

## Anatomy and Physiology II

### Exam 1

#### Review from BSCI201

- Chapters 1-4 of text
  - Orientation of the human body (ch1)
    - Language of anatomy
  - Basic chemistry (ch2)
  - Cell structures and cellular organelles (ch3)
  - Tissue types and tissue structures (ch3)
  - Body membranes (ch4)
  - The nervous system: neurons, neurotransmitters and action potentials, neuromuscular junction
  - Hormones and endocrine glands
  - Muscles → both the physiology and anatomy
  - Anatomy → study of the structure and shape of the body and its parts
  - Physiology → study of how the body and its parts work or function on both a microscopic and macroscopic level
  - Levels of organization
    - Cells → smallest structural unit
    - Tissues → collection of cells of same type
    - Organs → collection of two or more types of tissues put together into structures that perform a specific function
    - Organ systems → collection of organs that work together to accomplish a particular task
  - Primary cells/tissue classes
    - Over 200 types of cells divided into 4 general categories
      - Muscle → contraction, generation of force
      - Connective → connect, anchor, support
      - Epithelial → barrier between body and external environment; exchange
      - Nervous → initiate, transmit electrical impulses
  - Body fluid compartments
    - For a 70 kg man, total body water=42 liters
      - 28 liters intracellular fluid (ICF)
      - 14 liters extracellular fluid (ECF)
        - 3 liters plasma
        - 11 liters interstitial fluid
  - Organ systems
    - Endocrine

- Hypothalamus, pituitary gland, adrenal gland, thyroid gland, parathyroid glands, thymus, pancreas
- Provide communication between cells of the body through the release of hormones in the bloodstream
- Nervous
  - Brain, spinal cord, peripheral nerves
  - Provide communication between cells of the body through electrical signals and the release of neurotransmitters into small gaps between certain cells
- Musculoskeletal
  - Skeletal muscle, bones, tendons, ligaments
  - Support the body, allow voluntary movement of the body, allow facial expressions
- Cardiovascular
  - Heart, blood vessels, blood
  - Transport molecules throughout body in bloodstream
  - Transports materials in body via blood pumped by heart
    - Oxygen, carbon dioxide,  $\text{H}^+$ , wastes
- Respiratory
  - Lungs, pharynx, trachea, bronchi
  - Bring oxygen into the body and eliminate carbon dioxide from the body
  - Keeps blood supplied with oxygen, removes  $\text{H}^+$ , maintains blood/plasma pH
- Urinary
  - Kidneys, ureters, bladder, urethra
  - Filter the blood to regulate acidity, blood volume and ion concentrations, eliminate wastes
  - Eliminates  $\text{H}^+$ , maintains acid-base balance, regulates water and electrolytes
- Gastrointestinal (Digestive)
  - Mouth, esophagus, stomach, small intestine, large intestine, liver, pancreas, gallbladder
  - Break down food and absorb it into the body
  - Allows for nutrient absorption into  $\text{H}^+$ , eliminates indigestible material
- Reproduction
  - Gonads, reproductive tracts and glands
  - Generate offspring, not required for  $\text{H}^+$
- Immune
  - White blood cells, thymus, lymph nodes, spleen, tonsils, adenoids
  - Defend the body against pathogens and abnormal cells
  - Returns fluids to blood vessels, cleanses the blood, protects the body from pathogens,  $\text{H}^+$

- Integumentary
  - Skin
  - Protect the body from the external environment
- Interrelationships among body systems
  - Integumentary system allows food to enter → mouth → digestive system → unabsorbed matter goes out anus → nutrients enter blood in circulatory system → nitrogen containing metabolic waste products exit body through excretory system → CO<sub>2</sub> exits and O<sub>2</sub> enters through respiratory system which also travels through the circulatory system through blood

#### o Homeostasis

- The process of maintaining stable internal environment compatible for life
- Necessary for normal body functioning and to sustain life
  - Stable body temperature
  - Maintain blood \*
  - Maintain blood pressure
  - Maintain water balance/osmolarity
  - Stable blood/sugar levels
- Most organ systems contribute to homeostasis except the reproductive system
- Negative feedback control in Homeostasis
  - Primary mechanism for maintaining homeostasis
  - Body's response the original stimulus is to offset it so that it is within normal physiological \*
  - External change → triggers change in a regulated variable in internal environment → this triggers a reaction to oppose the detected change and return regulated variable toward normal parameters (set point)
- Homeostasis in action → thermoregulation and negative feedback
- Homeostasis imbalance → a disturbance in homeostasis resulting in disease if not corrected
- Maintaining homeostasis through neural and hormonal control systems
  - Receptor (sensors)
    - o Responds to changes in the environment (stimuli)
    - o Sends information to control center
    - o Detect level of regulated variable and provide input to integrating center
  - Control center/\*
    - o Determines set point (usually in the brain), desired level of regulated variable and analyzes information
    - o (usually in the brain) compares set point to actual level of regulated variable and sends output to effectors to return regulated variable toward set point