TISSUES

Muscle & Nervous
Features
- Highly cellular
- Well vascularized

Functions
- Produces movement
- Maintains posture
- Produces heat
MUSCLE TISSUE

3 Types

A Skeletal muscle

B Cardiac muscle

C Smooth muscle

Unit of muscle contraction
Muscle fiber
Nucleus

Muscle fiber
Junction between two cells
Nucleus

B Cardiac muscle

C Smooth muscle
MUSCLE TISSUE

- Skeletal muscle
  - Striated
  - Produces gross body movements
  - Voluntary
(a) Skeletal muscle

Description: Long, cylindrical, multinucleate cells; obvious striations.

Function: Voluntary movement; locomotion; manipulation of the environment; facial expression; voluntary control.

Location: In skeletal muscles attached to bones or occasionally to skin.

Photomicrograph: Skeletal muscle (approx. 460x). Notice the obvious banding pattern and the fact that these large cells are multinucleate.
- Smooth muscle
  - Visceral muscle
  - Spindle shaped cells
  - No striations
  - Involuntary
(c) Smooth muscle

Description: Spindle-shaped cells with central nuclei; no striations; cells arranged closely to form sheets.

Function: Propels substances or objects (foodstuffs, urine, a baby) along internal passageways; involuntary control.
Location: Mostly in the walls of hollow organs.

Photomicrograph: Sheet of smooth muscle (200x).
Cardiac muscle
- Striated
  - Intercalated discs = gap junctions
- Electrical impulses
  - Involuntary
## (b) Cardiac muscle

**Description:** Branching, striated, generally uninucleate cells that interdigitate at specialized junctions (intercalated discs).

**Function:** As it contracts, it propels blood into the circulation; involuntary control.

**Location:** The walls of the heart.

**Photomicrograph:** Cardiac muscle (500X); notice the striations, branching of cells, and the intercalated discs.
Cardiac muscle cell
Skeletal muscle cell
Smooth muscle cell
MUSCLE MATCHING

- **Skeletal**
  - a. voluntarily controlled
  - b. striations visible microscopically
  - c. cell is spindle shaped
  - d. nuclei centrally located
  - e. nuclei located at cell margin
  - f. multinucleated cells
  - g. intercalated discs present
  - h. cells may be branched
  - i. can contract independently of nerve impulse
  - j. involuntary control
  - k. cells are cylindrical in shape

- **Visceral**

- **Cardiac**
NERVOUS TISSUE

- Neurons
  - Principle cell of the nervous system
    - Brain, spinal cord and peripheral nerves
  - Long, slender, branching
  - Rapid conduction of electrical impulses

- Support cells
  - Neuroglia
**Nervous tissue**

**Description:** Neurons are branching cells; cell processes that may be quite long extend from the nucleus-containing cell body; also contributing to nervous tissue are nonirritable supporting cells (not illustrated).

**Function:** Transmit electrical signals from sensory receptors and to effectors (muscles and glands) which control their activity.  
**Location:** Brain, spinal cord, and nerves.

Photomicrograph: Neurons (350x)
NERVOUS TISSUE

- Oligodendrocyte
- Ependymal cell
- Neuron
- Astrocyte
- Microglial cell
- Capillary