Myology

Gross Anatomy

MYOLOGY: GENERAL

- Muscle is derived from the term "mus" or "mys" for mouse.
- Myology – movement of muscles, characteristics of all organisms
- Main role of muscles is a device that converts the chemical energy of ATP (adenosine triphosphate) into mechanical energy of movement.

MYOLOGY: GENERAL

- Muscle is a specialized connective tissue
- It contracts (contractile units) to produce body movement in response to nerves or (humoral) hormones stimulation.

THE FUNCTIONS OF MUSCLES

Muscles provide motive power for:

- Locomotion [movement] &
- Movements of body contents
  - Respiration (diaphragm & intercostal)
  - Circulation
  - Alimentation (digestion – GI tract, defecation, & urination. Movement of body contents)
  - Child birth
  - Indication of emotional states

MYOLOGY: GENERAL

- Muscle fiber- Myocyte (organelles, fibers etc.) and Sarcomeres

- Components:
  - Protein fibers actin & Myosin
  - Microfilaments
  - Glycogen
  - Deposit of myelin &

MYOLOGY: GENERAL

- Fascia is a sheet or band of fibrous connective tissue
  - Attaching skin to underlying tissues
  - Invests muscles, tendons, ligaments and certain organs

TYPES OF FASCIA

- Superficial fascia (subcutis) or (areolar)
  - Below the skin
  - Principal sites for the storage of fat
    - S/C injections are made into this tissue
- Deep fascia
  - Tougher fibrous sheets
  - Fuses to bones
  - Penetrates between muscles,
    - Assists return of blood and lymph to heart (contraction of muscle pushes blood back)

MYOLOGY: FUNCTIONS OF FASCIA

- Attachment of skin and muscles
- Pathway for vessels and nerves
- Containing sheaths for muscles to operate
- Binds down and redirects tendon forces
- Fat storage
- It is encountered in surgery
  - Direction of spreading fluids and pus
  - Holds sutures securely in wound closure

MYOLOGY: GENERAL

Muscle is grouped into one of three types:

- Smooth muscle
- Cardiac muscle
- Skeletal muscle
  - Voluntary (usually subject to conscious control)
  - Striated

  - Diaphragm and cremaster don't under control its skeletal muscles

SKELETAL MUSCLE

- ~ 50% of the body is the carcass

- All attached to bone
  - Not limited to the skeleton.
  - Found in the pharynx and esophagus.

SKELETAL MUSCLE

Functions:

1. Movements of animal body
   - Prevent unwanted movements (stabilizing joints)
   - Movement: most obvious function is to move the body, as in walking, running, writing, chewing, and swallowing. Stimulation maintains a state of muscle contraction "tonus" for movement of blood & lymph.
   - Posture: Skeletal muscles maintain posture by stabilizing the flexible muscles.
2. Control of body openings and passages "maintain continence":
   - Ring-like sphincter muscles
     (eyelids, pupils, mouth, urethra , & anus)

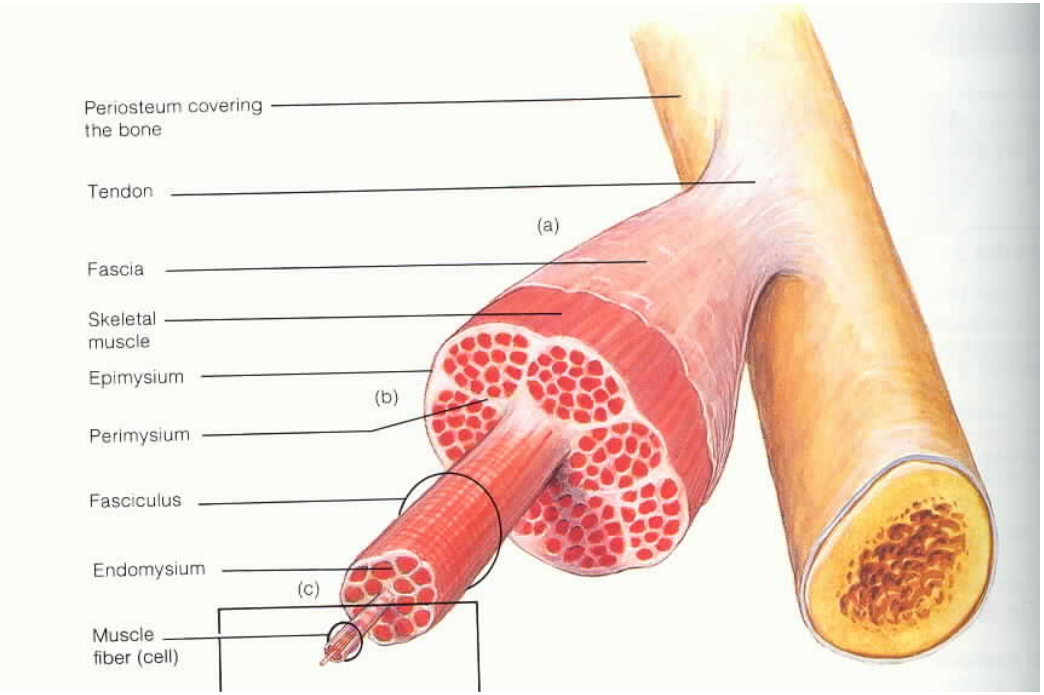
SKELETAL MUSCLE

Functions (cont.):

3. Generate heat by shivering.
   - Homeostasis – maintain proper body function with proper environment (i.e. enzymes need to function)
- Body support and maintenance of posture (tonus)
   - Certain muscles work in opposition to gravity.

SKELETAL MUSCLE

- Connective tissues components of muscles:
- Myofiber (muscle cell) - endomysium= within
- Fascicle 'bundle' = groups of M. fibers -perimysium= around.
- Muscle is invested by a c.t. sheet - epimysium= upon

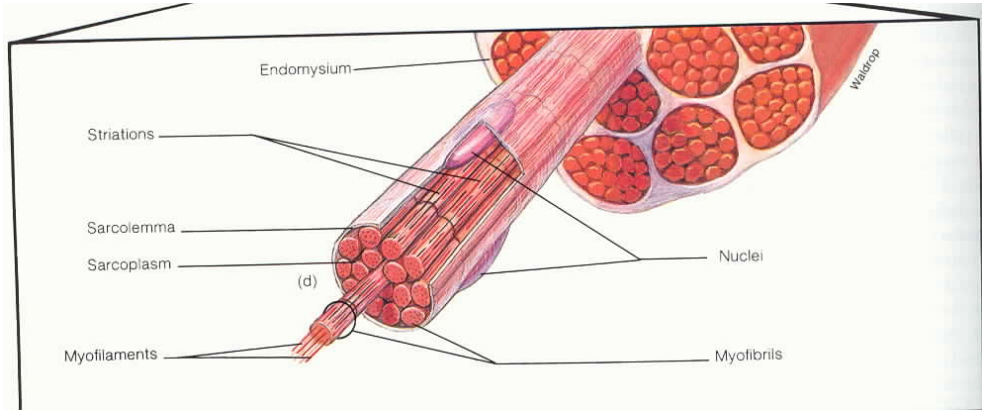


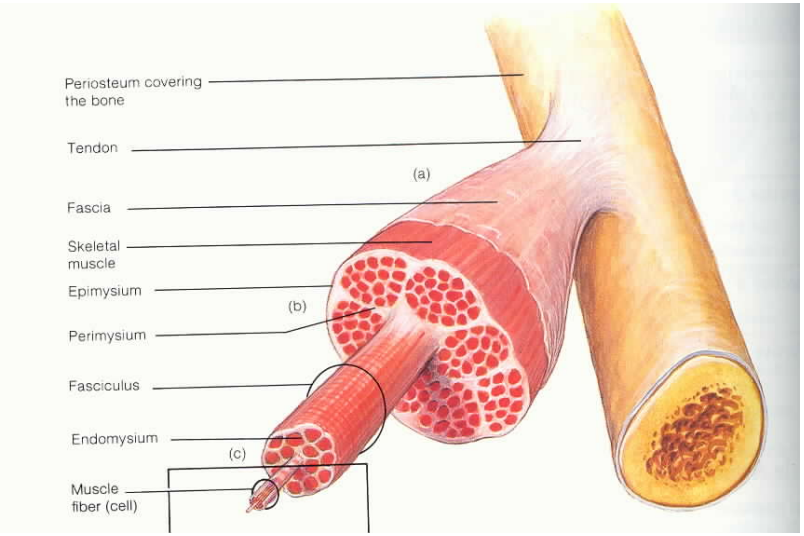
SKELETAL MUSCLE

- Contracting muscle fibers would not be effective if they worked as isolated units.
- Each fiber is bound to adjacent fibers to form bundles, and the bundles in turn are bound to other bundles.
- With arrangement, the contraction in one area of a muscle works in conjunction with contracting fibers elsewhere in the muscle.
- The binding substance within muscles is the associated loose C.T.

SKELETAL MUSCLE

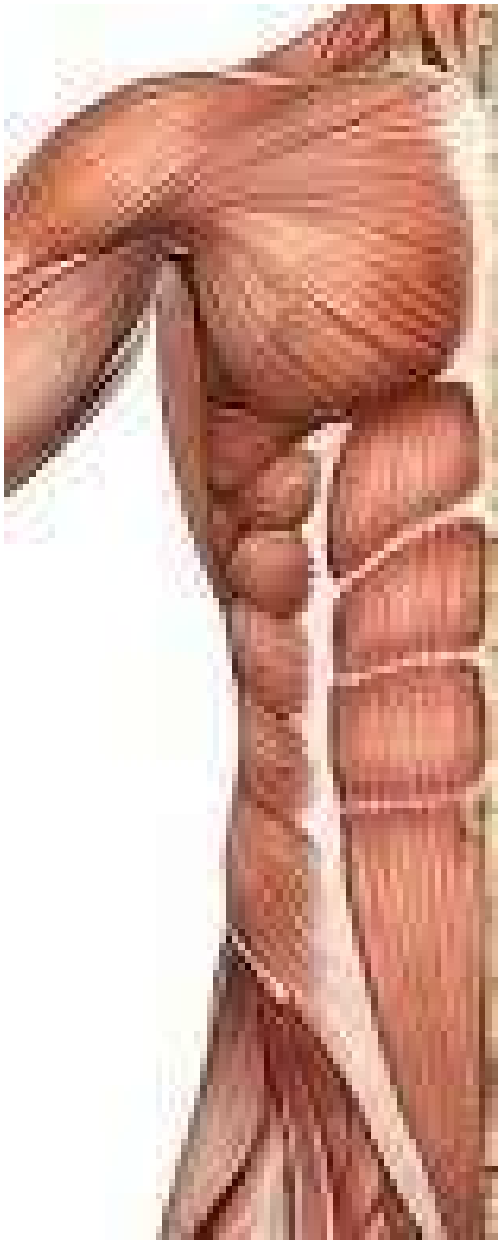
- Structure:
- These C.Ts merge at the end of the muscle "belly" to form the tendon – dense regular connective tissue – attach to bone.
- What is the importance of these c.t. arrangements?
  - To make sure they all contract simultaneously





MYOLOGY GENERAL DEFINITIONS:

- Origin: fixed attachment; usually proximal-most on limb
- Insertion: mobile attachment; usually distal-most on limb
- Belly: *(gaster)*- wide mid-region of muscle.
- Head: *(ceps)*- grossly separable parts of a given named muscle; usually having different attachments (biceps, triceps, or quadriceps)



NAMING MUSCLES

- Attachments: cleidobrachialis.
  - Cleido Clavicle
- Shape: Teres minor
  - Rounded muscle
- Size: Teres major
  - Large. Along with latissium dorsi
- Function: Supinator

- Location/position: deep digital flexor (DDF) (SDF - Superficial digital flexor)

TYPES OF MUSCLE ATTACHMENTS

- Tendon- D.R.C.T. in compact cylinder (tensile strength) attaching muscle to periosteum of bone

- Aponeurosis - broad, flat tendon sheet-like union

MYOLOGY: GENERAL

Types of muscle attachments:

- Fascia- common of superficial muscles (like cutaneous trunci)
- Periosteum (fleshy)- "appears" directly to bone (not directly attached, must be through periostuem)

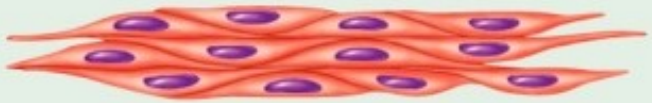
MUSCLE ATTACHMENTS

- Accessory structures [necessary for muscle function]:
- Tendons:
  - Low metabolic activity (poorly vascularized)
  - Tough, but can be damaged by excessive pressure or friction, when change direction over bony prominences

SMOOTH MUSCLE

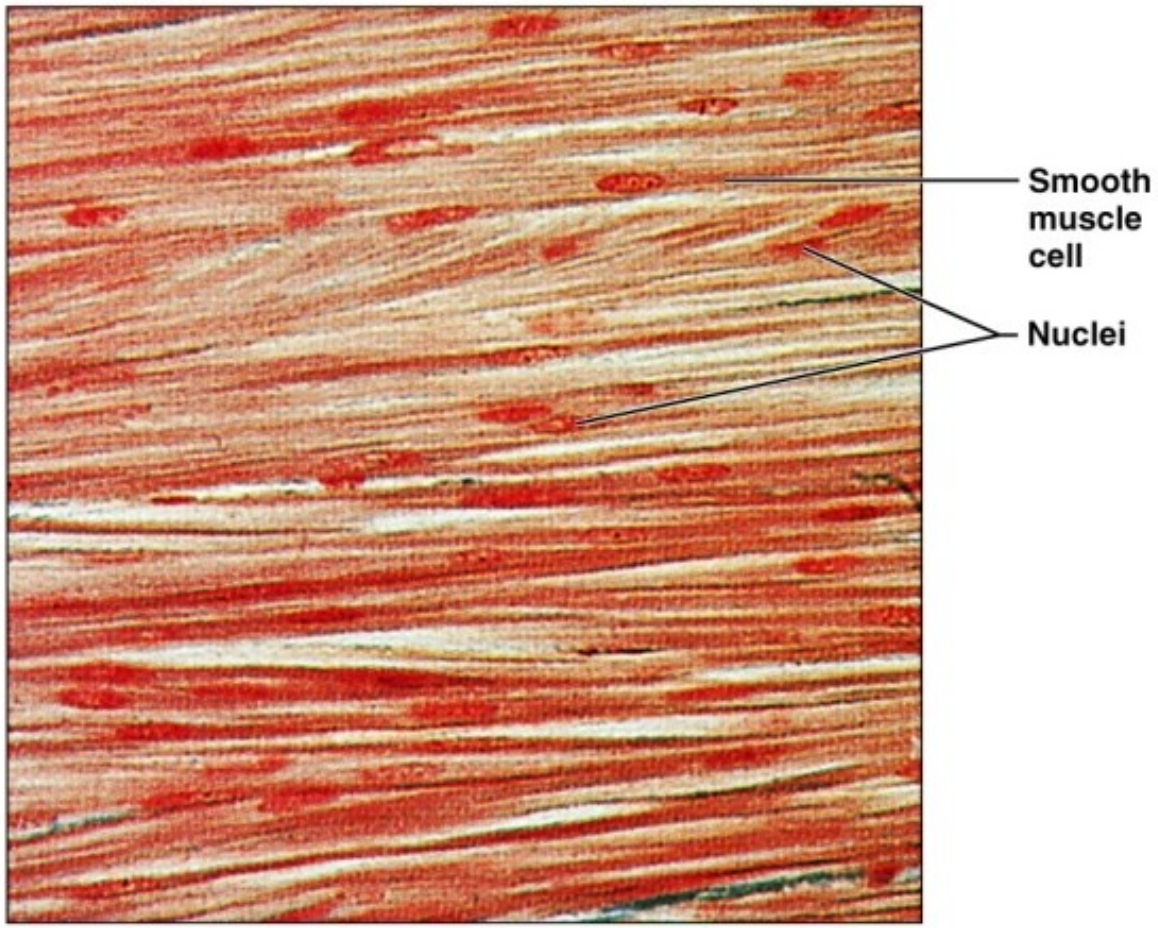
(c) Smooth muscle

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.

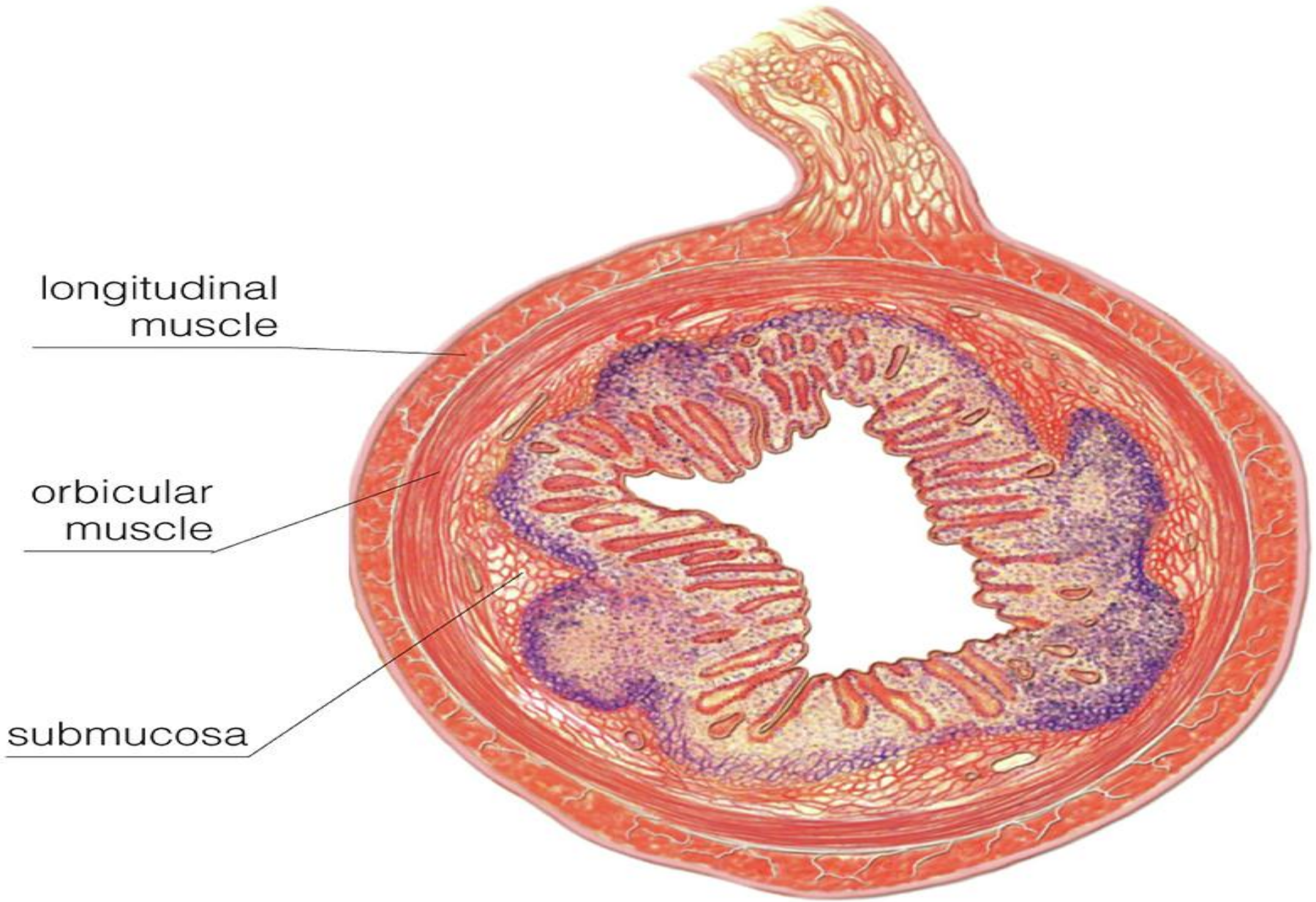
Location: Mostly in the walls of hollow organs.



Photomicrograph: Sheet of smooth muscle (approx. 600×).

SMOOTH MUSCLE

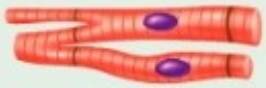
- Non-striated (homogenous or haphazardly arranged). Filaments are not organized in order.
- Involuntary innervation (ANS) and use; humoral control.
- Found around blood vessels, gut, bronchi, bladder, eye, glands, etc. (visceral organs not attached to skeleton)
    - Arrector pili muscle??? – in the skin to raise hair
    - Detrusor muscles??? – fibers within the urinary bladder


longitudinal muscle
orbicular muscle
submucosa

CARDIAC MUSCLE

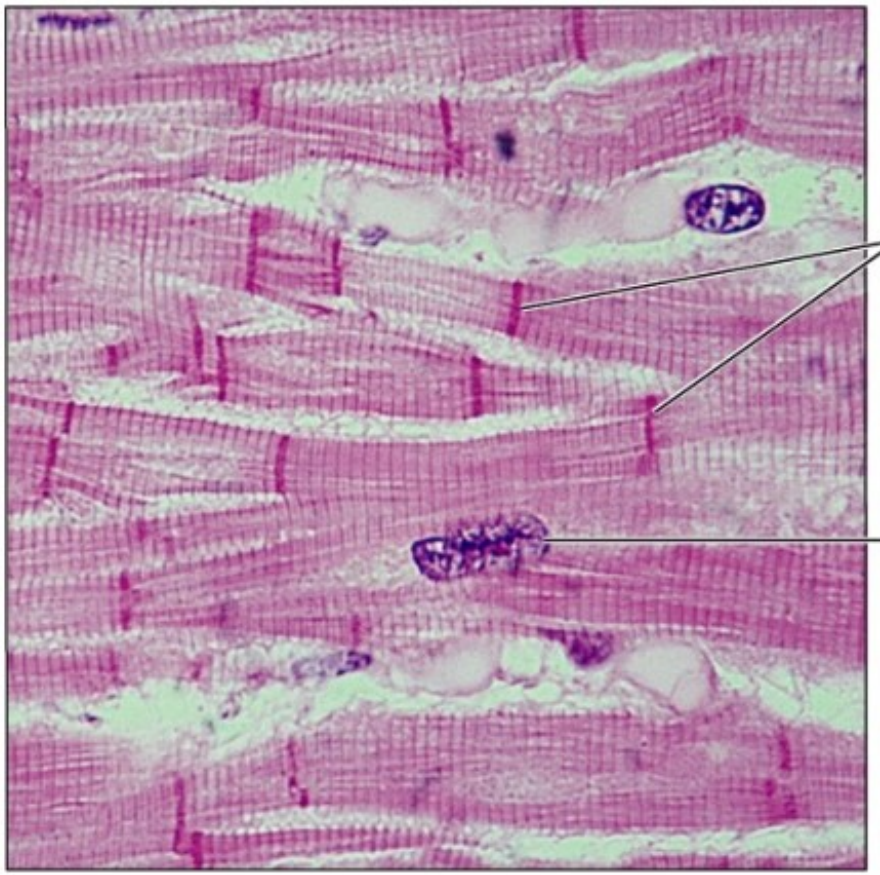
(b) Cardiac muscle

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 (800×); notice the striations, branching of cells, and the intercalated discs.

CARDIAC MUSCLE

- Striated organized fibers
- Involuntary innervation and use.
- Joined at intercalated disc
- Limited to myocardium (heart) and base of great vessels.
- Generates its own contractions autonomously, & regulate the frequency of contractions rhythmically. (doesn't need nerve to beat)
- Purkinje fibers: conducting of impulses

Myology

The end