

Basic anatomic structures 2

Muscles, vessels, lymphatics, mucous and serous membranes

Curricular Objectives

By the end of this session students are expected to:

Theory

1. Identify the three types of muscle and describe the basic structure of each type
2. Describe the shape and attachment patterns of skeletal muscles
3. Describe the parameters used in naming skeletal muscles
4. Outline the pattern of innervation of skeletal muscle
5. Define muscle tone and describe its role in clinical examination
6. Discuss the terms used to describe the actions of skeletal muscles
7. List the types of blood vessels and outline their roles in transporting blood
8. Define anastomosis and compare their types
9. Outline the differences between the types of end arteries with an example for each
10. Describe the systemic, pulmonary and portal circulations
11. Outline the arrangement of lymphatic system and its role in cancer spread
12. Compare mucous and serous membranes

Practical

1. Distinguish the three main types of muscles
2. Identify some of skeletal muscles and outline their general action
3. Distinguish the three main types of blood vessels and their anastomosis
4. Trace the parts forming the systemic, pulmonary and portal circulations
5. Identify the axillary lymph nodes
6. Identify pleura and pericardium

Selected references and suggested resources

- ✦ Clinical Anatomy by Regions, Richard S. Snell, 10th edition
- ✦ Grant's Atlas of Anatomy, 13th Edition
- ✦ McMinn's Clinical Atlas of Human Anatomy, 7th Edition
- ✦ [Anatomy for Babylon medical students](#) (Facebook page)
- ✦ [Anatomy for Babylon medical students](#) (YouTube channel)
- ✦ [Human Anatomy Education](#) (Facebook page)
- ✦ [Human anatomy education](#) (YouTube channel)

Feedback and suggestions

- ✦ <http://goo.gl/forms/SjyjGeUpvH>

Session check list

❖ **Clinical importance**

- Skeletal muscles can become paralyzed, hypotonic or hypertonic. Also, they can undergo atrophy or hypertrophy. Physicians need a good background knowledge of the muscle location, nerve supply as well as the actions it produce so they can diagnose muscle disease
- Blood vessels injuries are commonly encountered as emergency cases. The ability of the clinician to locate and identify the injured blood vessel and its type is directly related to the depth of anatomical knowledge

❖ **Muscles**

- There are three types of muscle within the body, skeletal, smooth, and cardiac
- In general, skeletal muscles form the muscular system
- Cardiac and smooth muscles are parts of other systems such as the cardiovascular, alimentary, genitourinary, integumentary, and visual systems.

❖ **Skeletal muscles**

- They contract to move the skeleton
- They attach to bones, cartilages, ligaments, fascia, organs (e.g., the eyeball), skin (such as facial muscles) and mucous membranes (intrinsic tongue muscles)
- They consist of a belly that is attached on either ends by tendons, raphe or aponeurosis
- Their names contain terms referring to one or more of the following features (shape, size, position, depth, attachments, actions, number of heads). Understanding the meanings of each term may help give a lot of information regarding these features
- They are supplied by motor and sensory nerves
- All skeletal muscles have a tone (tonus) even when relaxed which means they are slightly contracted without producing movements. This tone helps maintain joint stability, body posture. It is absent in deep sleep or under general anesthesia or after injury to the nerve supplying the muscle
- During a specific movement, skeletal muscles act in one of the following ways (agonist, antagonist, synergist, fixator)

❖ **Vessels**

- Blood vessels are concerned with distributing blood from the heart to the body and backward
- Arteries has no valves while many veins contain valves to prevent backflow of blood
- Arterioles and venules are considered as the smallest arteries and veins respectively
- Capillaries connects the arterioles to venules
- Anastomosis mean connection between two tubes
- End artery is a term given to an artery that is the only source of blood supply to a target tissue

❖ **Lymphatic system**

- Cancer can invade the body by *metastasis* to distant sites through blood or lymphatic system
- Lymph channels are widely distributed within the body
- Lymph is drained proximally toward the large veins in the neck
- Lymph nodes nearest to cancer site are first enlarged, for example cancer of the breast usually spread to the nearby lymph nodes of the axilla

❖ **Mucous and serous membranes**

	Serous membrane	Mucous membrane
1.	Lines body cavities and covers viscera	Lines the luminal surface of a viscera
2.	Parietal and visceral layers	Non
3.	Peritoneum, pericardium, pleura	EX: Mucosa of mouth

Lab activity list

For each task below, identify the listed structures then answer the related questions

❖ Task 1 (muscles)

- ✓ Cardiac (heart)
- ✓ Smooth (small intestine)
- ✓ Skeletal (belly, tendon, aponeurosis)
- ⊕ Which of these types of muscles is not under voluntary control?

❖ Task 2 (examples of skeletal muscles)

- ✓ Deltoid
- ✓ Pectoralis major
- ✓ Biceps brachii
- ✓ Gastrocnemius
- ⊕ Which of the above muscles has its name suggest it has two heads?
- ⊕ Which of the above muscles covers the largest surface area?
- ⊕ Which of the above muscles is essential in walking?

❖ Task 3 (vessels)

- Systemic circulation
 - ✓ Heart
 - ✓ Aorta
 - ✓ Superior and inferior vena cava
- Pulmonary circulation
 - ✓ Lungs
 - ✓ Pulmonary artery
- Portal circulation
 - ✓ Liver
 - ✓ Portal vein
- Anastomosis
 - ✓ Arterial anastomosis
 - ✓ Arteriovenous anastomoses
 - ✓ Anatomic/Functional end arteries
- ⊕ The blood goes out of the heart into two vessels, name them
- ⊕ The venous blood from small intestine passes to the _____ organ, through _____ vessel, before it reaches the systemic circulation

❖ Task 4 (membranes)

- ✓ Mucous membrane of mouth
- ✓ Pleura
- ✓ Pericardium
- ⊕ The parietal layer of the pleura covers the lungs. (true/false)
- ⊕ The pericardium is a mucous membrane. (true/false)

Review questions:

1. Compare the terms origin and insertion of skeletal muscles
2. What is the function of smooth muscles in the blood vessels?
3. Why there are no valves in the arteries in general?
4. What are the lymph nodes and how they are useful in clinical examination?
5. What is the main function of the serous membrane?

Homework:

1. The nerve supplying the biceps muscle was completely cut by a stab wound. Which of the followings will best describes the condition of the muscle after 6 months?
 - A. Paralyzed
 - B. Decreased tonus
 - C. Hypertrophied
 - D. Increased tonus
 - E. Paralyzed and atrophied
2. Fourth year medical students were discussing a case of heart attack (myocardial infarction) with their mentor; he asked the following open question ((If a coronary artery is blocked by thrombus, the target tissue supplied by that artery will undergo necrosis. Explain in anatomical terms why there will be no sufficient blood for the target tissue to stay alive?)). Can you answer this question for them?