

PowerLecture:
Chapter 33
Animal Tissues and Organ Systems
Section 33.0: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online or click highlighted articles below (articles subject to change)

- Section 33.0: Stem Cell Information
- Section 33.0: Stem Cells in the Spotlight
- Section 33.0: EmCell Embryonic Cell Therapy Clinic
- Section 33.0: Demystifying Stem Cells. Mehmet Oz et al. *Saturday Evening Post*, Nov.–Dec. 2004.
- Section 33.0: This Boy's Life (stem cell transplant). Hamilton Cain. *Men's Health*, Mar. 2005.
- Section 33.0: The Promise of Stem Cells (today's options). Anne Nowlin. *RN*, Apr. 2005.

How Would You Vote?

The following is the question for this chapter. See national results below.

Should researchers start new stem cell lineages from embryos?

Impacts, Issues: Open or Close the Stem Cell Factories

- Stem cells – undifferentiated cells that can become any kind of tissue
- Laboratory embryonic stem cell lineages were established from cells removed from aborted embryos
- Possibilities for embryonic stem cells are endless
 - repair damaged spinal cord

Section 33.1: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online or click highlighted articles below (articles subject to change)

- Section 33.1: Simulation and Reconstruction of 3-D Epithelial Structure
- Section 33.1: Epithelia Study Guide
- Section 33.1: Basement Membrane: More Matrix than Membrane! Mike Grant. *Biological Sciences Review*, Mar. 2001.
- Section 33.1: Study Points to Pivotal, Early Event in Development (most cancers epithelial in origin). *Genomics & Genetics Weekly*, Feb. 16, 2001.

Homeostasis

- Stable operating conditions in the internal environment
 - Brought about by coordinated activities of cells, tissues, organs, and organ systems
- #### Tissue
- A group of cells and intercellular substances that interact in one or more tasks
 - Four types
 - Epithelial tissue Muscle tissue
 - Connective tissue Nervous tissue
- #### Organs
- Group of tissues organized to perform a task or tasks
 - Heart is an organ that pumps blood through body
 - Heart consists of muscle tissue, nervous tissue, connective tissue, and epithelial tissue

Organ Systems

- Organs interact physically, chemically, or both to perform a common task
- Circulatory system includes the heart, the arteries, and other vessels that transport blood through the body

Epithelial Tissue

- Lines the body's surface, cavities, ducts, and tubes
- One free surface faces a body fluid or the environment

Simple Epithelium

- Consists of a single layer of cells
- Lines body ducts, cavities, and tubes
- Cell shapes:

Stratified Epithelium

- Two or more layers thick
- Functions in protection, as in skin
- Cells in the layers may be squamous, columnar, or cuboidal

Glands

- Secretory organs derived from epithelium
- Exocrine glands have ducts or tubes
- Endocrine glands are ductless

Cell Junctions

- Tight junctions prevent leaks
- Gap junctions connect abutting cytoplasm
- Adhering junctions cement cells together

Section 33.2: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online or click highlighted articles below (articles subject to change)

- Section 33.2: Connective Tissue Disorders
- Section 33.2: Cartilage Slides
- Section 33.2: Spring in Your Step? The Forces in Cartilage. *Science News*, July 6, 2002.
- Section 33.2: Connective Tissues: Matrix Composition and Its Relevance to Physical Therapy. Elizabeth Culav et al. *Physical Therapy*, Mar. 1999.
 - Connective Tissue
 - Most abundant tissue in the body
 - Cells are scattered in an extracellular matrix
 - Matrix is collagen and/or elastin fibers in a polysaccharide ground substance
- Soft Connective Tissues
- Specialized
- Connective Tissues

Blood

- Classified as a connective tissue because blood cells arise in bone
- Serves as the body's transport medium
- Red cells, white cells, and platelets are dispersed in a fluid medium called plasma

Section 33.3: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online or click highlighted articles below (articles subject to change)

- Section 33.3: Histology Lab—Muscle Types
- Section 33.3: How Muscles Work—Smooth Muscle
- Section 33.3: Cellular Mechanisms of Muscle Fatigue. R.H. Fitts. *Physiological Reviews*, Jan. 1994.

- Section 33.3: The Physical Effects of Lightning Injury. Ted Epperly et al. *Journal of Family Practice*, Sept. 1989.

Muscle Tissue

- Composed of cells that contract when stimulated
- Helps move the body and specific body parts
- Skeletal, cardiac, smooth

Skeletal Muscle

- Located in muscles that attach to bones
- Long, cylindrical cells are striated
- Cells are bundled closely together in parallel arrays

Smooth Muscle

- In walls of many internal organs and some blood vessels
- Cells are not striped and taper at the ends

Cardiac Muscle

- Present only in the heart
- Cells are striated and branching
- Ends of cells are joined by communication junctions

Section 33.4: Weblinks and InfoTrac

See the **latest Weblinks and InfoTrac articles** for this chapter online or click **highlighted articles below (articles subject to change)**

- Section 33.4: Neuroscience for Kids
- Section 33.4: Smart Glue (glial cells). Gary Slutsker. *Forbes*, Sept. 16, 1991.

Nervous Tissue

- Detects stimuli, integrates information, and relays commands for response
- Consists of excitable neurons and supporting neuroglial cells

Neurons

- Excitable cells
- When stimulated, an electrical impulse travels along the plasma membrane
- Arrival of the impulse at the neuron endings triggers events that stimulate or inhibit adjacent neurons or other cells

Coordination

- Coordination between muscle and nervous tissues allows this chameleon to calculate the distance and direction of its meal

Neuroglia

- Constitute more than half of the nervous tissue
- Protect and support the neurons, both structurally and metabolically

Section 33.5: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online or click highlighted articles below (articles subject to change)

- Section 33.5: HistoWeb

- Section 33.5: Six Critical Body Parts. Esquire, June 2002.
Tissue Research

- Lab-grown epidermis
- Designer organs

Primary Tissues

- In vertebrate embryos, cells become arranged to form three primary tissues
 - Ectoderm
 - Mesoderm
 - Endoderm

- These give rise to all adult tissues

Major Body Cavities

- Cranial cavity
- Spinal cavity
- Thoracic cavity
- Abdominal cavity
- Pelvic cavity

Planes of Symmetry

Major Organ Systems

- Integumentary
- Muscular
- Skeletal
- Nervous
- Endocrine

Section 33.6: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online or click highlighted articles below (articles subject to change)

- Section 33.6: American Academy of Dermatology
- Section 33.6: The Skin Cancer Foundation
- Section 33.6: Dermatology Cinema (Skinema)

- Section 33.6: Some of a Body's Crucial Functions Are Only Skin Deep. Albert Rosenfeld. *Smithsonian*, May 1988.
- Section 33.6: Fuzzy Science: Researchers Brush Up on the Biology of Hair. Rick Weiss. *Science News*, Mar. 16, 1991.

Integumentary System

- An animal's outer covering
- Examples
 - Chitin-hardened cuticle of many invertebrates
 - Vertebrate skin and its derivatives

Vertebrate Skin

- Two layers
 - Upper epidermis
 - Lower dermis
- Lies atop a layer of hypodermis

Functions of Human Skin

- Protects the body from injury, dehydration, UV radiation, and some pathogens
- Helps control temperature
- Receives some external stimuli
- Produces vitamin D

Sunlight Damages Skin

- UV light stimulates melanin production in skin; produces a tan
- Tan is the body's way of protecting itself against UV
- Prolonged sun exposure causes elastin fibers to clump, skin to age prematurely