كلية المستقبل الجامعة

قسم تقنيات التخدير

Anatomy

المرحلة الاولي

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Lecture Three : Basic structures in the body

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Basic structures in the body

Joints figure 2.13

A site where two or more bones come together is called a **joint. The ends of the bones sharing the joint are called articulating surface.**

Joints are classified according to the tissues that lie between the articulating ends: **fibrous joints, cartilaginous joints, and synovial joints.**

Fibrous Joints

The articulating surfaces of the bones are joined by fibrous tissue and thus very little movement is possible.

The sutures of the **vault of the skull and the inferior tibiofibular joints** are examples of fibrous joints.

Basic structure

Cartilaginous Joints

Cartilaginous joints can be divided into two types: **primary and secondary.**

A **primary cartilaginous joint** is one in which the bones are united by a plate or a bar of hyaline cartilage. Thus, the union between the 1st rib and the manubrium sterni is an example of such a joint. No movement is possible.

A **secondary cartilaginous joint** is one in which the bones are united by a plate of fibrocartilage and the articular surfaces of the bones are covered by a thin layer of hyaline cartilage.

Basic structures in the body

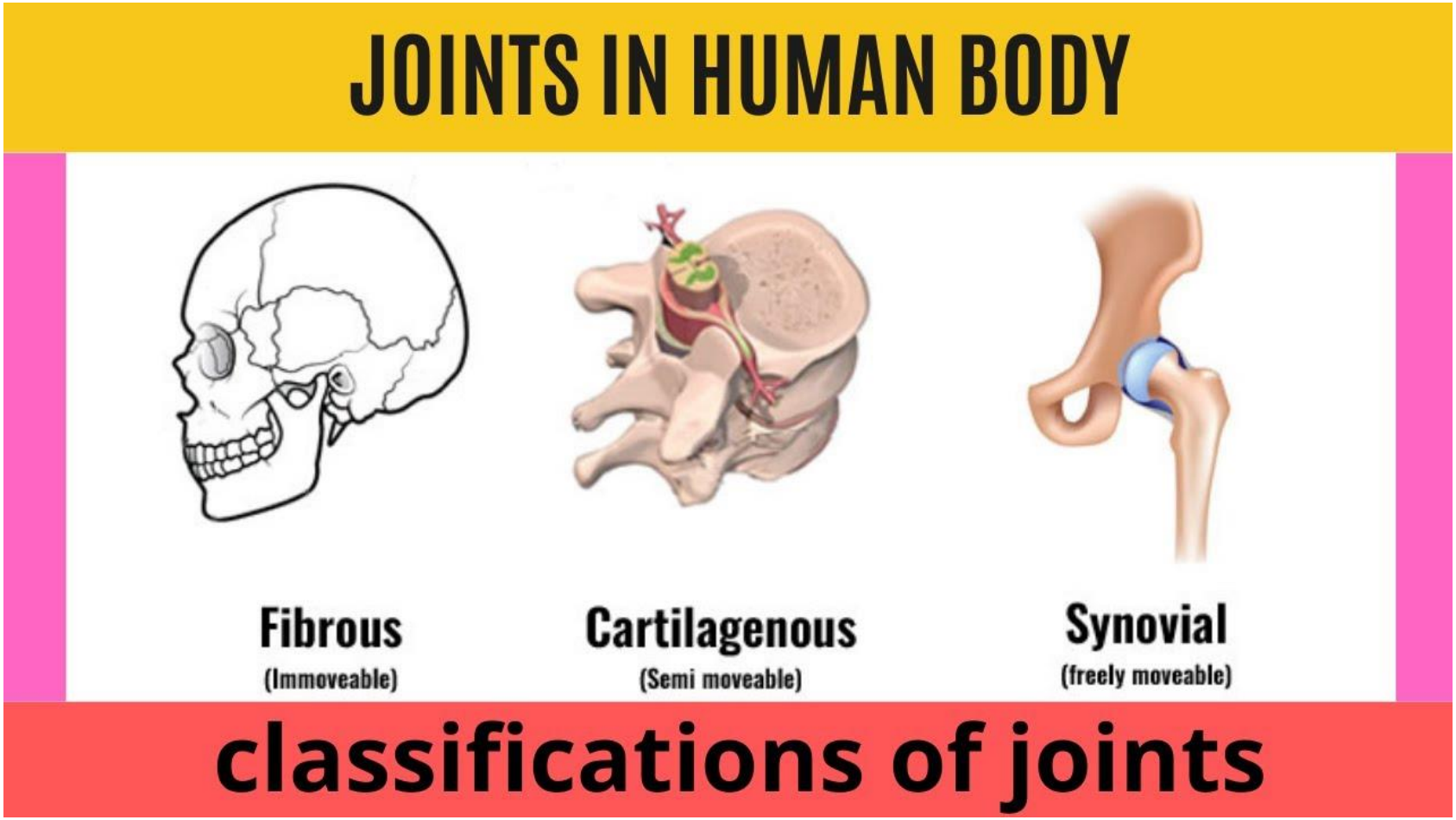


Figure 2.13

Basic structure

Synovial Joints 2.14

The articular surfaces of the bones are covered by a thin layer of hyaline cartilage separated by a **joint cavity** This arrangement permits a great degree of freedom of movement. The cavity of the joint is lined by **synovial membrane,** which extends from the margins of one articular surface to those of the other. The synovial membrane is protected on the outside by a tough fibrous membrane called the **capsule.**

Ligaments

A ligament is a cord or band of connective tissue uniting two structures. Commonly found in association with joints, ligaments are of two types. Most are composed of dense bundles of collagen fibers and are un stretchable under normal conditions.

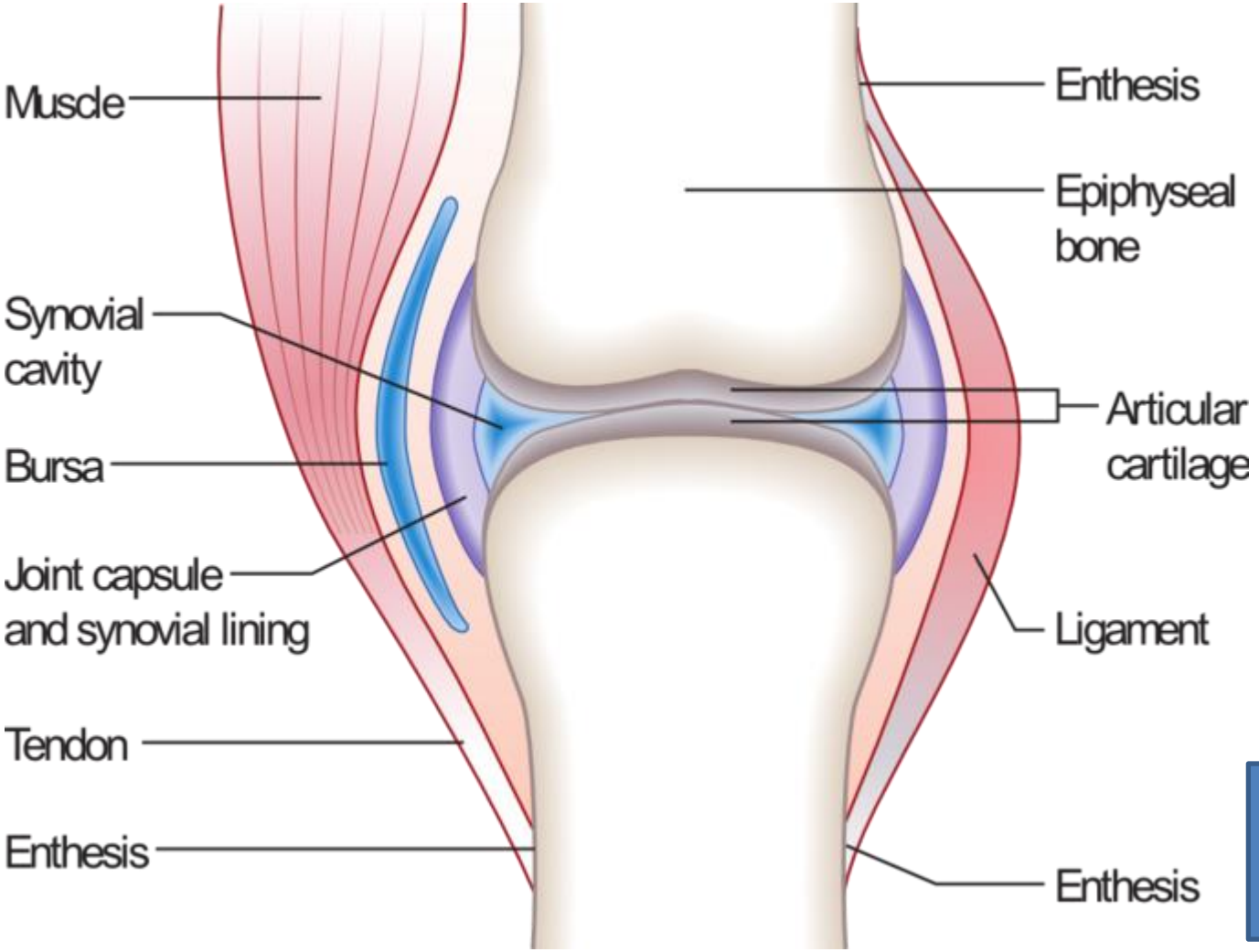

Muscle
Synovial cavity
Bursa
Joint capsule and synovial lining
Tendon
Enthesis
Enthesis
Epiphyseal bone
Articular cartilage
Ligament
Enthesis

Figure 2.14

Basic structures

Blood vessels figure (1.15)

Blood vessels are of three types: **arteries, veins, and capillaries**

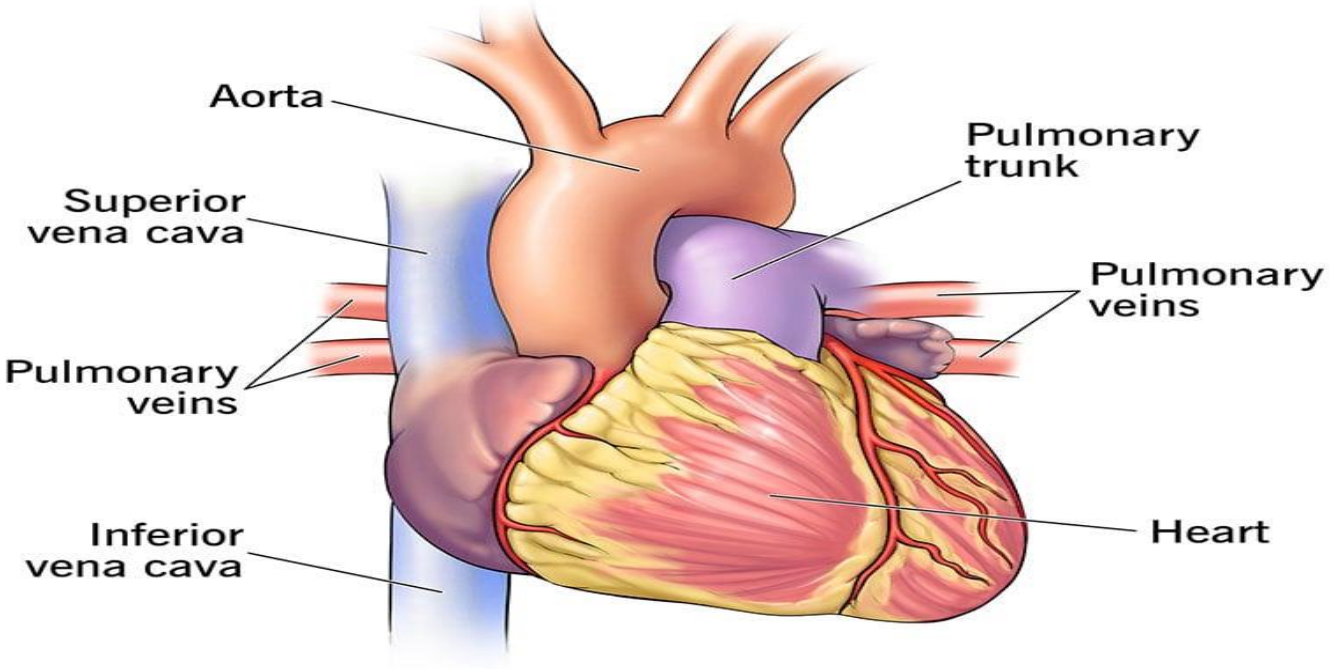
Arteries transport blood from the heart and distribute it to the various tissues of the body by means of their **branches** .

Arteries have a tick muscular wall consist of smooth muscles arranged circularly.

The smallest arteries, <0.1 mm in diameter, are referred to as **arterioles.** The joining of branches of arteries is called an **anastomosis. (Figure 2.16).**

Arteries do not have valves. **Anatomic end arteries** are vessels whose terminal branches do not anastomose with branches of Arteries.

Great Vessels of the Heart



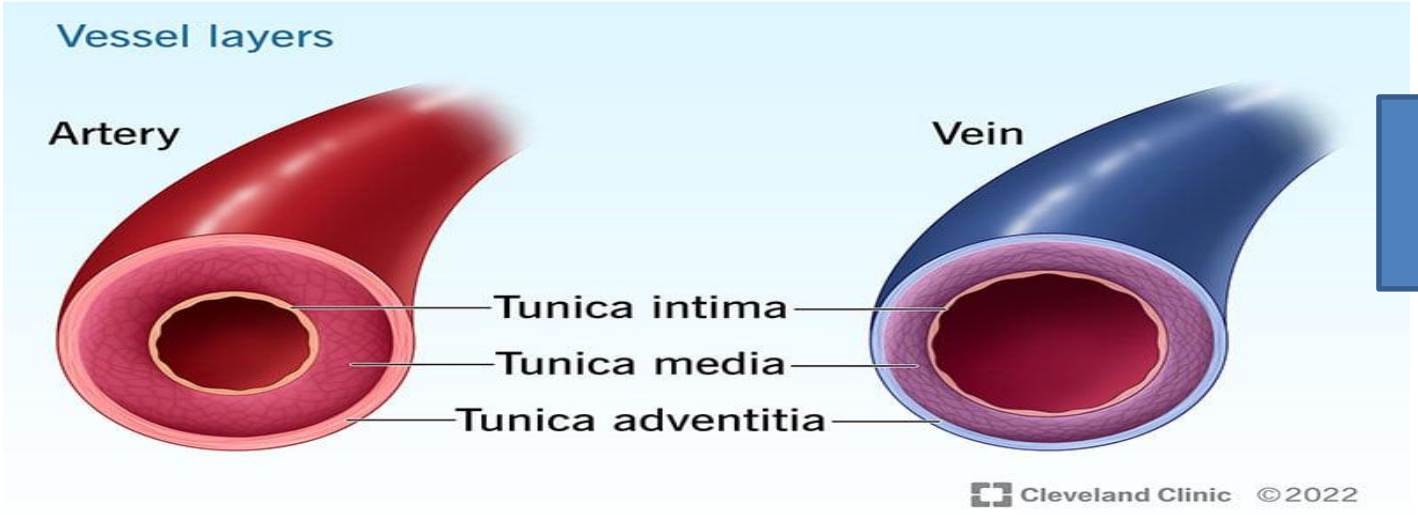


Figure 2.15

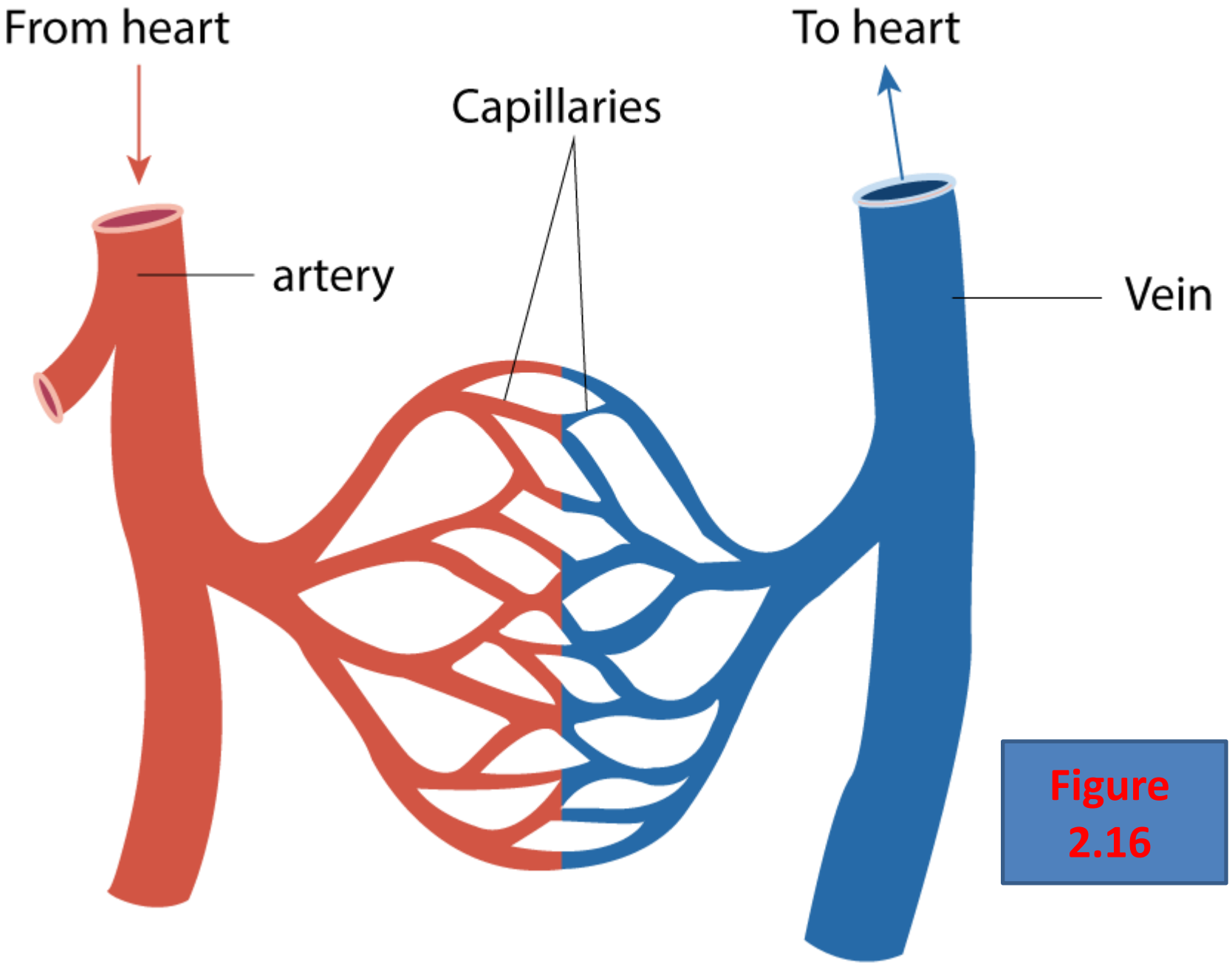


Figure 2.16

Basic structures

Veins are vessels that transport blood back to the heart;
many of them possess valves. The smallest veins are called
venules. Medium-size deep arteries are often accompanied by two veins, one on each side, called **venae comitantes. Veins have a thinner muscular wall than arteries.**

Veins leaving the gastrointestinal tract do not go directly to the heart but converge on the **portal vein;** this vein enters the liver and breaks up again into veins of diminishing size, which ultimately join capillary-like vessels, termed **sinusoids,** in the liver.

A **portal system** is thus a system of vessels interposed between two capillary beds.

Basic structures of the body

Capillaries are microscopic vessels in the form of a network connecting the arterioles to the venules .

Sinusoids resemble capillaries in that they are thin-walled blood vessels, but they have an irregular cross diameter and are wider than capillaries. They are found in the bone marrow, the spleen, the liver, and some endocrine glands.

Lymphatic vessels are tubes that assist the cardiovascular system in the removal of tissue fluid from the tissue spaces of the body; the vessels then return the fluid to the blood.

Basic structures

Lymphatic vessels are found in all tissues and organs of the body except the central nervous system, the eyeball, the internal ear, the epidermis of the skin, the cartilage, and the bone. **The** lymph vessels that carry lymph to a lymph node are referred to as **afferent** vessels, those that transport it away from a node are **efferent** vessels.

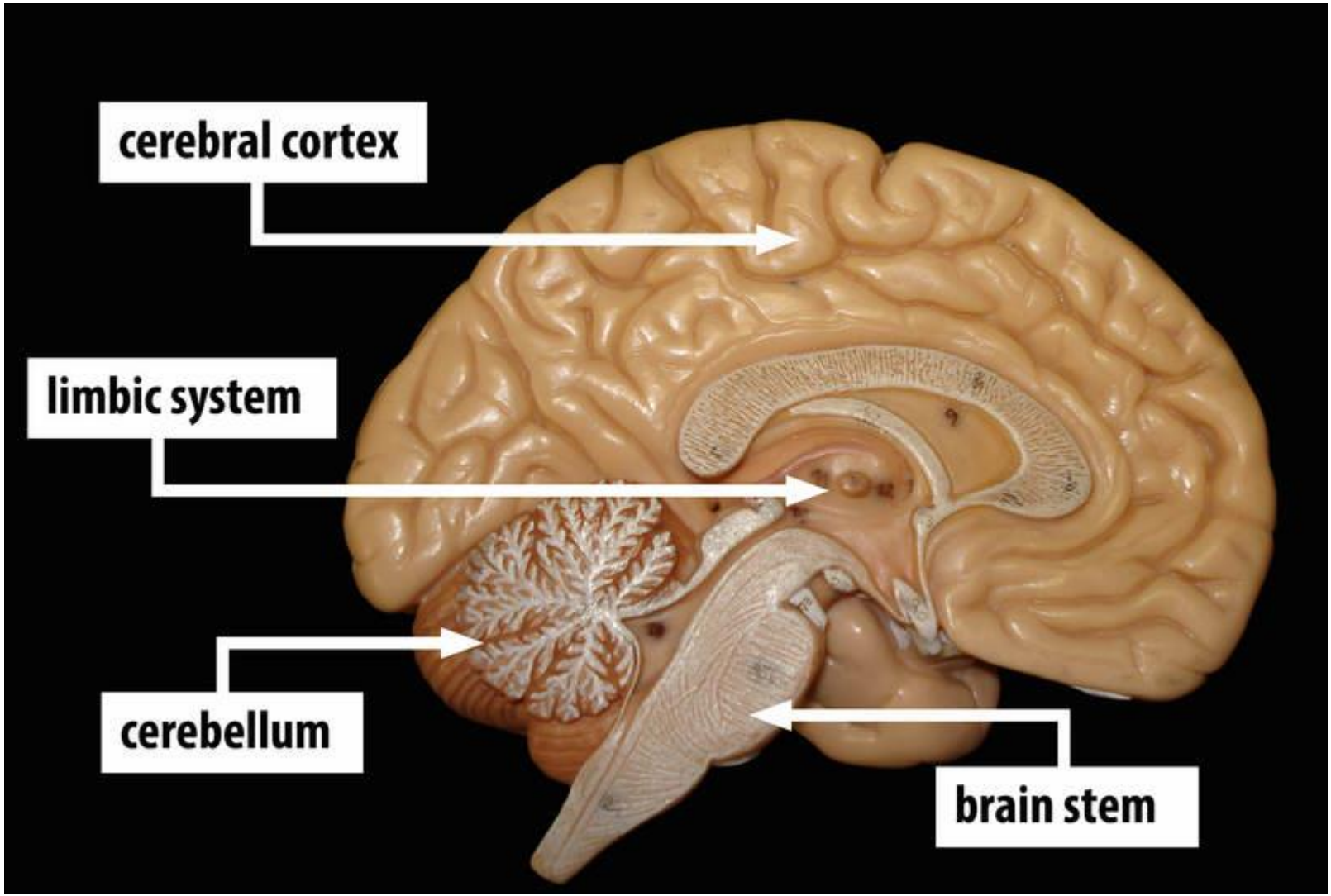
Basic structures

Nervous system. figures (2.17, 2.18, 2.19)

The nervous system is divided into two main parts: the **central nervous system,** which consists of the brain and spinal cord, and the **peripheral nervous system,** which consists of **12 pairs of cranial nerves and 31 pairs of spinal nerves** and their associated ganglia.

Functionally, the nervous system can be further divided into the **somatic nervous system,** which controls voluntary activities, and the **autonomic nervous system,** which controls involuntary activities.

Figure 2.18

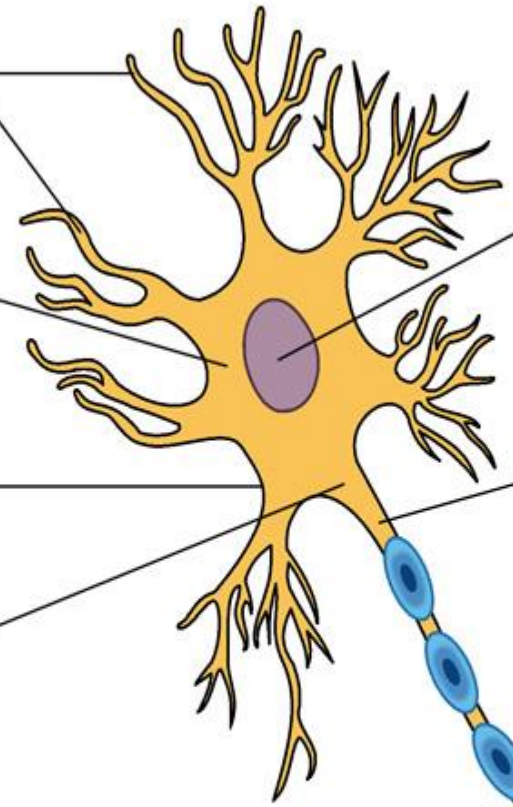


Basic structures

Neuron is the term given to the nerve cell and all its processes. The nerve cell has two types of processes, called **dendrites** and an **axon.** Dendrites are the short processes of the cell body; the axon is the longest process of the cell body.

The interior of the central nervous system is organized into gray and white matter. **Gray matter** consists of nerve cells embedded in neuroglia. **White matter** consists of nerve fibers (axons) embedded in neuroglia.

Parts of a Neuron with Functions



Dendrites
Receive signals from other cells

Cell body
Organizes and keeps the cell functional

Cell membrane
Protects the cell

Axon hillock
Generates impulse in the neuron

Nucleus
Controls the entire neuron

Axon
Transfers signals to other cells and organs

Myelin sheath
Increases the speed of the signal

Axon terminal
Forms junctions with other cells

Node of Ranvier
Allow diffusion of ions

Schwann cell
Produces the myelin sheath

Basic structures

Peripheral Nervous System

The peripheral nervous system consists of the cranial and spinal nerves and their associated ganglia. On dissection, the cranial and spinal nerves are seen as grayish white cords. They are made up of bundles of nerve fibers (axons)supported by delicate areolar tissue.

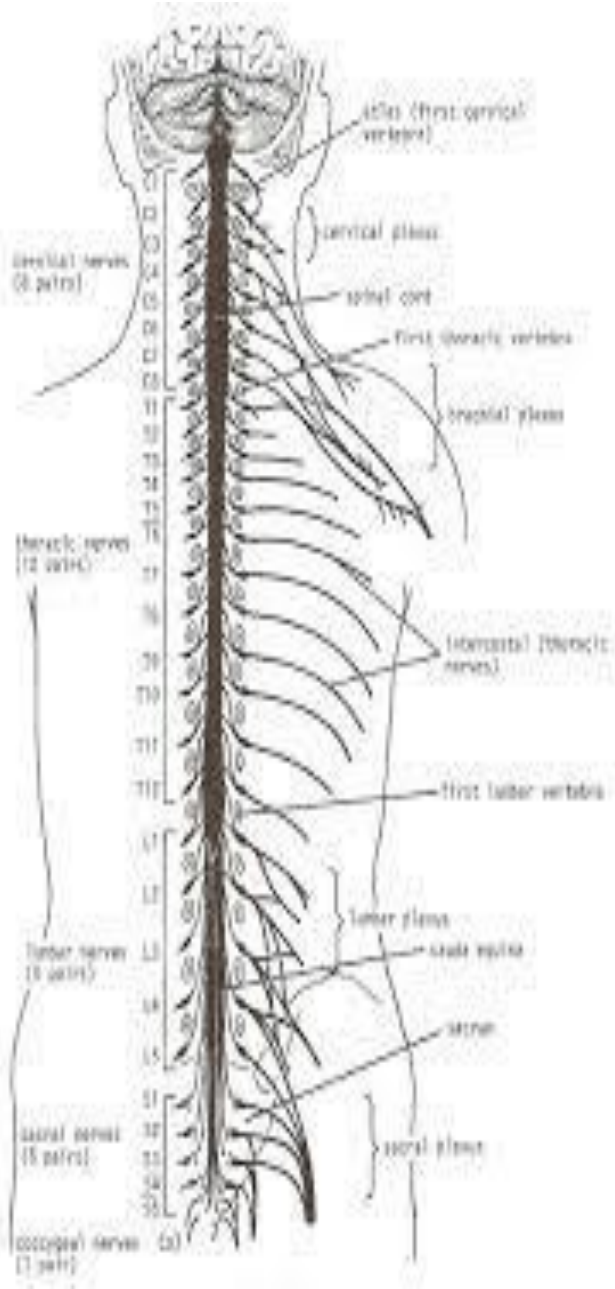

atlas (first cervical vertebra)
cervical plexus
spinal cord
first thoracic vertebra
brachial plexus
(intercostal) thoracic nerves
first lumber vertebra
lumbar plexus
cauda equina
sacral plexus
coccygeal nerves (2)

Figure 2.18

Basic structures

Cranial Nerves

There are 12 pairs of cranial nerves that leave the brain and pass through **foramina in the skull**. All the nerves are distributed in the head and neck except the Xth (vagus), which also supplies structures in the thorax and abdomen.

The Cranial Nerves

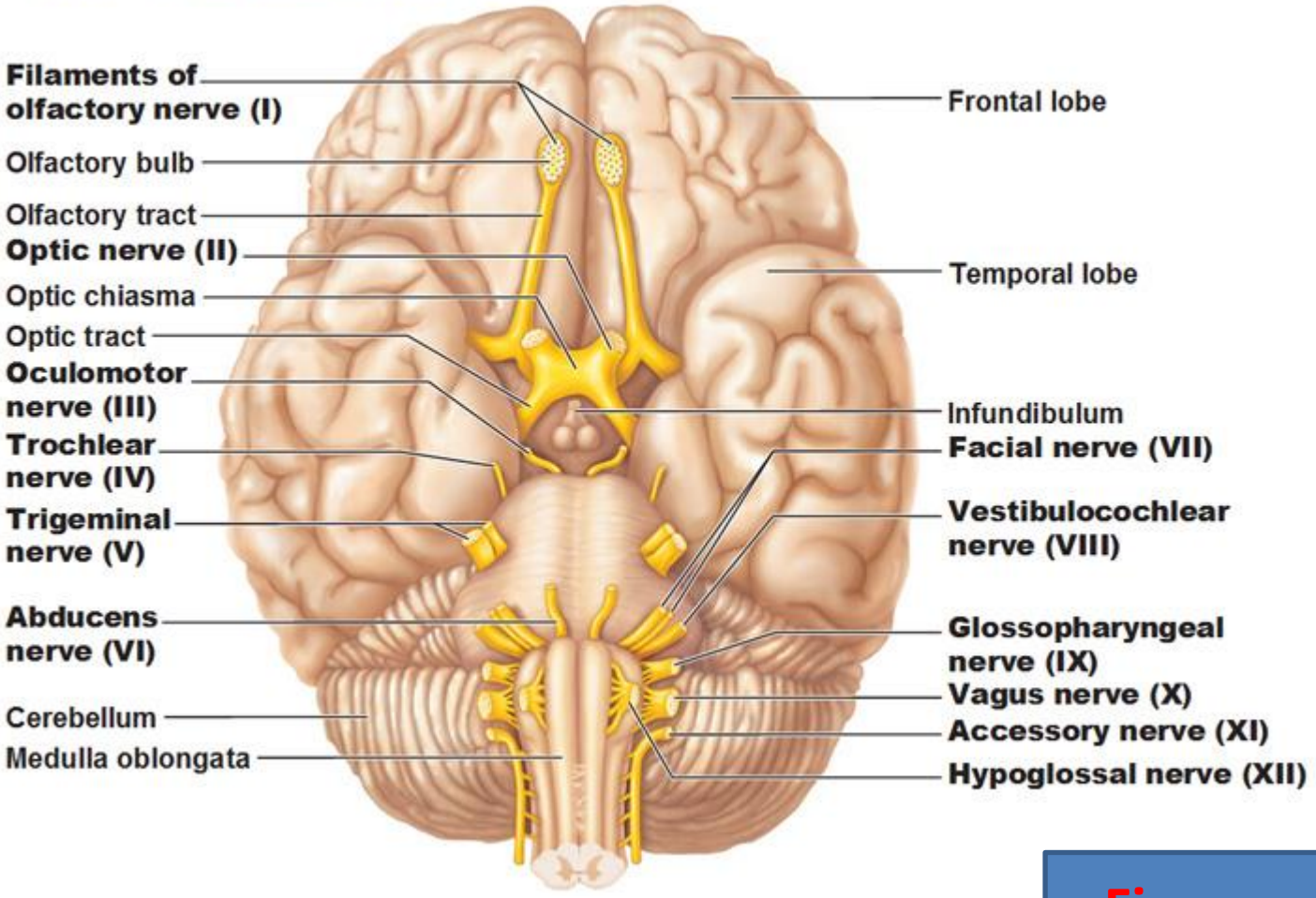


Figure 2.17

Basic structures

Spinal Nerves

A total of 31 pairs of spinal nerves leave the spinal cord and pass through intervertebral foramina in the vertebral column . The spinal nerves are named according to the region of the vertebral column with which they are associated: 8 **cervical,** 12 **thoracic,** 5 **lumbar,** 5 **sacral,** and 1 **coccygeal.**

Each spinal nerve is connected to the spinal cord by two roots: **the anterior root and the posterior root.**

Basic structures

The anterior root consists of bundles of nerve fibers carrying nerve impulses away from the central nervous system. Such nerve fibers are called **efferent** fibers. Those efferent fibers that go to skeletal muscle and cause them to contract are called **motor fibers.** Their cells of origin lie in the anterior gray horn of the spinal cord.

The posterior root consists of bundles of nerve fibers that carry impulses to the central nervous system and are called **afferent** fibers.

Basic structures

Because these fibers are concerned with conveying information about sensations of touch, pain, temperature, and vibrations, they are called **sensory fibers.** The cell bodies of these nerve fibers are situated in a swelling on the posterior root called the **posterior root ganglion**.

The anterior and posterior roots unite at intervertebral foramen to form a **spinal nerve**. Here, the motor and sensory fibers become mixed together, so that a spinal nerve is **made up of a mixture of motor and sensory fibers.** On emerging from the foramen, the spinal nerve divides into a large **anterior ramus and a smaller posterior ramus.** The posterior ramus passes posteriorly around the vertebral column to supply the **muscles and skin of the back** .

Basic structures

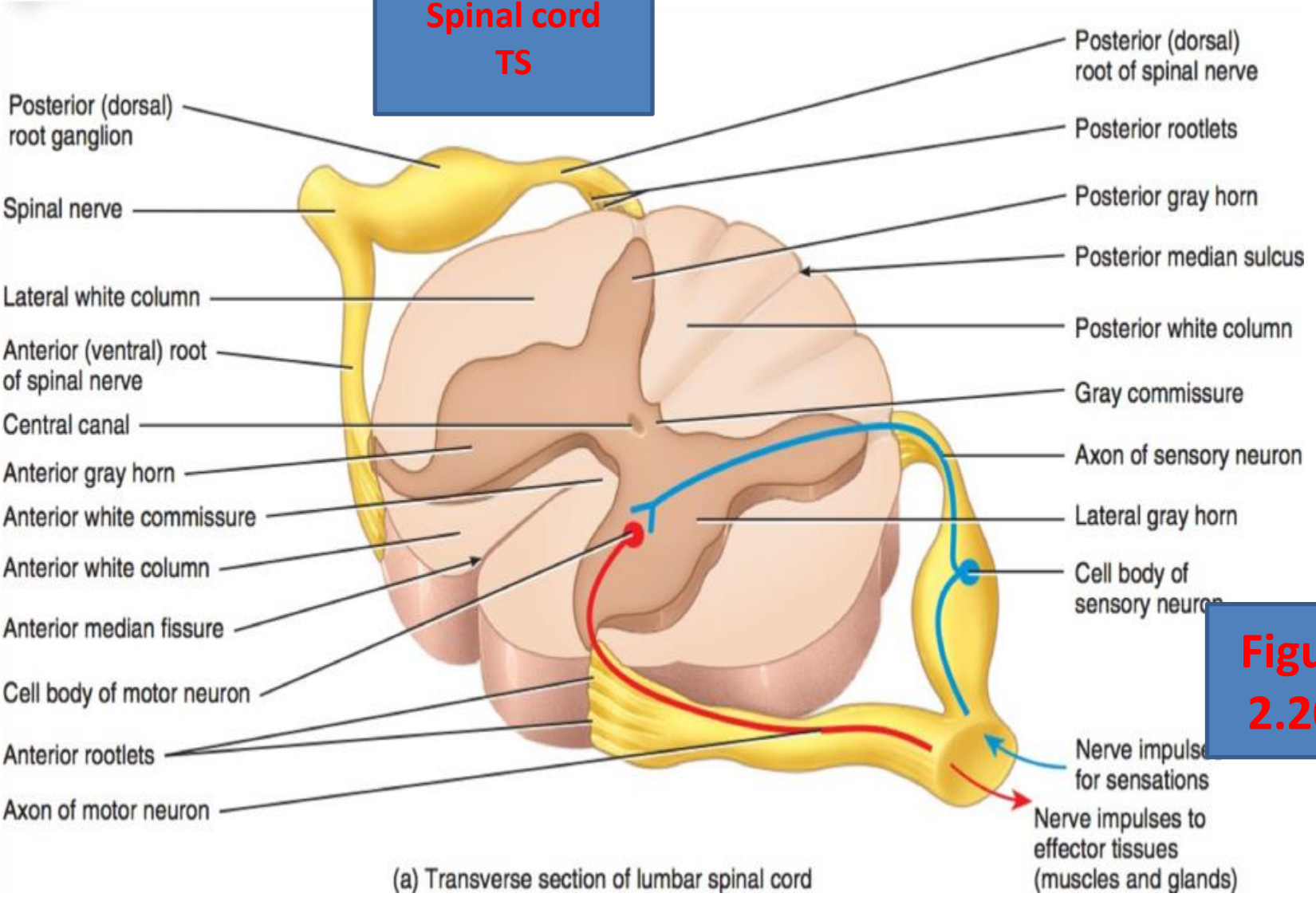
The anterior ramus continues anteriorly to **supply the muscles and skin over the anterolateral body wall and all the muscles and skin of the limbs (figure 20b).**

Autonomic Nervous System

The autonomic nervous system is the part of the nervous system

concerned with the innervation of involuntary structures such as the heart, smooth muscle, and glands throughout the body and is distributed throughout the central and peripheral nervous system. The autonomic system may be divided into two parts—the **sympathetic** and the **parasympathetic**—and both parts have afferent and efferent nerve fibers.

Spinal cord TS



(a) Transverse section of lumbar spinal cord

Figure 2.20a

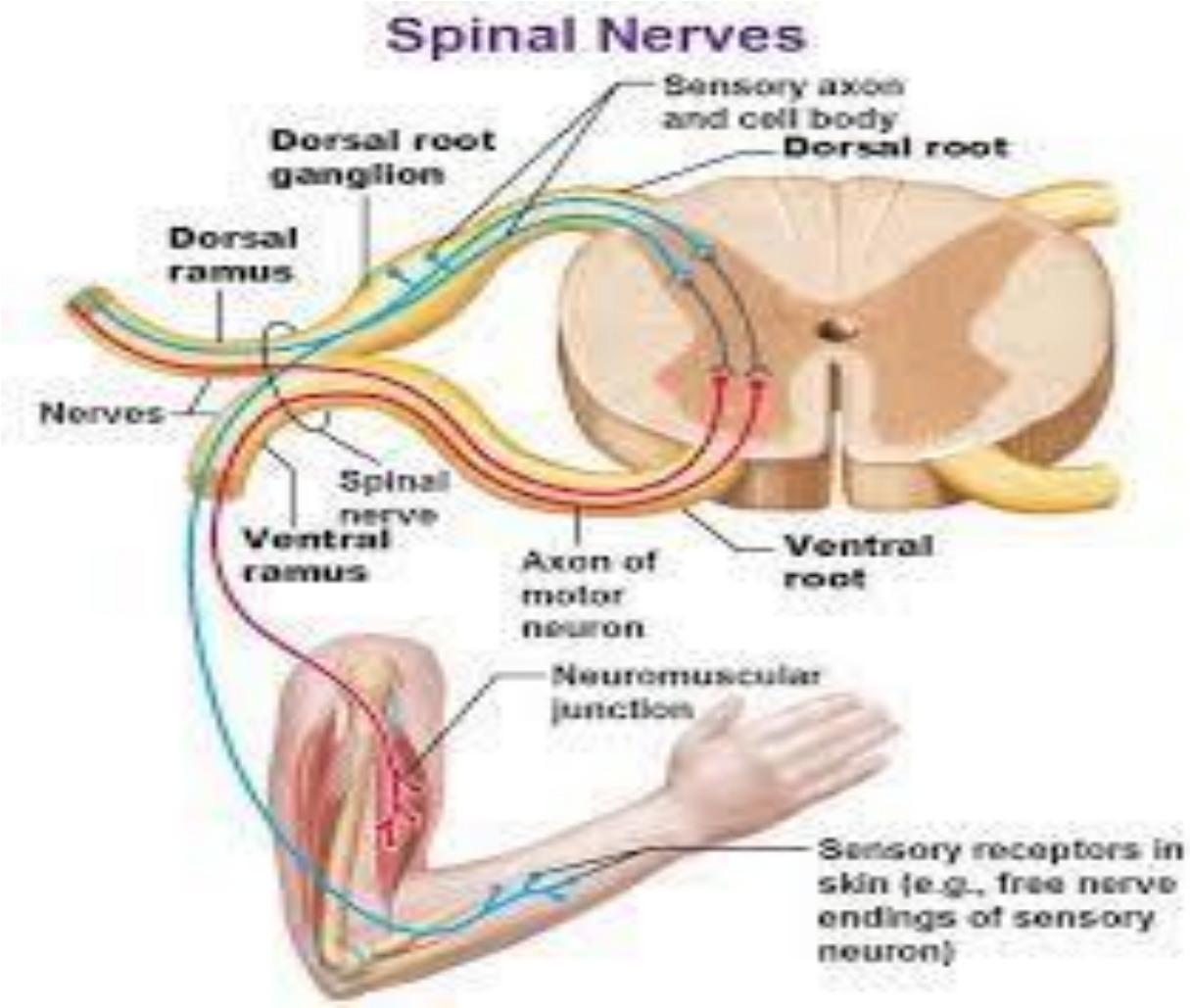

Spinal Nerves
Sensory axon and cell body
Dorsal root ganglion
Dorsal root
Dorsal ramus
Nerves
Spinal nerve
Ventral ramus
Axon of motor neuron
Ventral root
Neuromuscular junction
Sensory receptors in skin (e.g., free nerve endings of sensory neuron)

Figure 20b

Basic structures

Bone

Bone is a living tissue capable of supporting other body structures. bone is hard because of the calcification of its extracellular matrix and possesses a degree of elasticity because of the presence of organic fibers.

Bone exists in two forms: **compact and cancellous.**

Compact bone appears as a solid mass; cancellous bone consists of a branching network of **trabeculae.**

Basic structure

The trabeculae are arranged in such a manner as to resist the stresses and strains to which the bone is exposed.

Classification of Bones

Bones may be classified regionally or according to their general shape. Bones are grouped as follows based on their general shape: **long bones, short bones, flat bones, irregular** bones, and **sesamoid** bones. **Figure 2.21**

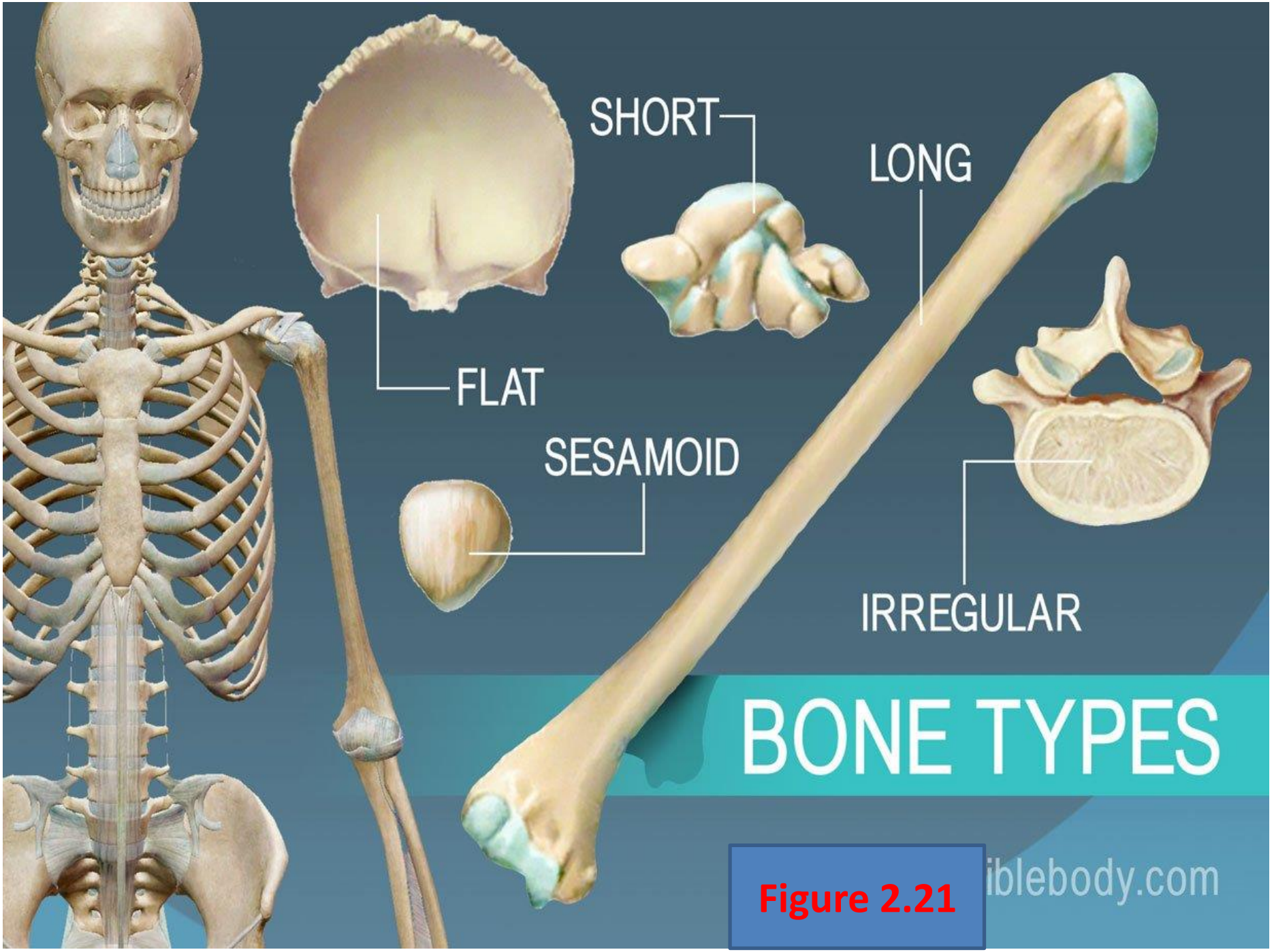

SHORT
LONG
FLAT
SESAMOID
IRREGULAR
BONE TYPES
iblebody.com

Figure 2.21

Basic structures

Cartilage. (Figure 2.22)

Cartilage is a form of connective tissue in which the cells and fibers are embedded in a gel-like matrix. There are three types of cartilage:

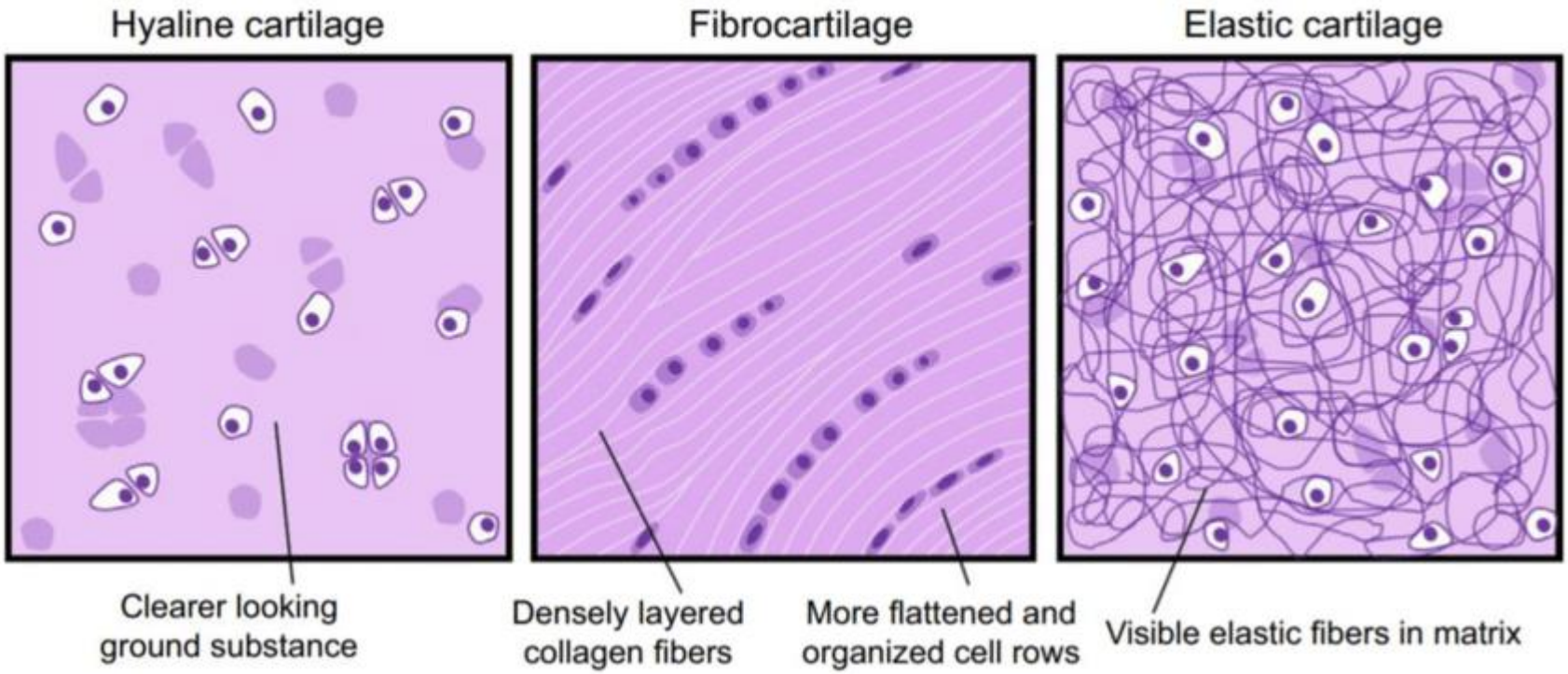
■■ **Hyaline cartilage** has a high proportion of amorphous hyaline matrix. it plays an important role in the growth in length of long bones. It covers the articular surfaces of nearly all synovial joints. Hyaline cartilage is incapable of repair. Hyaline cartilage covers the articular surfaces of synovial

Basic structures

Fibrocartilage has many collagen fibers embedded in a small amount of matrix and is found in the discs joints (e.g., the temporomandibular joint, sternoclavicular joint, and knee joint) and on the articular surfaces of the clavicle and mandible. Fibrocartilage, if damaged, repairs itself slowly in a manner similar to fibrous tissue elsewhere..

■■ **Elastic cartilage** possesses large numbers of elastic fibers embedded in matrix. It is flexible and is found in the auricle of the ear,. Elastic cartilage, if damaged, repairs itself with fibrous tissue. Hyaline cartilage and fibrocartilage tend to calcify or even ossify in later life.

Figure 2.22 types of cartilage




THANK YOU
FOR YOUR
ATTENTION