30 cm
- have muscle fibers, tissues, blood vessels, & nerves
- smooth: hollow structures, blood vessels, intestines; ex: stomach
- no voluntary control
- moe food, blood circulation, & decrease size of pupils in light
- smooth muscle cells r connected by gap junctions that allow direct electric impulses
- cordiac: heart
- straited, 1 or 2 nucleus
- connected by jap junctions

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Muscle Contraction

- muscle fibers are composed of myofibrils
- each myofibril is made up of 7 filaments
- thick filaments contain protein called myosin
- thin filaments contain protein called actin
- filaments are arranged in sacromeres, which are spereted by Z lines
- a muscle contracts when the thin filamnets in the muscle fiber slide over the thick filaments
- when muscle resting -> no filaments in sacromere
- cross bridge must form for msucle to contract
- energy for muscle contraction is supplied by ATP

Control of Muscle Contraction

- motor nuerons control contraction of skeletal muscles
- nueromuscular junction: point of contact btwn motor nueron & skeletal muscle cell
- vesicles or pockets in axon terminals of motor nuerons release a nuerotransmitter called acetylcholine
- acetylcholine molecules diffue across synapse -> produce an impulse -> produce calcium -> muscle contracts

How Muscles & Bones Interact

- muscles are joined by tough connective tissue called tendons
- tendons pull on bones like levers
- joints are the fixed point around which the lever moves like fructions
- the muscle provides the force to move lever
- skeletal muscles work in opposing pairs
- muscle contracts -> joint relaxes

Exercise & Health

- regular exercise is important in maintaining muscular strength and flexibility
- excersise -> more actin & myosin filaments -> strong muscles & bones
- no exercise -> small muscles, weak bones

Skin

- integumentary system serves as a barier against infection & injury, regulates body temp, removes waste products, & protects against uv
- skin is made of: epidermin & dermis
- epidermis: outer layer of the skin

1. outer layer: dead cells
2. inner layer: make keratin

- epidermis contains melanocytes; diff amounts of melanocytes
- dermis: inner layer of skin
- mantains homeostasis by regulating body temp
- blood vessels narrow or widen
- uv -> skin cancer
- dermis contains: sweat glands & sebaceous (oil glands)

Hair & Nails

- hair prevents dirt from getting in
- hair protects scalp against uv
- hair follicles: tubelike pockets of epidermal cells that extend and grow into the dermis
- hair follicles r in contact with sebaceous glands, which help mantain condition of individual hair
- nails grow from area of rapidly dividing cells called nail root
- nails grow 3 mm/month

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