Epithelial Tissues

- Characteristics
- Functions
- Specializations
**Simple Squamous Epithelium**

**LOCATIONS:** Mesothelia lining ventral body cavities; endothelium lining heart and blood vessels; portions of kidney tubules (thin sections of nephron loops); inner lining of cornea; alveoli of lungs

**FUNCTIONS:** Reduces friction; controls vessel permeability; performs absorption and secretion

**Stratified Squamous Epithelium**

**LOCATIONS:** Surface of skin; lining of mouth, throat, esophagus, rectum, anus, and vagina

**FUNCTIONS:** Provides physical protection against abrasion, pathogens, and chemical attack

**Simple Cuboidal Epithelium**

**LOCATIONS:** Glands: ducts; portions of kidney tubules; thyroid gland

**FUNCTIONS:** Limited protection, secretion, absorption

**Stratified Cuboidal Epithelium**

**LOCATIONS:** Lining of some ducts (rare)

**FUNCTIONS:** Protection, secretion, absorption

**Transitional Epithelium**

**LOCATIONS:** Urinary bladder; renal pelvis; ureters

**FUNCTIONS:** Permits expansion and recoil after stretching
Simple Columnar Epithelium

**LOCATIONS:** Lining of stomach, intestine, gallbladder, uterine tubes, and collecting ducts of kidneys

**FUNCTIONS:** Protection, secretion, absorption

Pseudostratified Ciliated Columnar Epithelium

**LOCATIONS:** Lining of nasal cavity, trachea, and bronchi; portions of male reproductive tract

**FUNCTIONS:** Protection, secretion, move mucus with cilia

Stratified Columnar Epithelium

**LOCATIONS:** Small areas of the pharynx, epiglottis, anus, mammary glands, salivary gland ducts, and urethra

**FUNCTION:** Protection
Connective

• Characteristics
• Functions
• Cells
This is the first connective tissue to appear in an embryo.

This sample was taken from the umbilical cord of a fetus.

Adipose Tissue
- **LOCATIONS**: Deep to the skin, especially at sides, buttocks, breasts; padding around eyes and kidneys
- **FUNCTIONS**: Provides padding and cushions shocks; insulates (reduces heat loss); stores energy

Reticular Tissue
- **LOCATIONS**: Liver, kidney, spleen, lymph nodes, and bone marrow
- **FUNCTIONS**: Provides supporting framework
**Dense Regular Connective Tissue**

**LOCATIONS:** Between skeletal muscles and skeleton (tendons and aponeuroses); between bones or stabilizing positions of internal organs (ligaments); covering skeletal muscles; deep fasciae

**FUNCTIONS:** Provides firm attachment; conducts pull of muscles; reduces friction between muscles; stabilizes relative positions of bones

![Tendon](image)

**Dense Irregular Connective Tissue**

**LOCATIONS:** Capsules of visceral organs; periosteum and perichondria; nerve and muscle sheaths; dermis

**FUNCTIONS:** Provides strength to resist forces applied from many directions; helps prevent overexpansion of organs such as the urinary bladder

![Deep dermis](image)

**Elastic Tissue**

**LOCATIONS:** Between vertebrae of the spinal column (ligamentum flavum and ligamentum nuchae); ligaments supporting penis; ligaments supporting transitional epithelia; in blood vessel walls

**FUNCTIONS:** Stabilizes positions of vertebrae and penis; cushions shocks; permits expansion and contraction of organs

![Elastic ligament](image)
Membranes

- **Mucous membranes** are coated with the secretions of mucous glands. These membranes line the digestive, respiratory, urinary, and reproductive tracts.

- **Serous membranes** line the ventral body cavities (the peritoneal, pleural, and pericardial cavities).

- **The cutaneous membrane**, or skin, covers the outer surface of the body.

- **Synovial membranes** line joint cavities and produce the fluid within the joint.
Muscle Tissue

- Characteristics
- Function
Nervous

- Characteristics
- Functions
Tissue Injury and Repair

Tissues are not isolated; they combine to form organs with diverse functions. Therefore, any injury affects several types of tissue simultaneously. To preserve homeostasis, the tissues must respond in a coordinated way. The restoration of homeostasis involves two related processes: inflammation and regeneration.

**Mast Cell Activation**
When an injury damages connective tissue, mast cells release a variety of chemicals. This process, called mast cell activation, stimulates inflammation.

**Exposure to Pathogens and Toxins**
Injured tissue contains an abnormal concentration of pathogens, toxins, waste products, and the chemicals from injured cells.

**Increased Blood Flow**
In response to the released chemicals, blood vessels dilate, increasing blood flow through the damaged tissue.

**Increased Oxygen and Nutrients**
Increased oxygen and increased blood flow result in enhanced delivery of oxygen and nutrients.

**Increased Phagocytes**
Phagocytes in the tissue are activated, and they begin engulfing tissue debris and pathogens.

**Removal of Toxins and Wastes**
Enhanced circulation carries away toxins and waste products, distributing them to the kidneys for excretion, or to the liver for inactivation.

**Regeneration**
Regenerative repair occurs after the damaged tissue has been stabilized and the inflammation has subsided. Fibroblasts move into the area, laying down a collagenous framework known as scar tissue. Over time, scar tissue is usually "remodeled" and gradually assumes a more normal appearance.

**Inflammation Subsides**
Over a period of hours to days, the cleanup process generally succeeds in eliminating the inflammatory stimulus.

[Image: http://www6.ufrgs.br/favet/imunovet/molecular_immunology/inflammation_cartoon.jpg]