

Jan 3, 10

What is Physiology?

The goal of physiology is to explain the physical and chemical factors for the origin and progression of life

OR

How animals work!

Disciplines: Cellular Physiology, Developmental Physiology, Neural, Renal, Muscle, Cardiovascular..... Physiology

Medical Physiology or Pathophysiology - abnormal physiology as the result of disease

Comparative, Animal or Integrative Physiology - how animal adapt to "abnormal" environments or life histories.

Also environmental physiology, evolutionary physiology and physiological ecology

Biology 2A03- 2011

Lecture 1
Introduction to Physiology
&
Homeostasis

Jeecht @ mcmaster

Quizzes: Jan 31
mar 7
mar 28
35 mca

Textbook
4th ed.



4000-5000m
10% O₂



Goldfish

0% O₂!

→ Lactate converted to ethanol



68 - 81°C
2000-3000m
High H₂S

Hierarchical organization of the body

| | |
|------------------|--|
| Cells | Differentiated and specialized 1) muscle, 2) nerve, 3) epithelial 4) connective cells |
| Tissues | Aggregate of specialized cells 1) muscle, 2) nerve, 3) epithelial 4) connective tissues |
| Functional units | Subunits of an organs (e.g. multiple nephrons in a kidney) |
| Organs | Composed of the 4 tissue-types in different proportions and patterns |
| Organ Systems | A collection of organs that function together e.g. Circulatory System = heart, blood vessels, blood |
| Organism | |

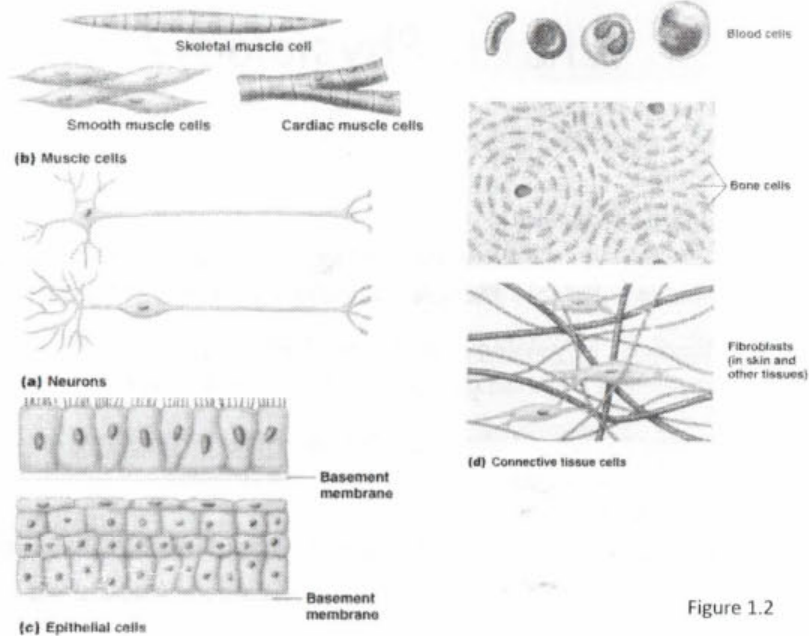


Figure 1.2

Hierarchical organization of the body

Cells: in humans over 200 distinct kinds

- 1) **Muscle cells:** specialized for contraction to produce movement
- 2) **Nerve cells:** generate and propagate electrical signals
- 3) **Connective tissue cells:** connect and support body structures
e.g. bone, collagen, cartilage
- 4) **Epithelial cells:** secretion and absorption; protective role
e.g. skin

Subtypes can exist:

- Muscle - skeletal, movement of limbs and skin
- cardiac, movement of heart
- smooth, dilation of blood vessels

Collection of organs that work together to accomplish a particular task

Table 1.1: Organ Systems

| System | Some organs/tissues within system | Function |
|------------------|---|---|
| Endocrine | Hypothalamus, pituitary gland, adrenal gland, thyroid gland, parathyroid glands, thymus, pancreas | Provide communication between cells of the body through the release of hormones into 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 |
| Respiratory | Lungs, pharynx, trachea, bronchi | Bring oxygen into the body and eliminate carbon dioxide from the body |
| Urinary | Kidneys, ureters, bladder, urethra | Filter the blood to regulate acidity, blood volume, and ion concentrations; eliminate wastes |
| Gastrointestinal | Mouth, esophagus, stomach, small intestine, large intestine, liver, pancreas, gallbladder | Break down food and absorb it into the body |
| Reproduction | Gonads, reproductive tracts and glands | Generate offspring |
| Immune | White blood cells, thymus, lymph nodes, spleen, tonsils, adenoids | Defend the body against pathogens and abnormal cells |
| Integumentary | Skin | Protect the body from the external environment |

→ circulatory
→ kidney
→ neurophysio
→ respiration
→ muscle/skeletal

→ covered in course

→ fr. text