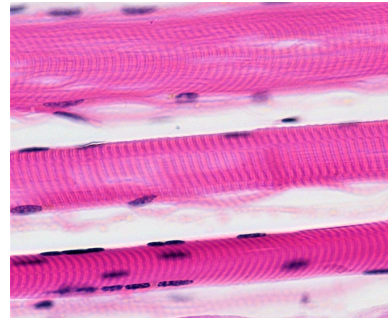
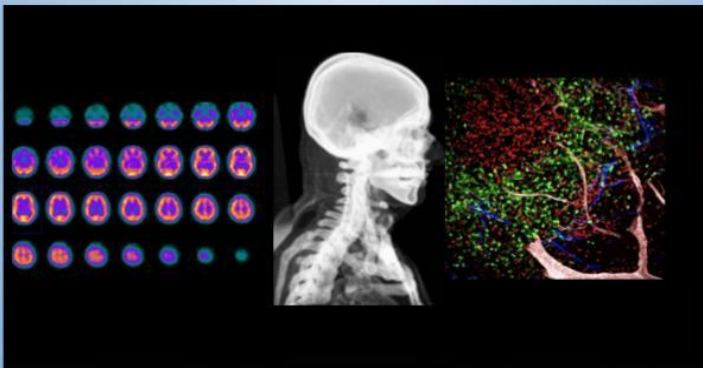


# Muscular System: Muscle Tissue Types

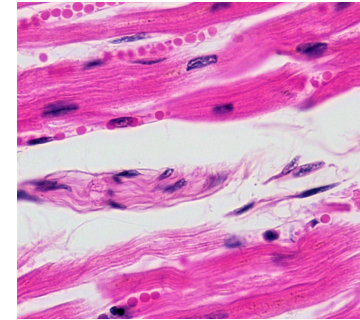
Introduction to Human Anatomy  
& Physiology: A Multilingual  
Approach

**An Open Educational Resource**

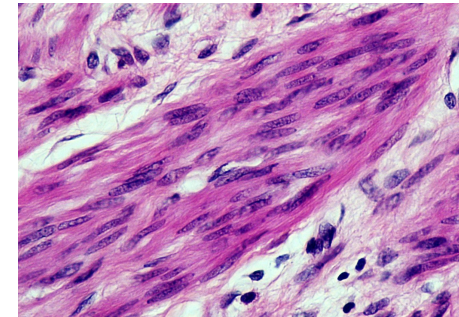
Rachel Sanchez Thwing, Hugh Jarrard,  
Ann DeChenne, Kiana Pigao, Zach  
Ellsworth



Skeletal



Cardiac



Smooth

[Skeletal](#), [Smooth](#), and [Cardiac Muscle](#) via Berkshire Community College Bioscience Image Library, CC0, via Wikimedia Commons

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# Lesson 2: Muscle Tissue and Physiology

## Learning Objectives:

Describe the structure and function of the three types of muscle tissue: their cellular structure, location, functional roles, and degree of conscious control



# See the Muscular System Wordlist!

- Can be found in accompanying materials to this lecture
- Materials are available in English, Spanish, Russian, Vietnamese, Filipino, East African French, Kiswahili (Swahili) and Chinese.

## Module 4 Muscular System Word List

### Microscopic Structure:

actin  
endomysium  
epimysium  
fascicle  
intercalated disc  
motor end-plate  
myofibril  
myosin  
perimysium  
sarcomere  
sarcolemma  
synaptic cleft  
T-tubule  
Thick filament (myosin)  
Thin filament (actin)  
Tropomyosin  
Troponin

### Muscle type:

Cardiac muscle  
Skeletal muscle  
Smooth muscle

### Major Muscles of the Body:

Orbicularis oculi m.  
Buccinator m.  
Orbicularis oris m.  
Sternocleidomastoid m.

Frontalis m.  
Temporalis m.  
Occipitalis m.  
Trapezius m.  
Latissimus dorsi m.  
Deltoid m.  
External oblique m.  
Rectus abdominis m.  
Pectoralis major m.  
Triceps brachii m.  
Biceps brachii m.  
Brachioradialis m.  
Supinator m.  
Pronator teres m.  
Quadriceps femoris  
Rectus femoris m.  
Vastus lateralis m.  
Vastus medialis m.  
Vastus intermedius m.  
Biceps femoris m.  
Gluteus maximus m.  
Tibialis anterior m.  
Gastrocnemius m.  
Soleus m.

### Muscle Actions:

abduction  
adduction  
flexion  
insertion

origin  
pronation  
supination

### Muscle contraction:

acetylcholine  
autorhythmicity  
contractility  
depolarize  
excitability  
excitation-contraction coupling  
motor unit  
neuromuscular junction (NMJ)  
neurotransmitter  
power stroke  
twitch  
tetanus  
twitch  
voltage-gated sodium channels  
wave summation

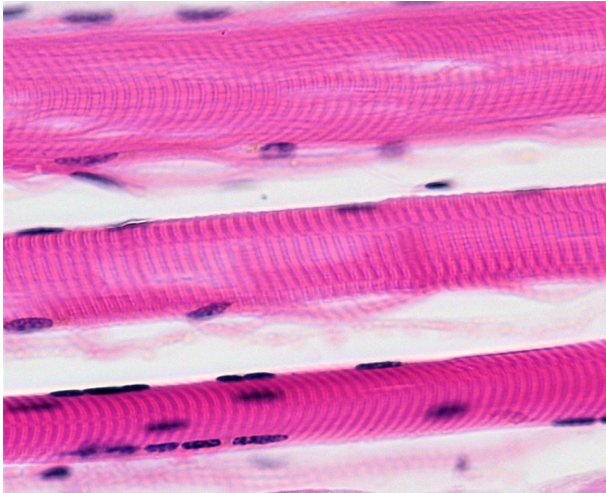
### Disruptions in Homeostasis:

atrophy  
fibrosis  
hypertrophy  
paralysis

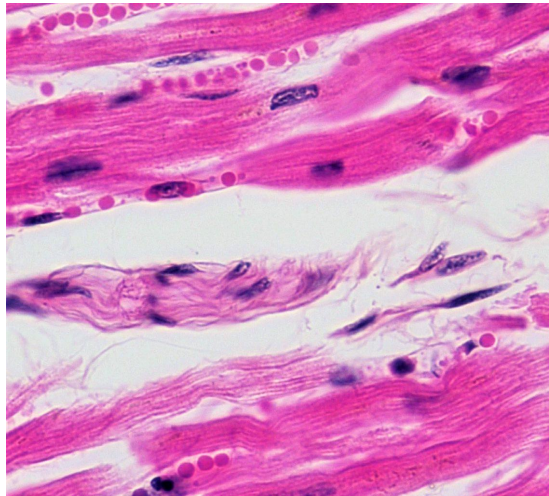


# Types of Muscle

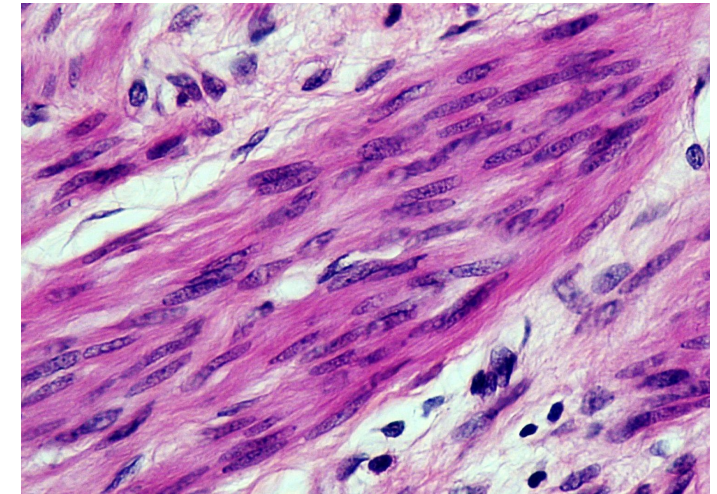
3 types of *muscle tissue* in the body



Skeletal



Cardiac

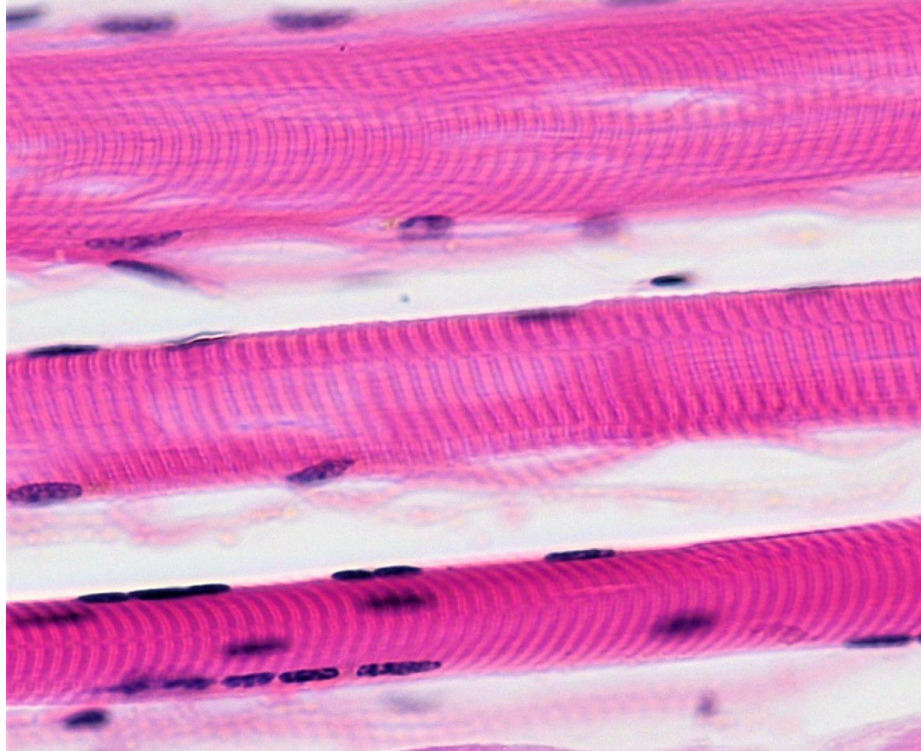


Smooth

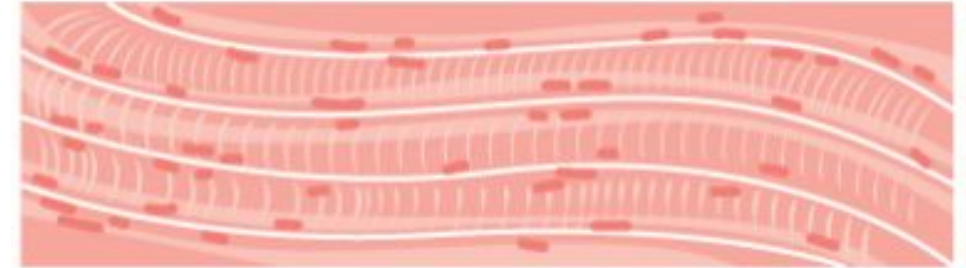
# Histology: Skeletal Muscle

Where is skeletal muscle found?

Does it function with or without conscious control?



Skeletal muscle features:  
Multinucleated  
Striated  
Muscle fiber



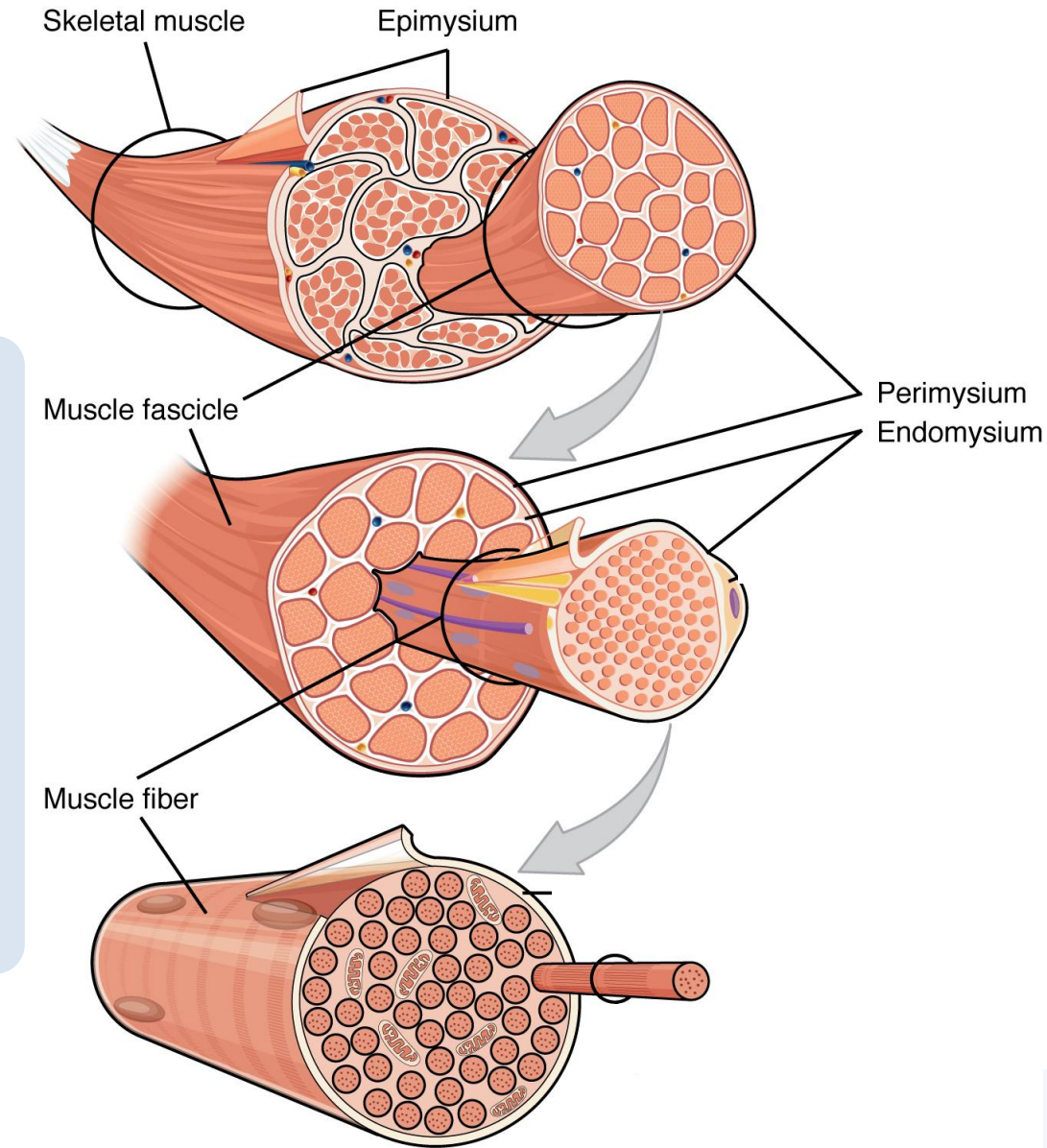
Made up of Individual, multinucleate, elongate cells (fibers)  
containing contractile elements (fibrils)



# Comparison: Skeletal Muscle

Wrapped by connective tissue:

- **endomysium**: surrounds individual **muscle fibers**
- **perimysium**: surrounds groups of fibers or **fascicle**
- **epimysium**: surrounds **entire muscle**



*Responsible for:*

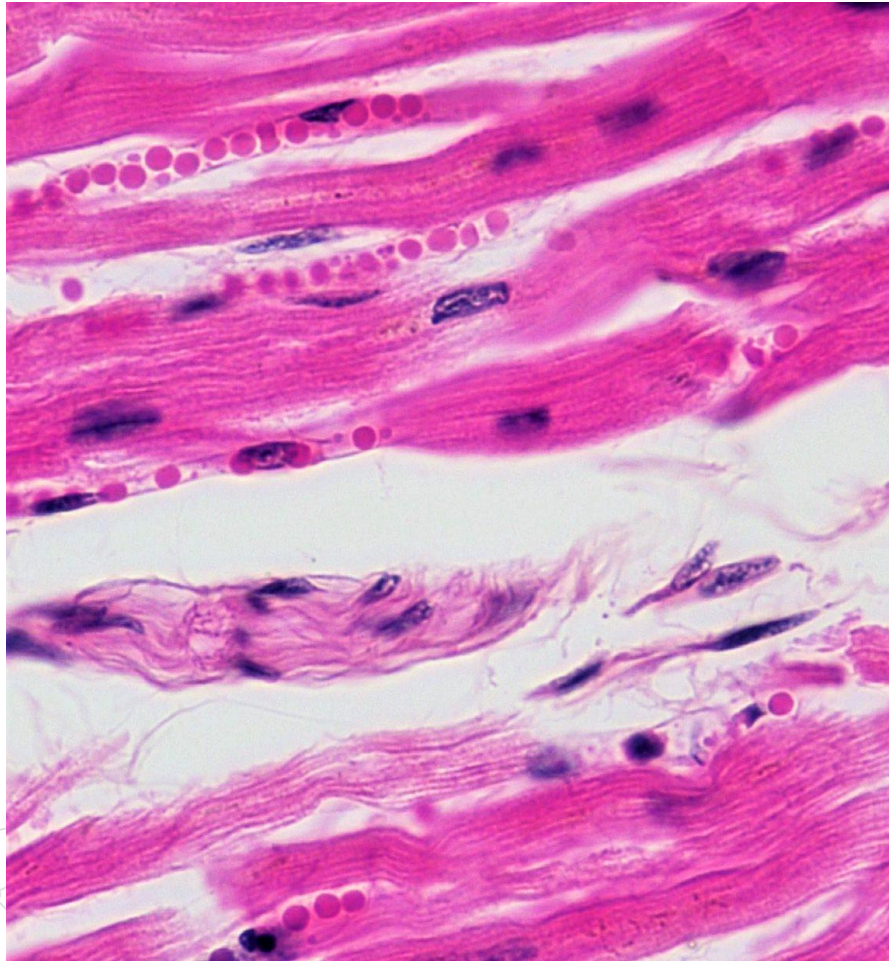
- **Voluntary Movement, Posture, Breathing**
- Each cell controlled by branch of a motorneuron

**Figure 10.3** The Three Connective Tissue Layers by Openstax College

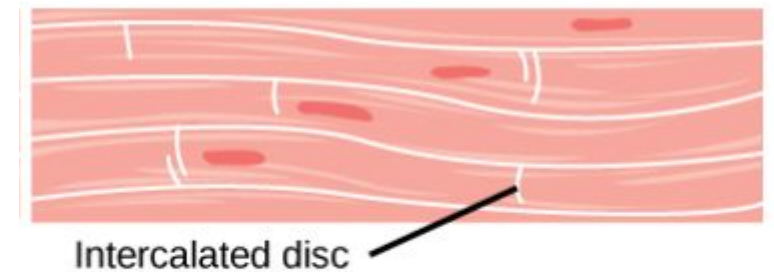
# Histology: Cardiac Muscle

Where is  
cardiac muscle  
found?

Does it  
function with  
or without  
conscious  
control?

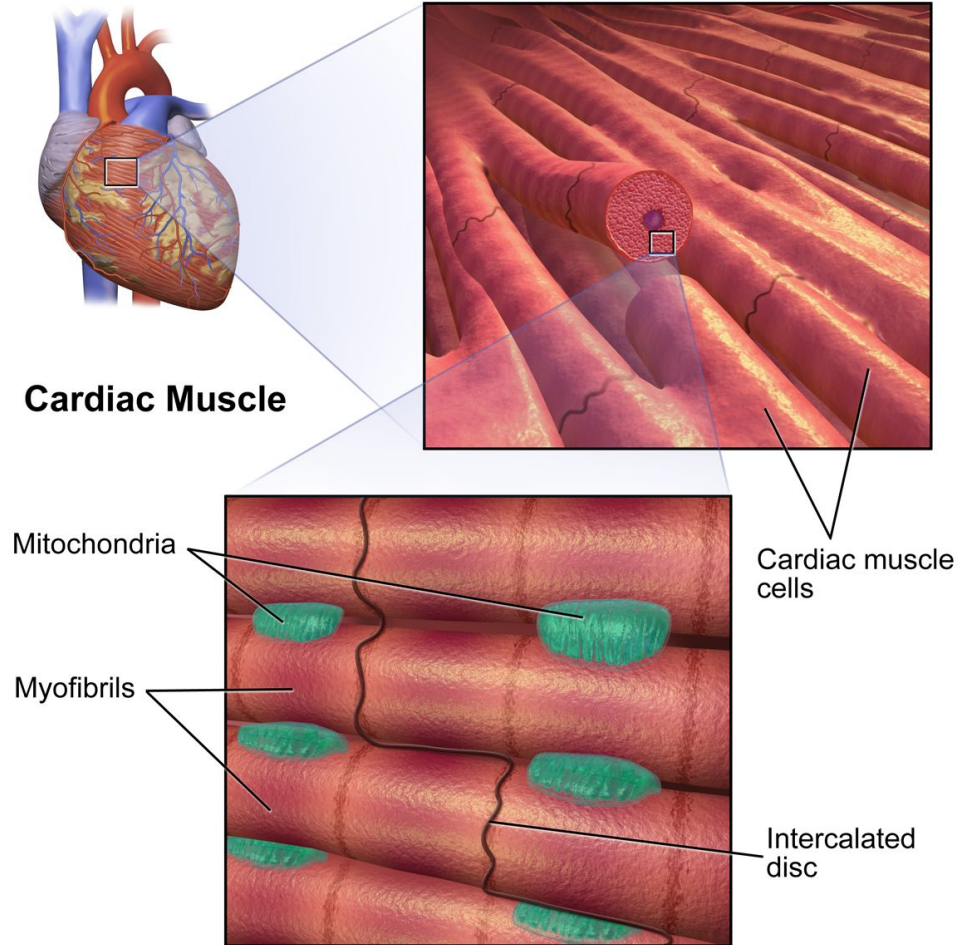


Cardiac muscle features  
Most have one nucleus  
Striated  
Intercalated discs



# Comparison: Cardiac Muscle

- **Found only in heart**
- Involuntary
- Autorhythmic -
  - The heart does not need input from the brain to contract



## ***Responsible for:***

- Maintaining Heartbeat
- Cells are electrically connected so they can contract as a functional unit

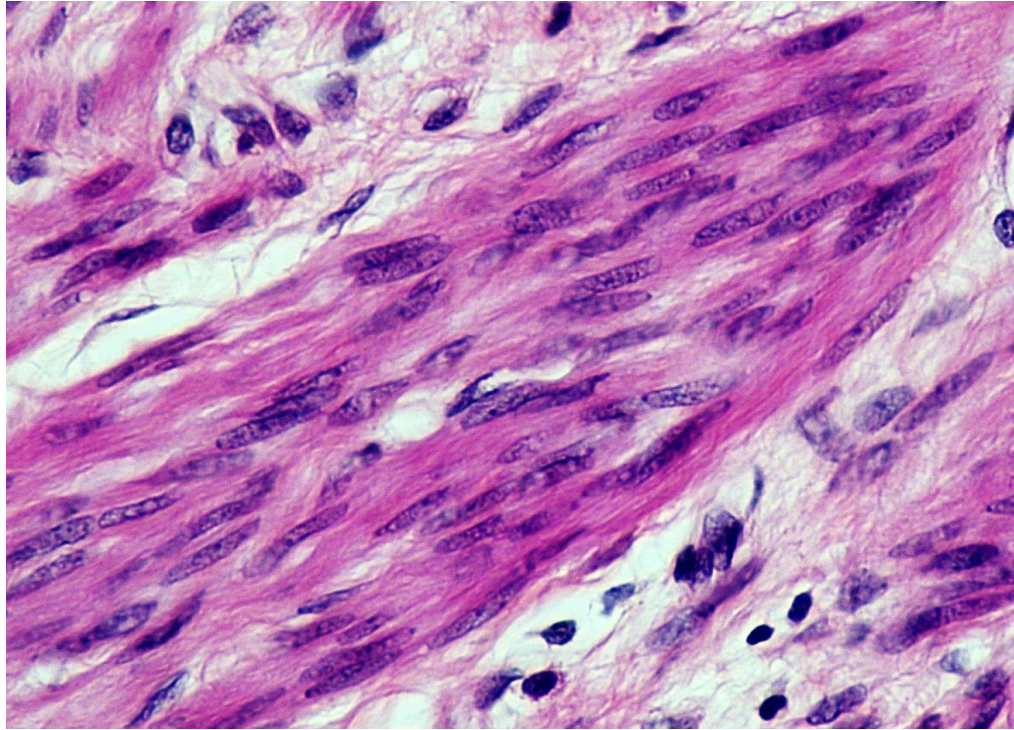
Cardiac Muscle by By BruceBlaus ,CC BY-SA 4.0, via [Wikimedia Commons](https://commons.wikimedia.org/wiki/File:Cardiac_Muscle.jpg)



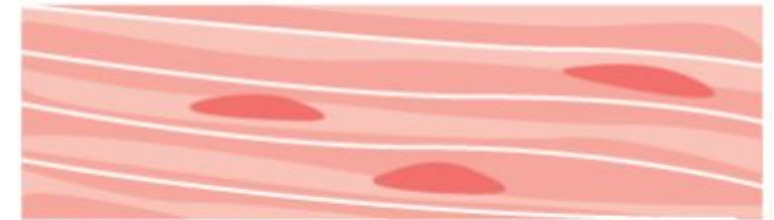
# Smooth Muscle Histology

Where is smooth muscle found?

Does it function with or without conscious control?

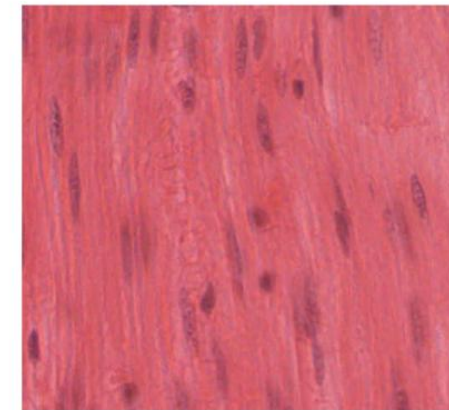
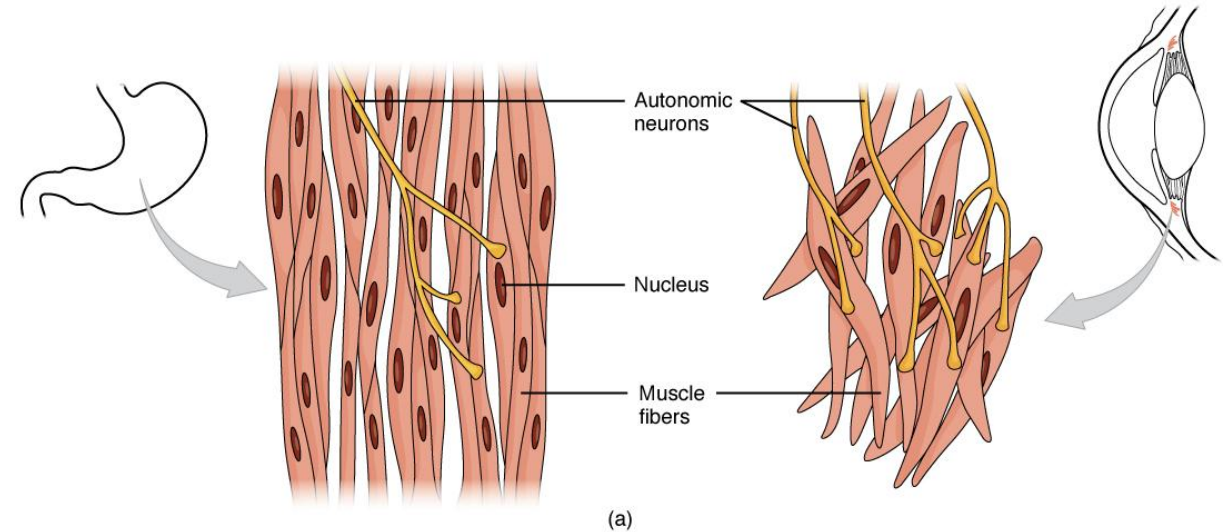


Smooth muscle features  
One nucleus  
NO Striations  
Tapered Ends



# Comparison – Smooth Muscle

- Found in walls of hollow organs (stomach, bladder) and blood vessels
- Responsible for muscular waves of contraction (peristalsis) that pushes substances through tubes
- Involuntary
- Contracts in response to:
  - Nervous stimulation
  - Organ stretch
  - Hormones
  - CO<sub>2</sub>, O<sub>2</sub>, and pH levels



**Smooth Muscle New** By OpenStax, CC BY 4.0, via [Wikimedia Commons](https://commons.wikimedia.org/wiki/File:Smooth_muscle_new.jpg)

# Lesson 2: Muscle Tissue and Physiology Summary

## Learning Objectives:

Describe the structure and function of the three types of muscle tissue: their cellular structure, location, functional roles, and degree of conscious control

