Human Anatomy and Physiology I

Biology 2404

Syllabus

- Dr. Christopher M. Ritzi
- Office: WSB 216
- Office hours: M & W 8:30-10:30, T 2-3 or appt.
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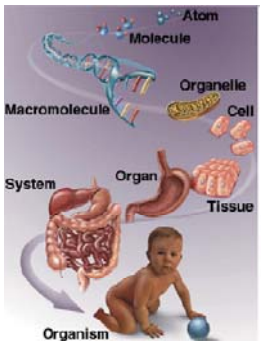
- Lecture: 9:30-10:15 TR WSB 201
- Labs: 3-5:00pm, & 7-9:00pm T WSB 109

Anatomy and Physiology

- Why anatomy AND physiology?
- Anatomy – the science of body structures ad the relationships among them.
- Physiology – the science of body functions, ie. how the body parts work.
- Highly interconnected with unity of form and function

Levels of Organization

- Chemical
- Cellular
- Tissue
- Organ
- System
- Organismal



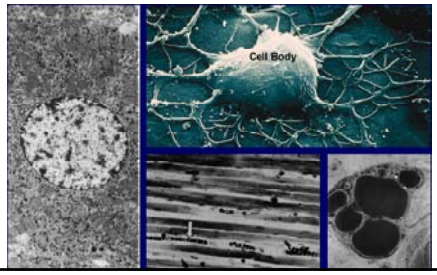
Chemical Organization

- Composed of atoms and molecules
- Carbon (C), Hydrogen (H), Oxygen (O), Nitrogen (N), phosphorus (P), and sulfur (S)
- Deoxyribonucleic acid (DNA), fats, proteins, and carbohydrates.

Unity of Form and Function

Cellular Organization

- Cells are the basic structural and functional unit of living bodies.
- Nervous, Muscle, and Epithelial cells



Tissue Organization

- Tissues are groups of cells that work together to perform a particular function.
- Epithelial, Connective, Muscle, and Nervous tissues

Organ Organization

- Organs are groups of tissues that work together and tend to have specific shapes.
- Ex. the Heart

Organ-system Organization

- This is the level in which groups of organs work together to complete complex tasks.
- Ex. Digestive system, Urinary system, etc.

Organismal Organization

- The study of the body at the entire living organism. This is viewing the body as a complete unit, rather than a sum of its parts.

Basic Life Processes

- Metabolism
- Responsiveness
- Movement
- Growth
- Differentiation
- Reproduction

Basic Life Processes

- Metabolism
  - The sum of all the chemical processes in the body
  - Catabolism – breaking down reactions
  - Anabolism – building reactions
- Responsiveness
  - The ability of the body to detect and respond to changes.

Basic Life Processes

- Movement
  - The motion of the whole body down to movement within individuals cells.
- Growth
  - The increase in size of an organism by either an increase in cell size, an increase in the number of cells, or both.

Basic Life Processes

- Differentiation
  - Development of an unspecified cell into a specialized one.
- Reproduction
  - The formation of new cells for growth, repair, or replacement, or the productions of a new individual.

Genes Underlie Common Design Between Organisms

House Mouse
Mus musculus

Human
Homo sapiens

Homeostasis

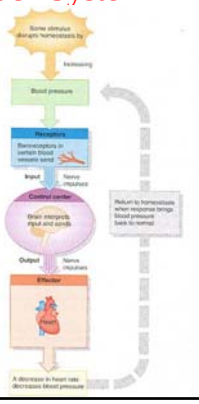
- The process of creating an equilibrium (balance) within the body due to the constant interaction of various processes and systems.
- Ex. Control of glucose in the blood around 70 to 110 mg/100 ml blood.

Control of Homeostasis

- Negative Feedback
- Positive Feedback
- Based on the interaction of a:
  - Receptor – monitors for changes and sends input to a control center
  - Control center – processes signals from receptor and sends response output.
  - Effector – receives output from control center and produces a response or effect.

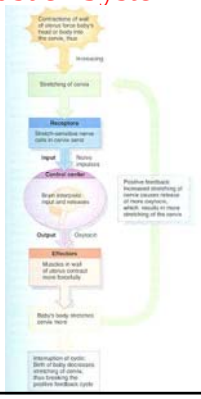
Negative Feedback System

- Reverses the change in a controlled system



Positive Feedback System

- Strengthens or reinforces a change in a controlled system



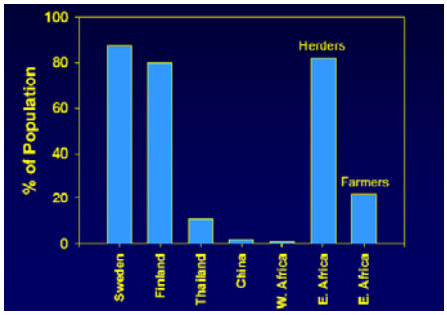
Homeostatic Imbalances

- Disorder – any abnormality of structure or function
- Disease – an illness characterized by a recognizable set of symptoms.
- Problems can be caused by ones environment or genetic background.

Evolution of Lactose Tolerance

Ancient cultures shifted to a pastural lifestyle.

Lactose Digesters in Human Populations



How to Cope?

- Invention of Lact-Aid