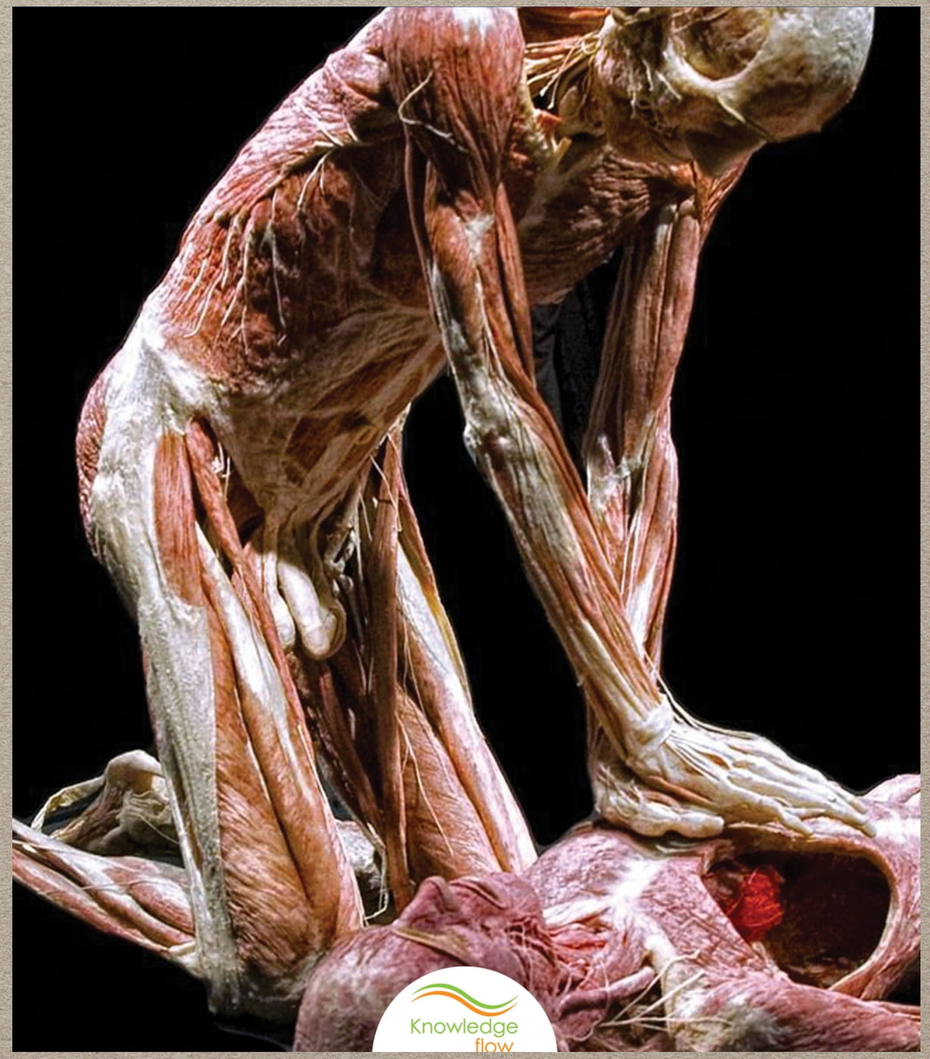
ANATOMY AND PHYSIOLOGY

NERVOUS SYSTEM
ENDOCRINE SYSTEM
CARDIOVASCULAR SYSTEM
RESPIRATORY SYSTEM
DIGESTIVE SYSTEM
HAND AND WRIST ANATOMY
SKELETAL SEGMENTS
MUSCLE GROUPS



Y.O.G.A
with
Kathryn Hallows

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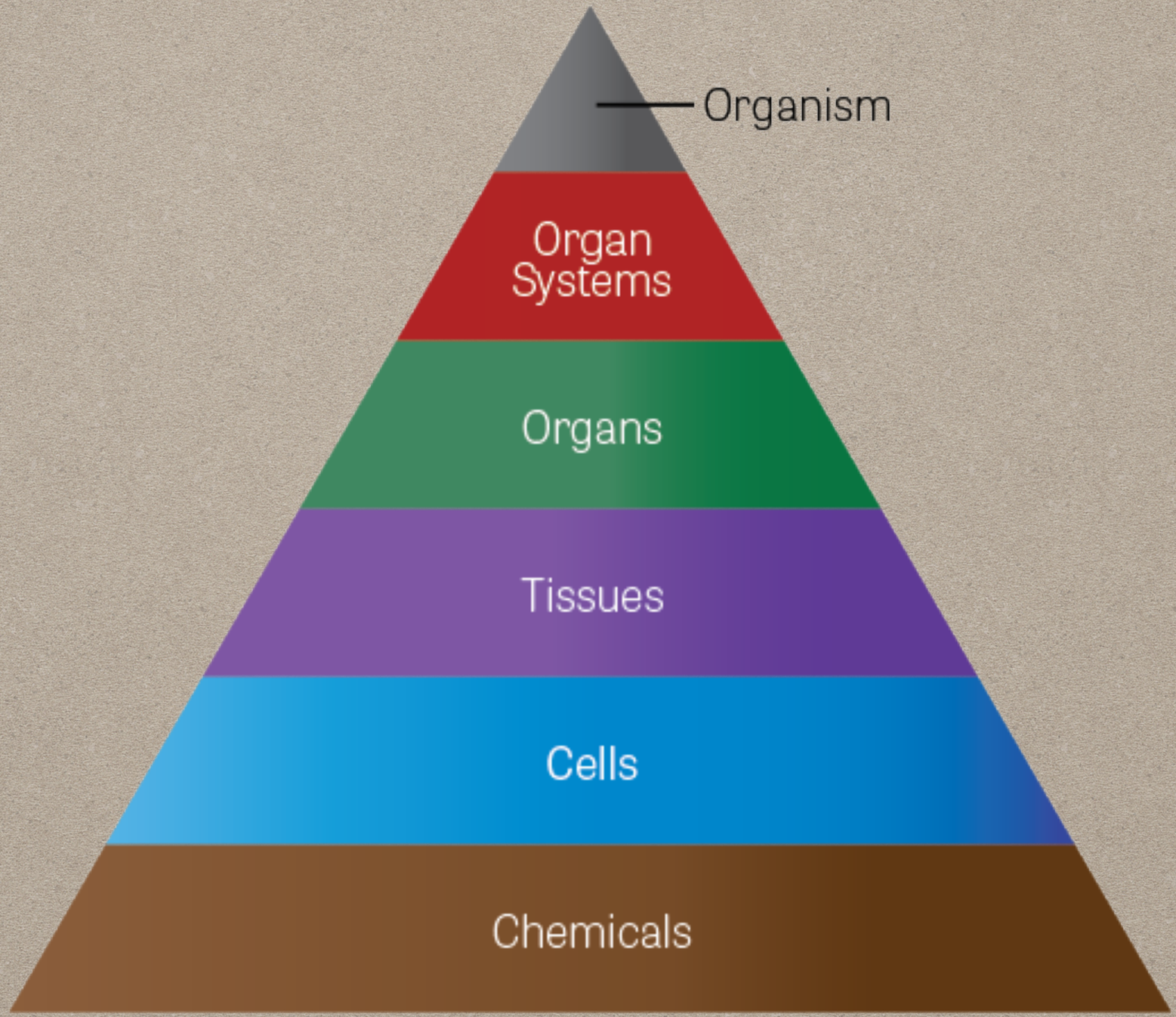
INTRODUCTION

Human anatomy is the study of the structure of the human body. It studies the way that every part of a human, from molecules to bones, interacts to form a functional whole.

Human physiology is the scientific study of the chemistry and physics of the structures of the body and the ways in which they work together to support the functions of life.

The body is put together by a collaboration of many smaller structures. The humans go through the chemical level. Then, the cellular level is made up of the smallest unit of living matter, the cell. Many cells join together to make a tissue.

An organ is a structure composed of at least two different tissue types that perform a specific function within the body. Many organs make an organ system. Different organ systems make the human body complete.


Organism
Organ Systems
Organs
Tissues
Cells
Chemicals

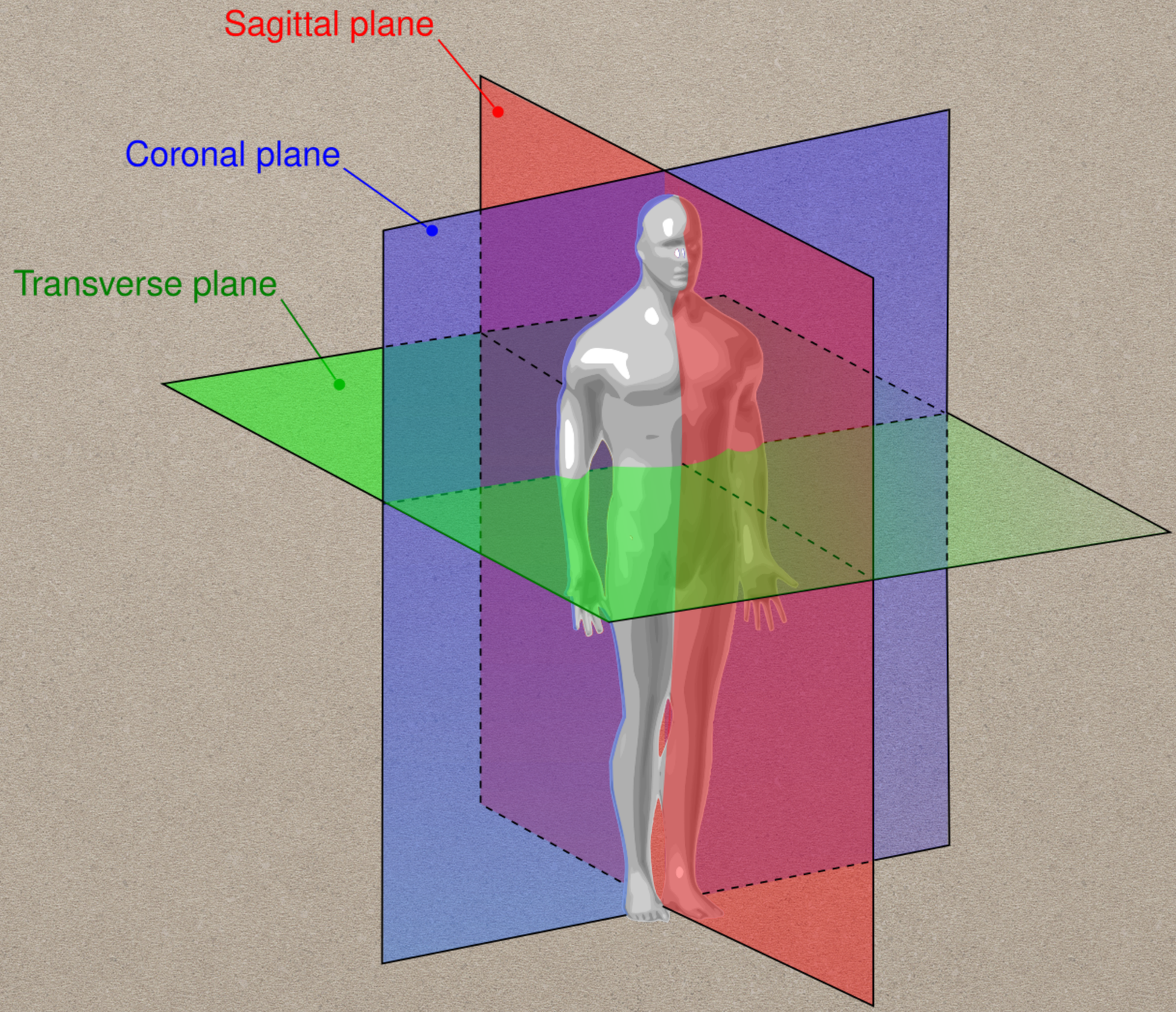
ANATOMICAL PLANES

Body planes are hypothetical geometric planes that divide the human body into sections. Mainly these body planes are used in human anatomy to describe the direction and location of body structures.

A human body in the anatomical position is described with the help of a co-ordinate system, which includes three axis (X, Y and Z) X-axis goes from left to right. Z axis from front to back and Y axis from up to down.

There are three planes:

- **Coronal Plane**: also known as frontal plane. Divides the brain into an anterior (front) and posterior (back) portion. It is created by slicing the brain parallel to the long axis of the body and thus perpendicular to the floor in a person that is upright.
- **Sagittal Plane:** runs down the midline of the brain dividing it into two separate halves. It is a vertical plane that divides the body symmetrically into right and left parts.
- **Transverse Plane** - a horizontal line with divides the body into an upper (superior) section and a lower (inferior) section. It is created by slicing the brain perpendicular to the long axis of the body, and thus parallel to the floor in a person that is upright.


Sagittal plane
Coronal plane
Transverse plane

NERVOUS SYSTEM

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Nervous systems

Central Nervous System (**CNS**)

Brain and Spinal Cord

Peripheral nervous system (**PNS**)

All nerves and sensory structures outside of the brain and spinal cord.

Somatic

Voluntary control of skeletal muscle

Autonomic

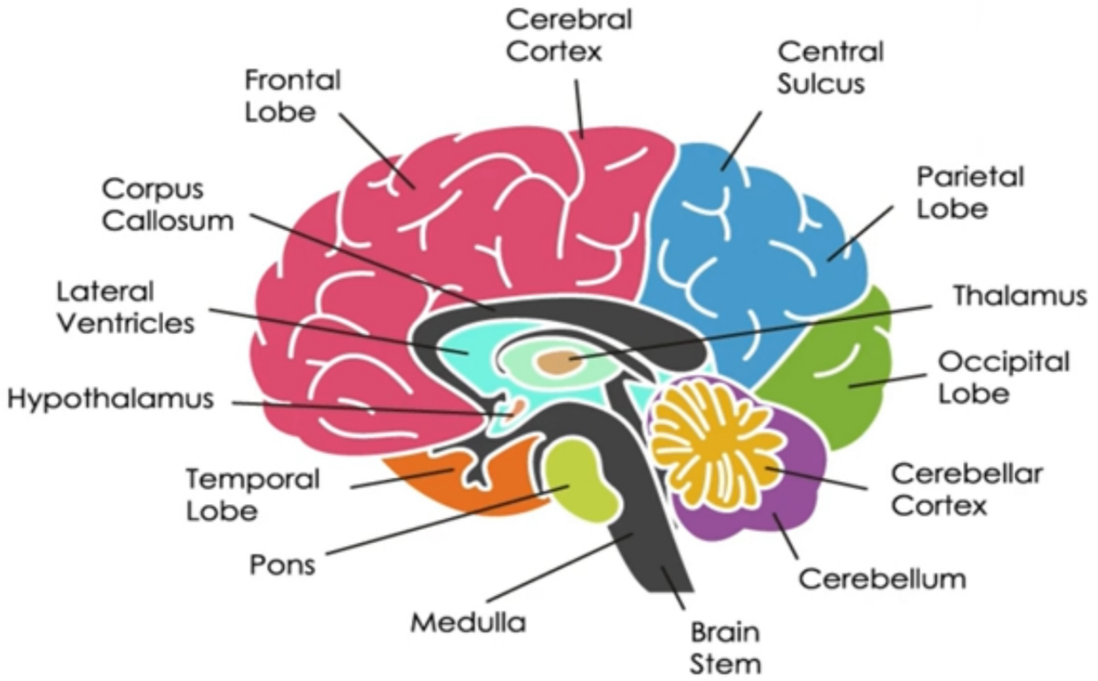
Involuntary control of glands and smooth muscle

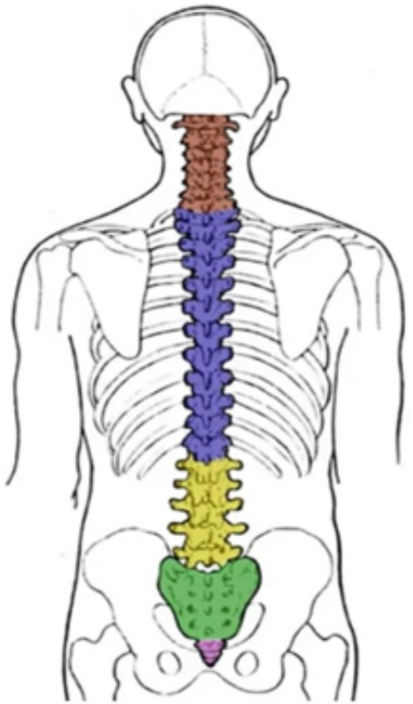
Sympathetic

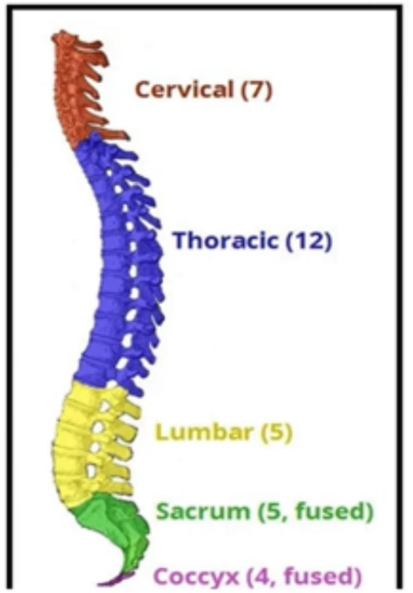
'Fight or flight' mode

Parasympathetic

'Rest and digest' mode



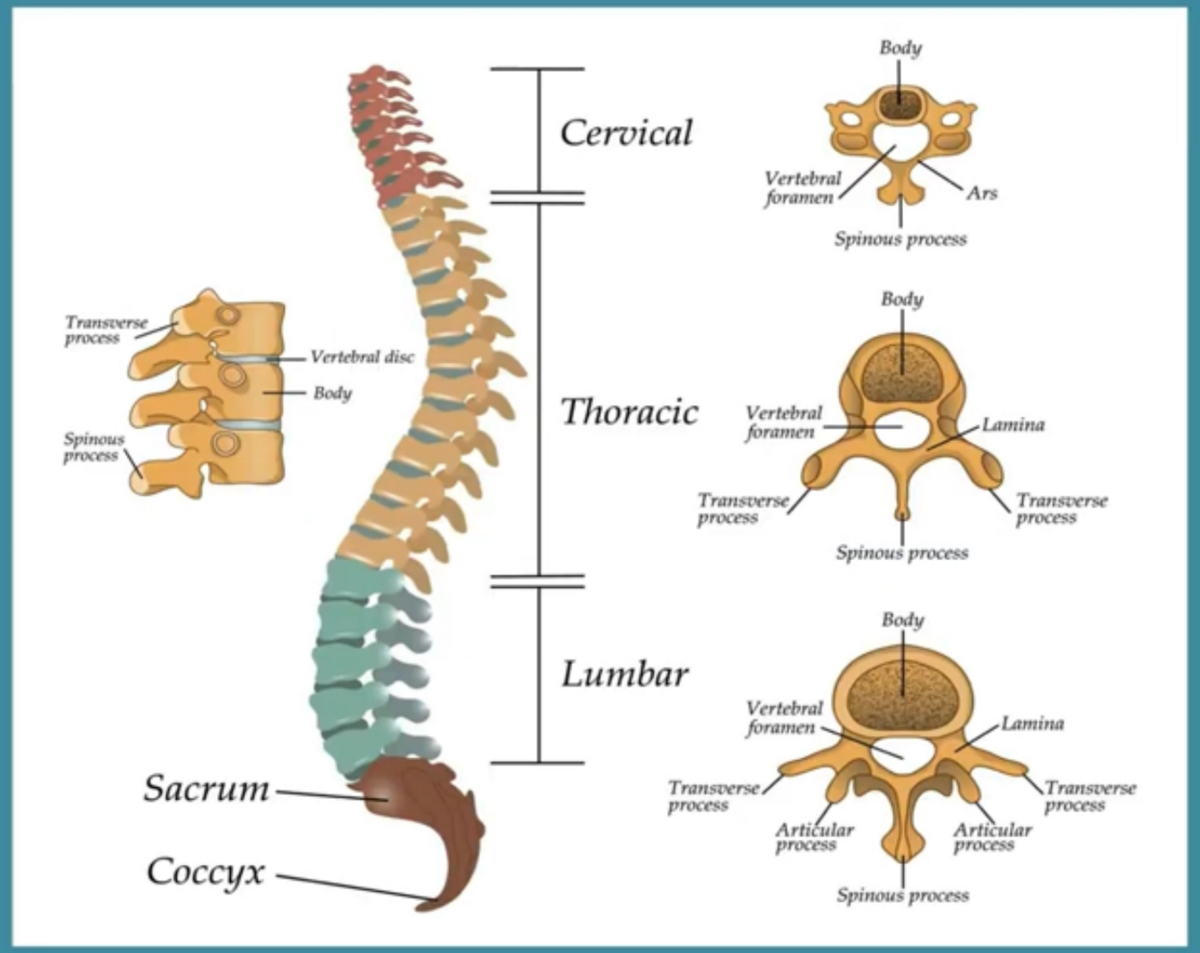




CENTRAL NERVOUS SYSTEM

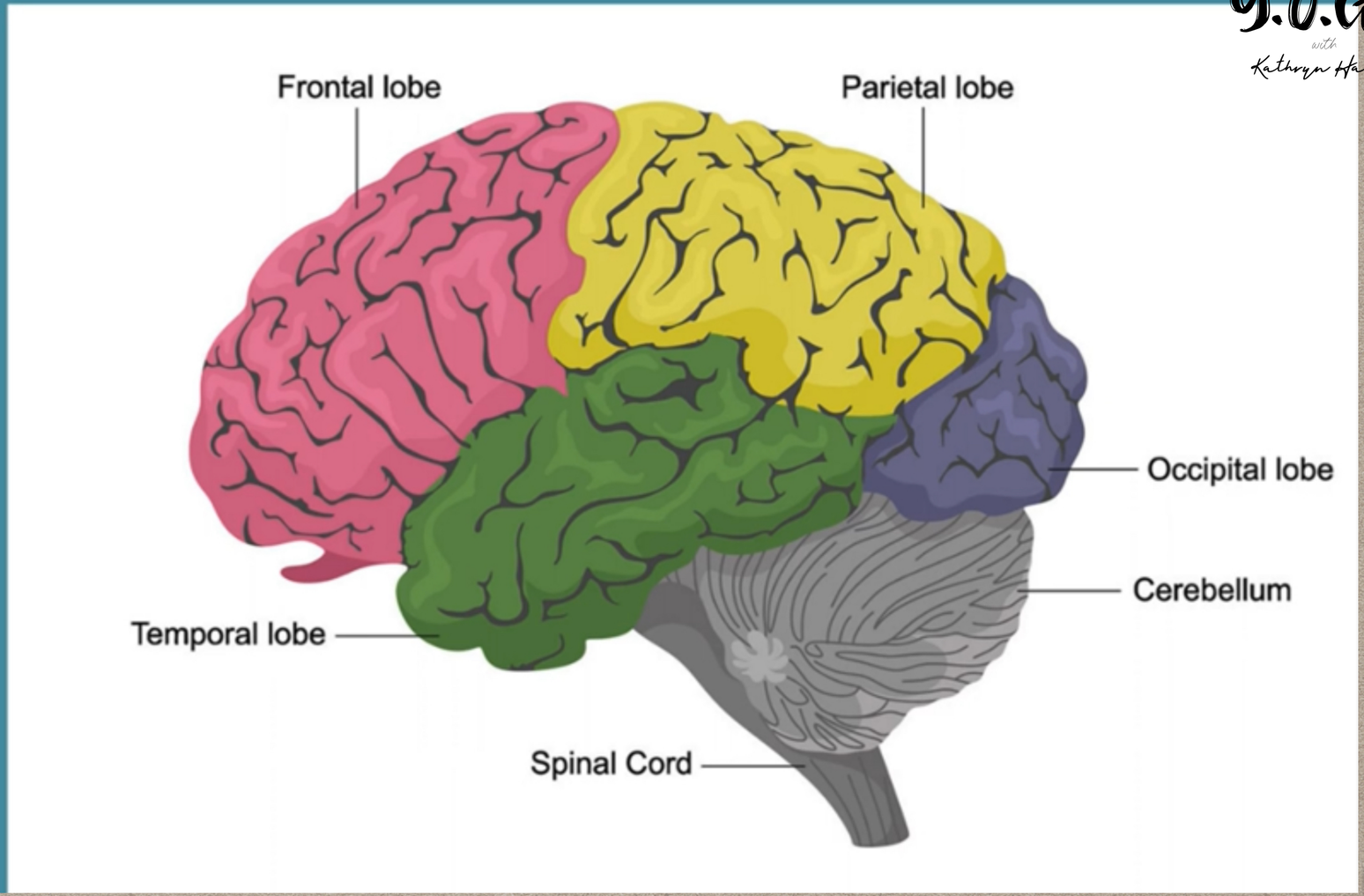
STRUCTURE OF THE SPINE

CERVICAL - 7
THORACIC - 12
LUMBAR - 5
SACRUM - 5
COCCYX - 4

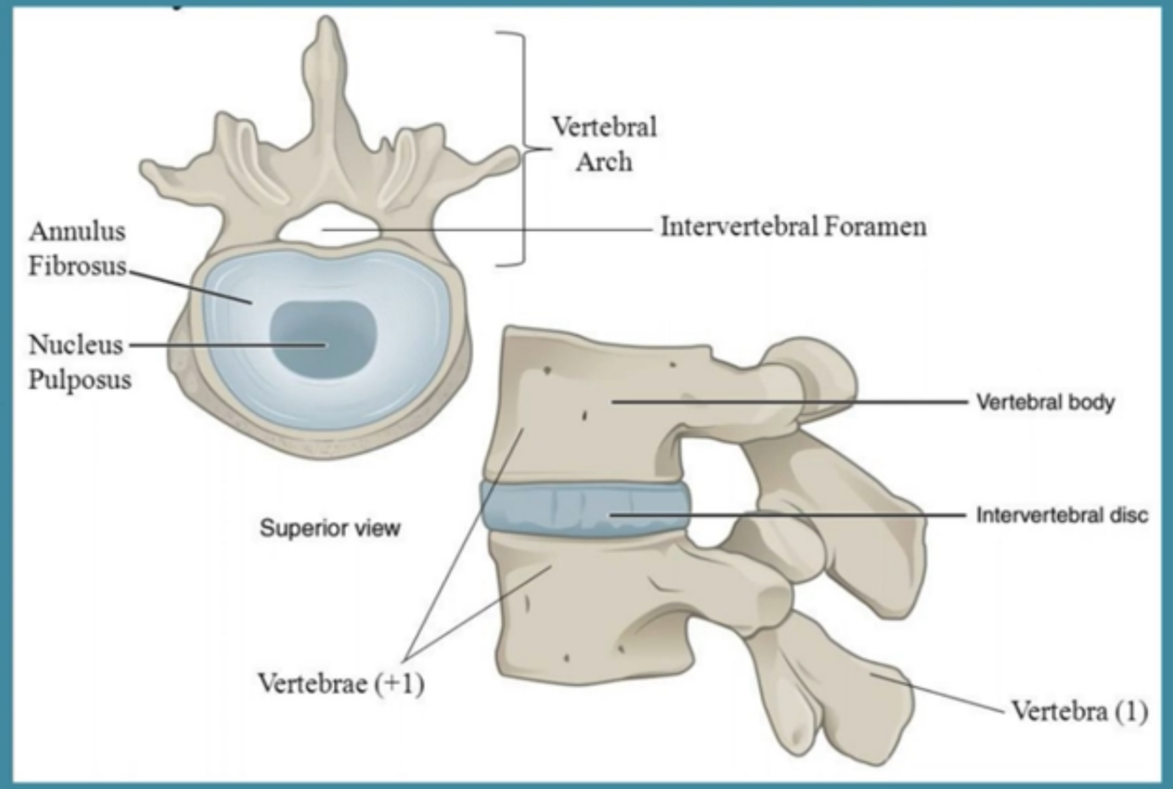


CENTRAL NERVOUS SYSTEM

PARTS OF THE BRAIN

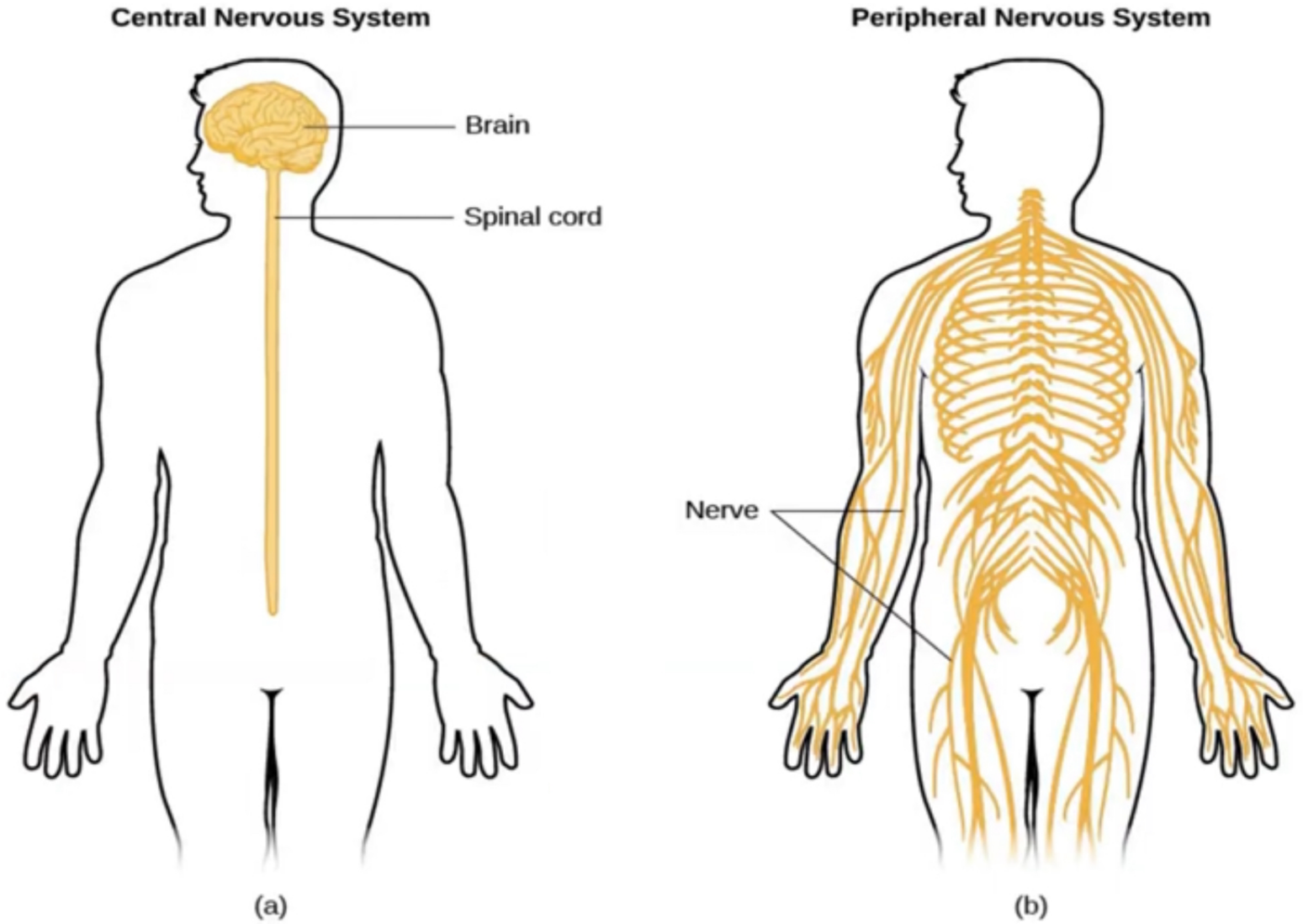


CENTRAL NERVOUS SYSTEM

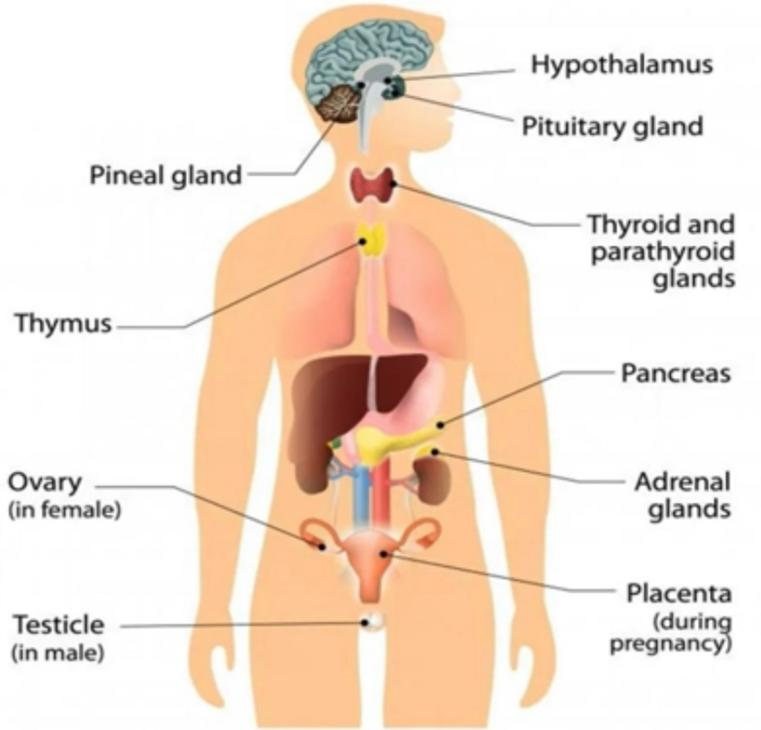


LATERAL & SUPERIOR VIEW OF THE SPINE

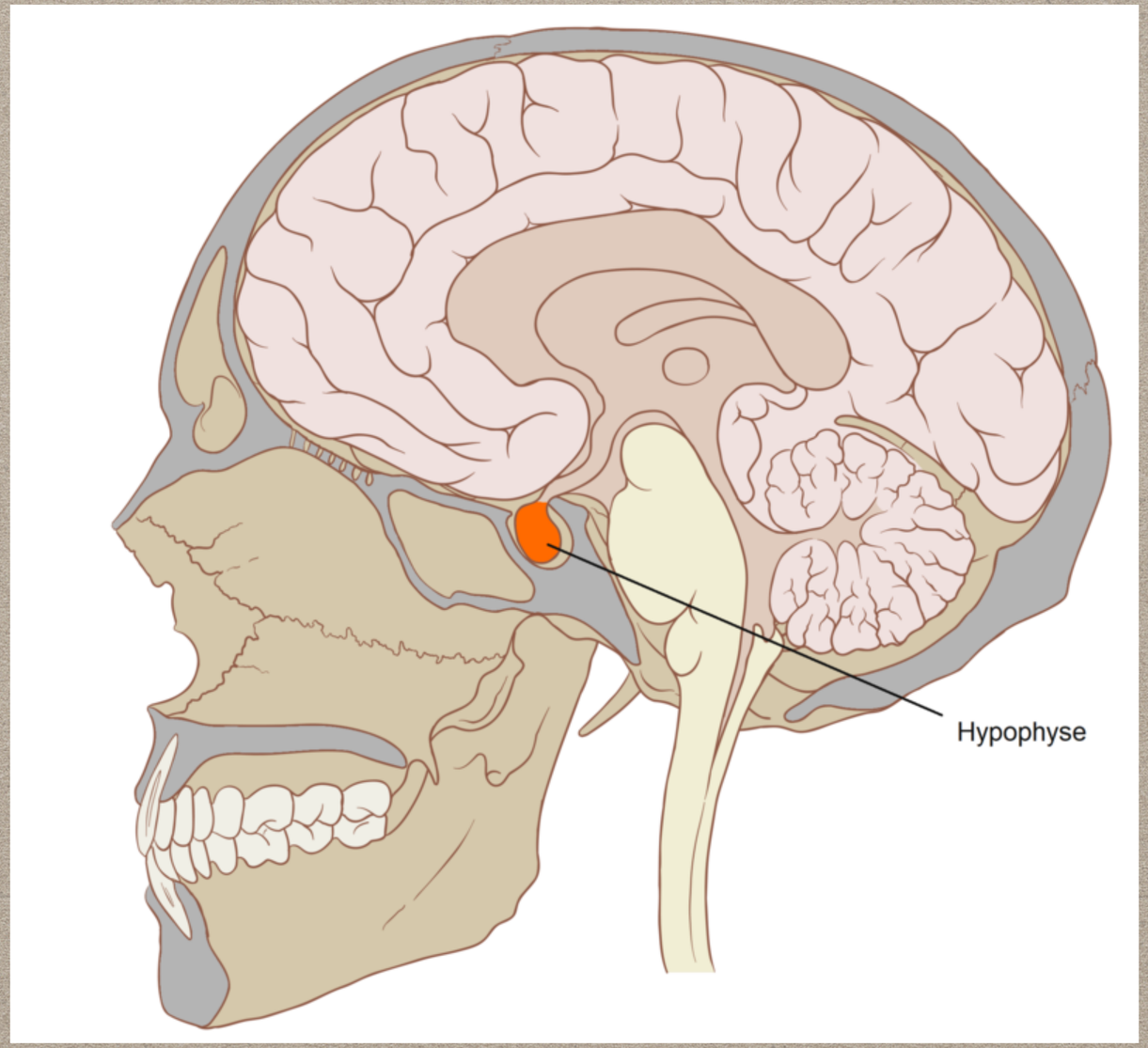
CENTRAL NERVOUS SYSTEM


Central Nervous System
Brain
Spinal cord
(a)
Peripheral Nervous System
Nerve
(b)

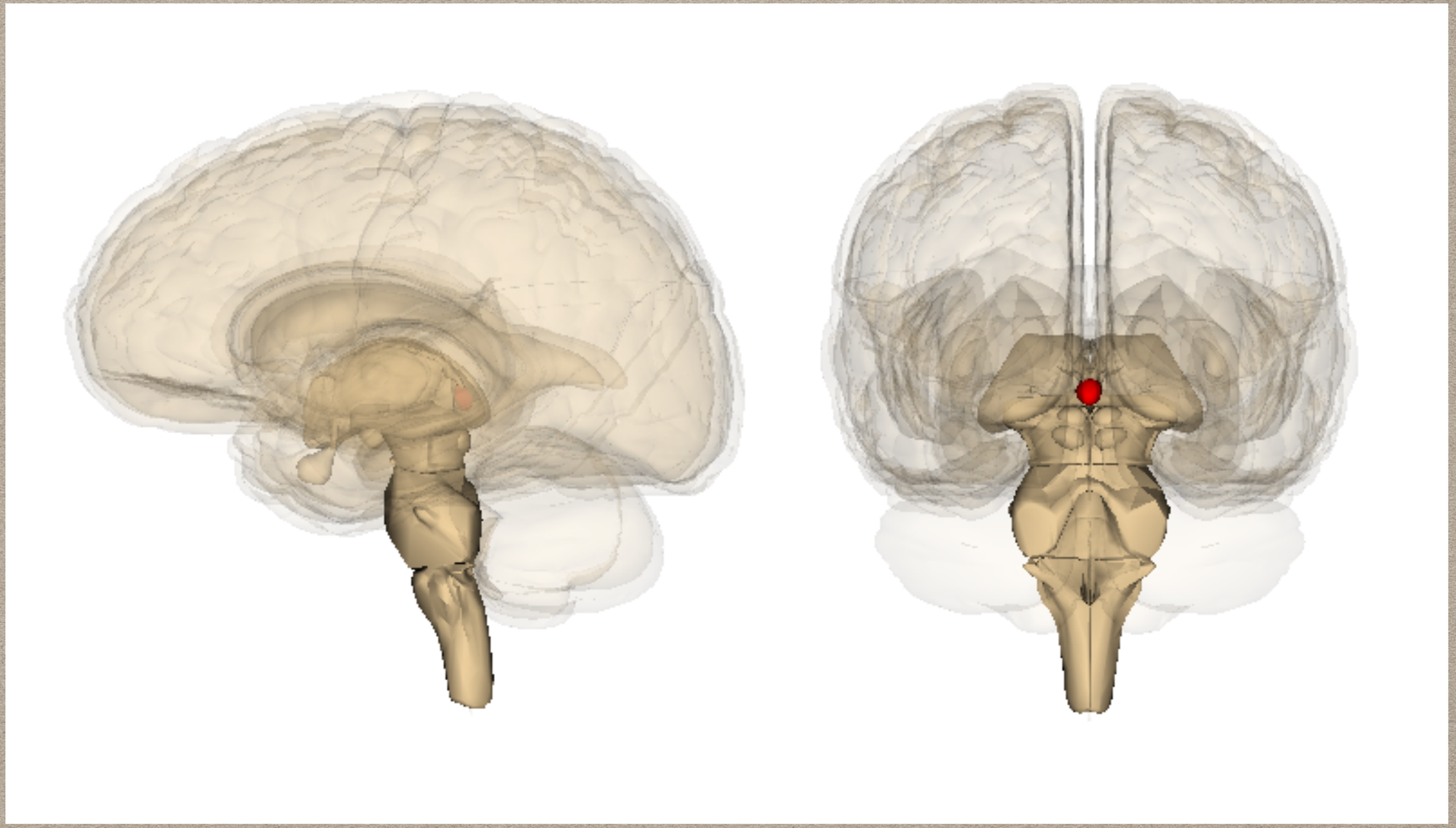
PARTS OF THE ENDOCRINE SYSTEM



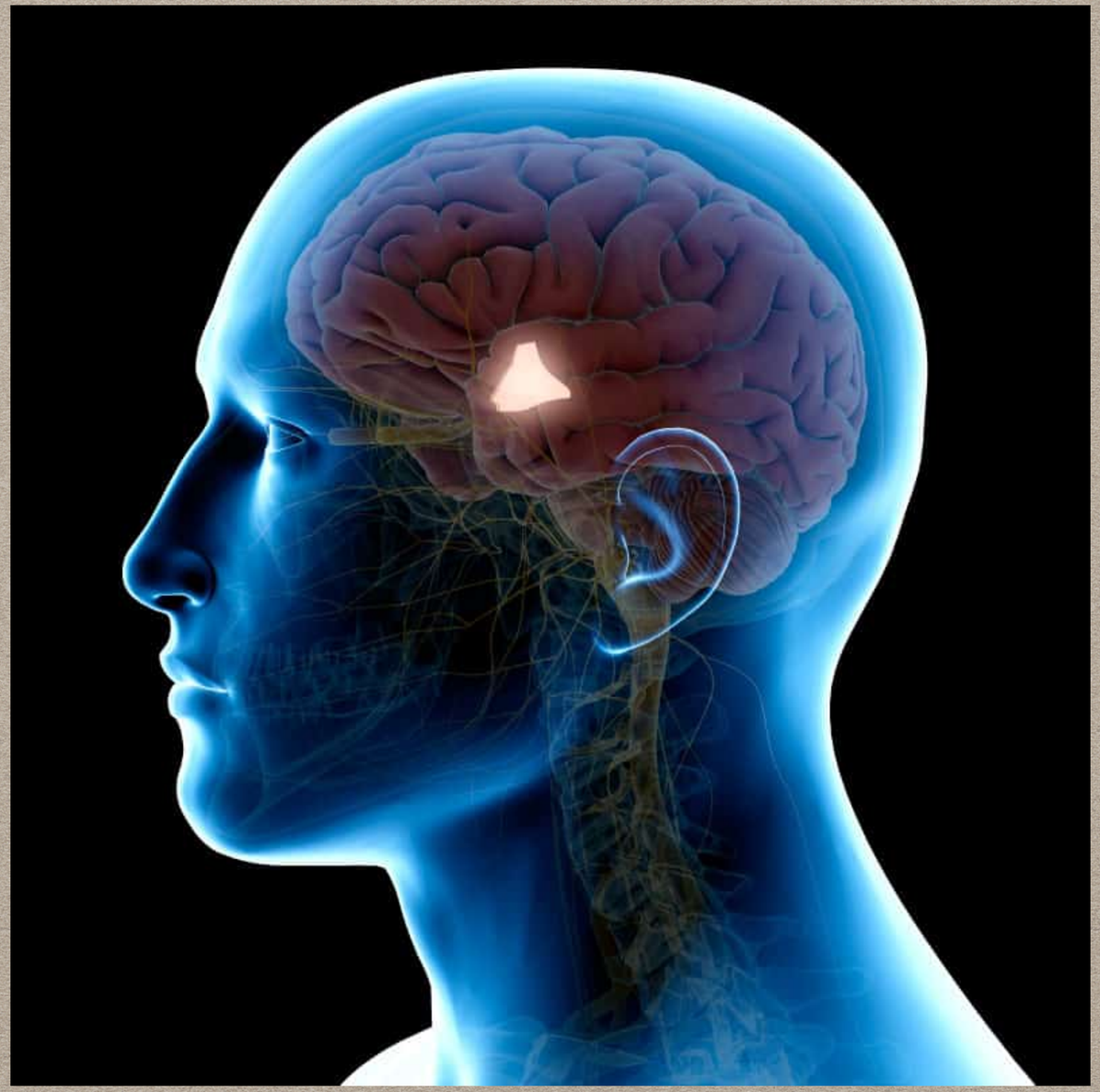
THE ENDOCRINE SYSTEM



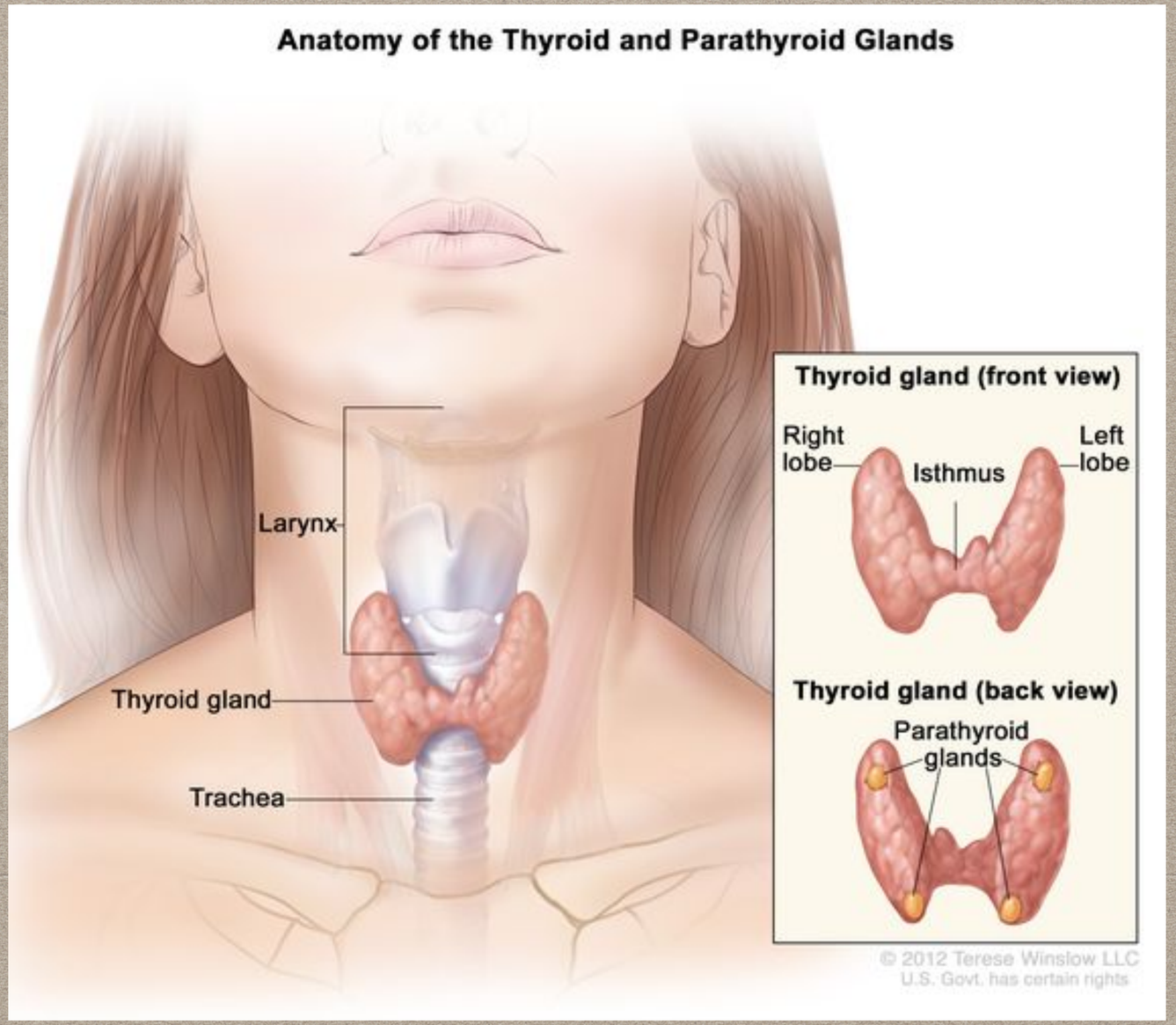
PITUITARY GLAND (MASTER GLAND)



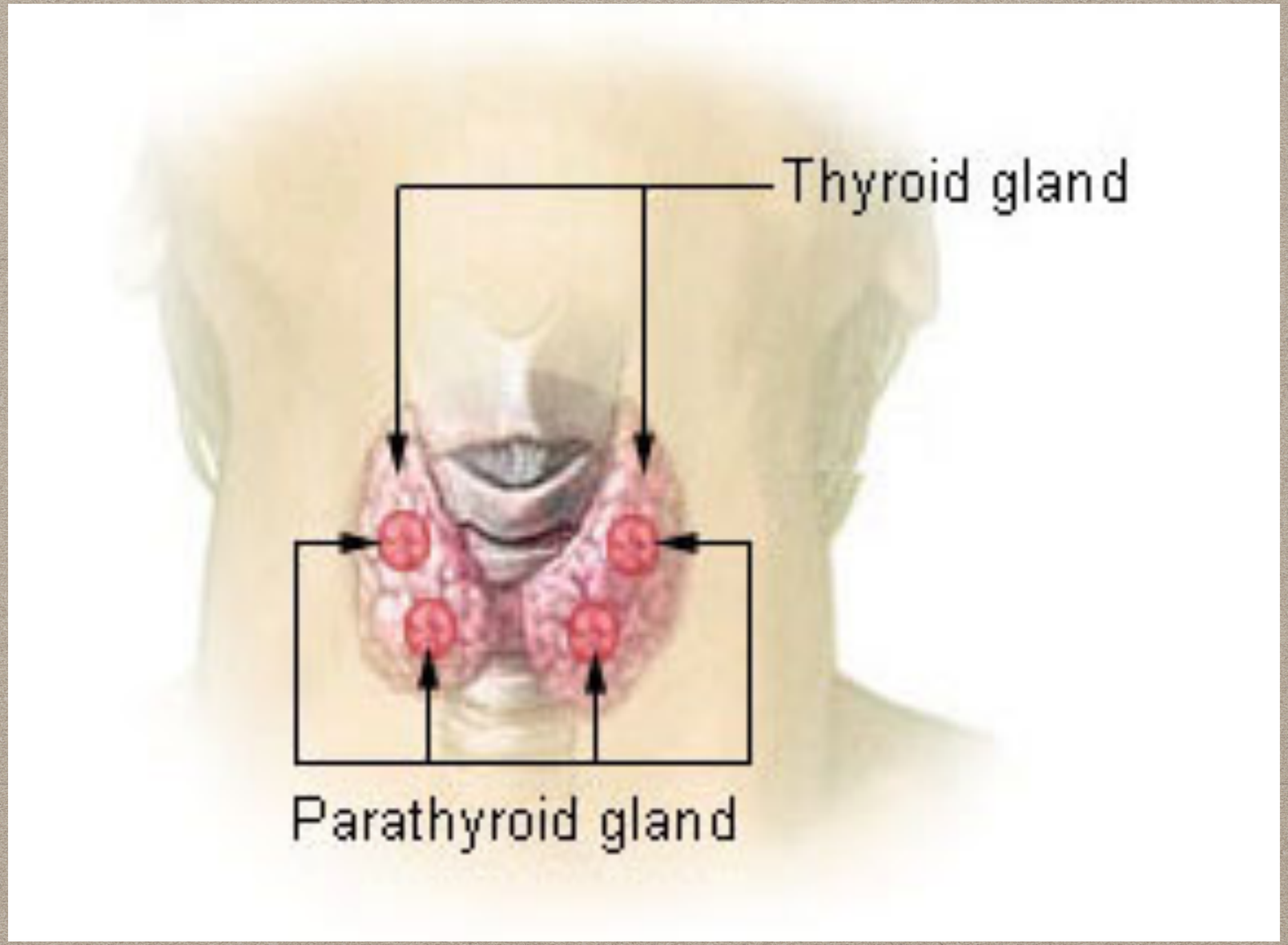
PINEAL GLAND



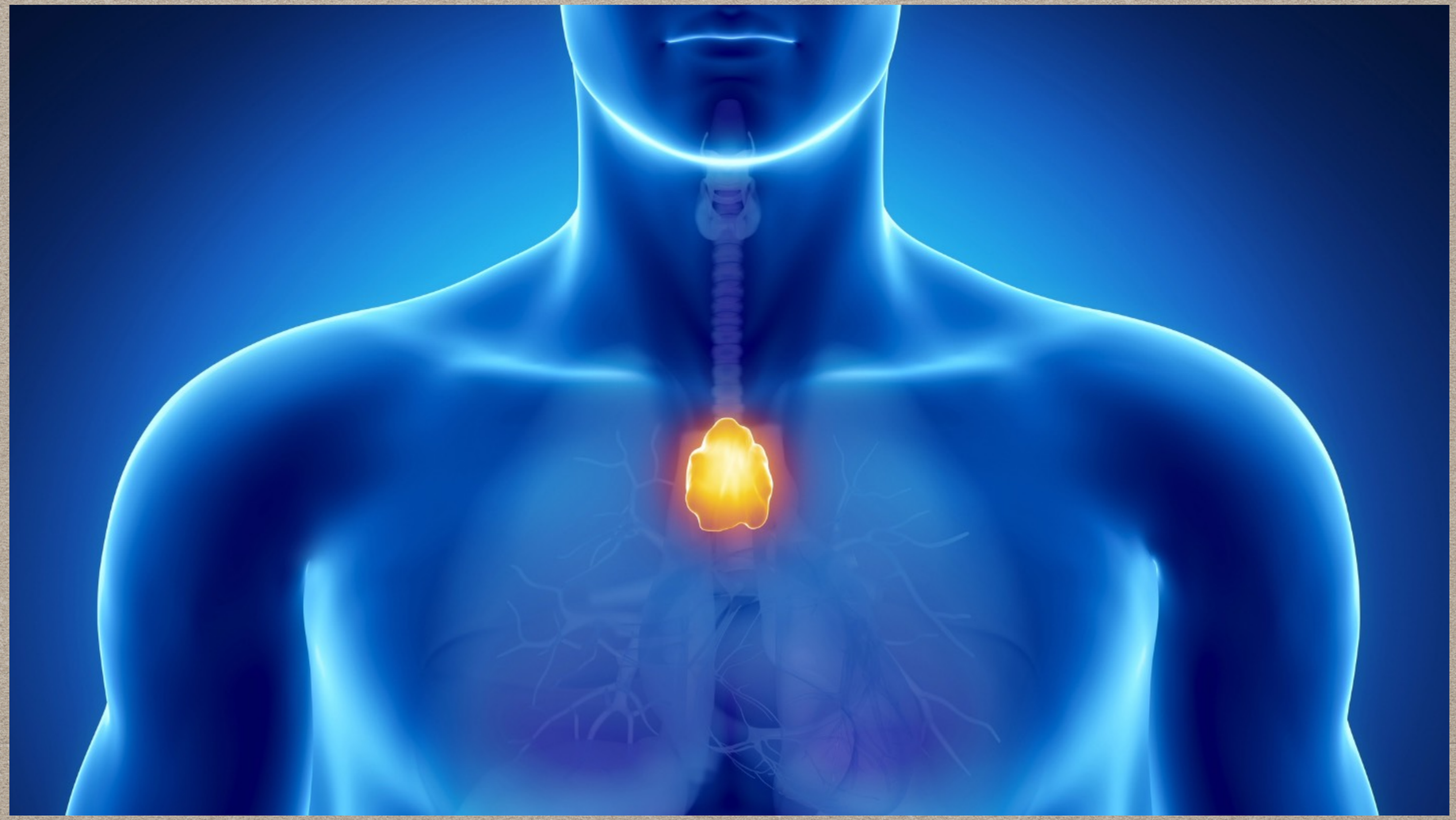
HYPOTHALAMUS



THYROID GLAND



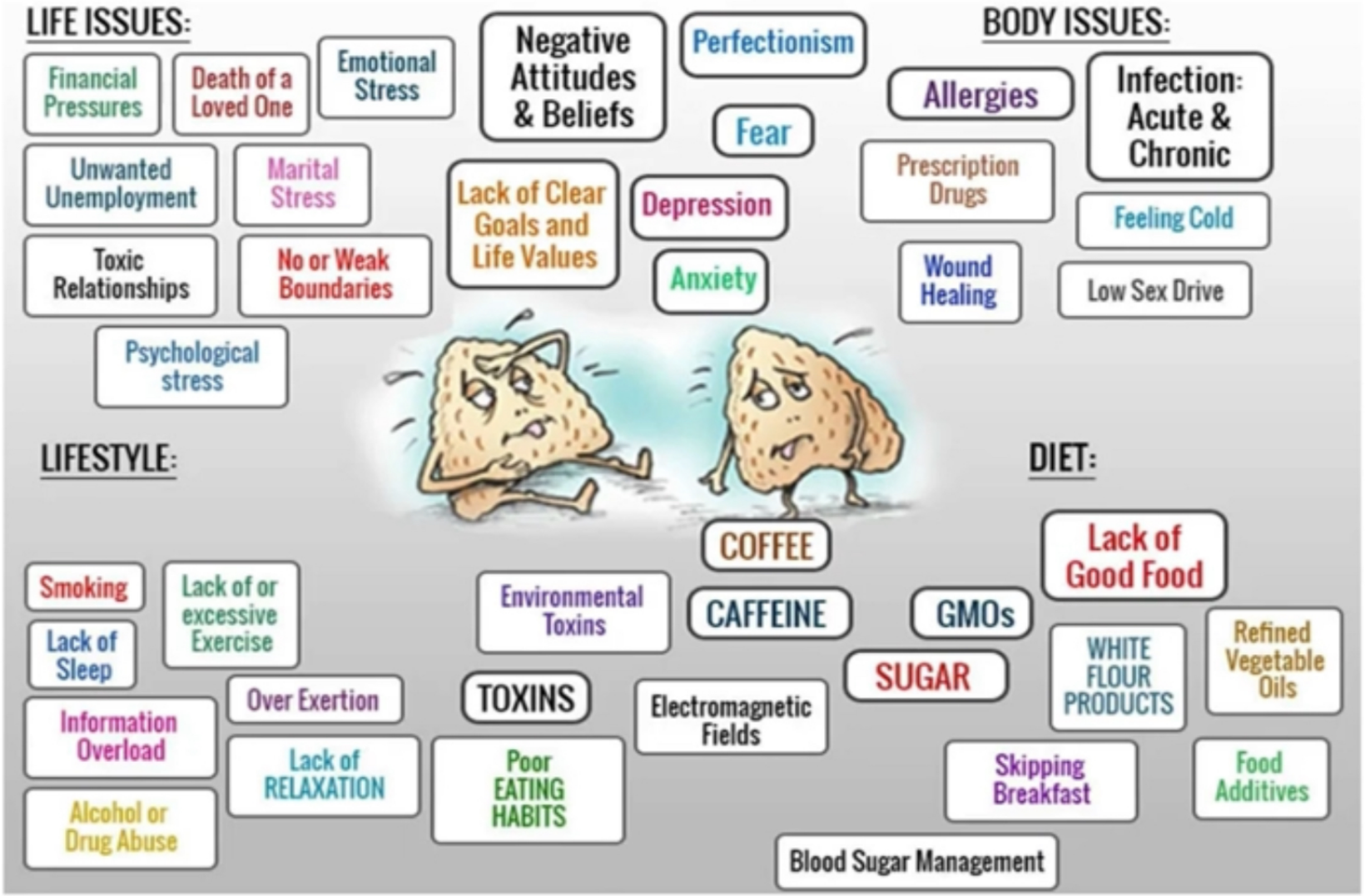
PARATHYROID GLANDS

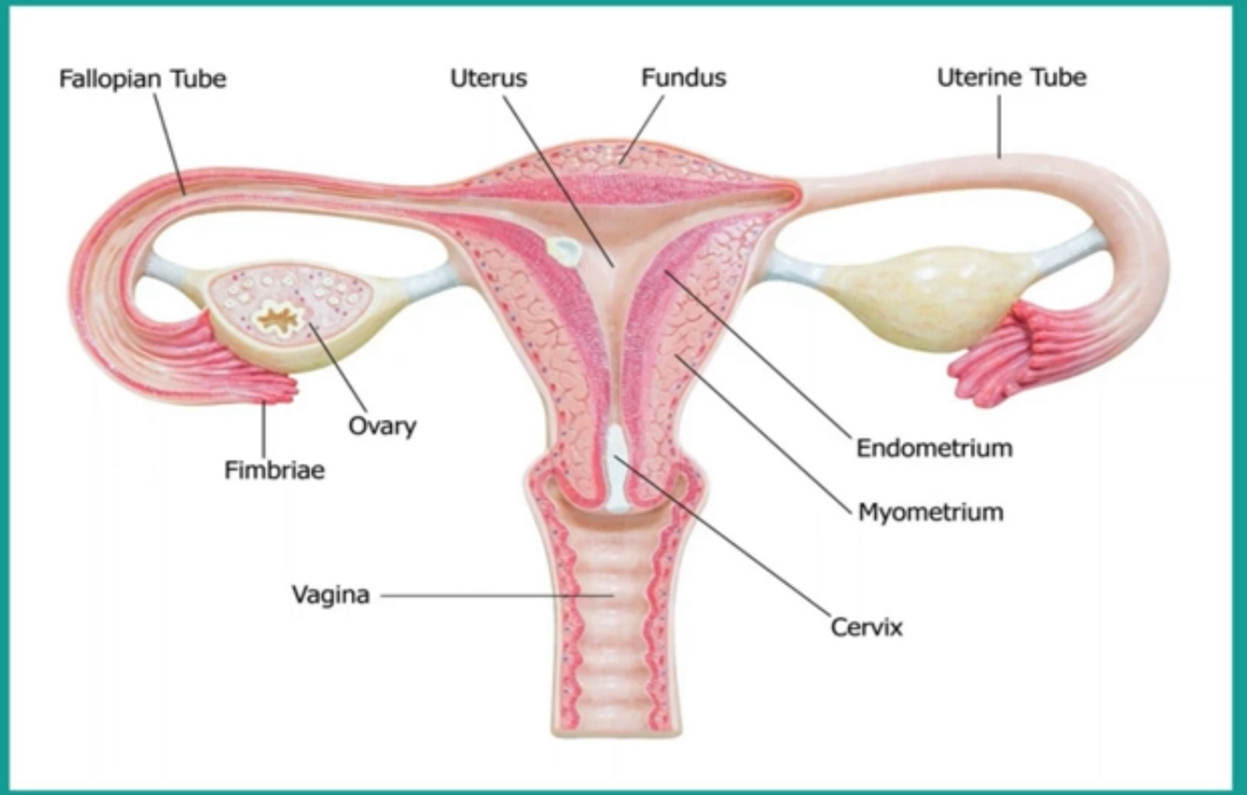


THYMUS GLANDS

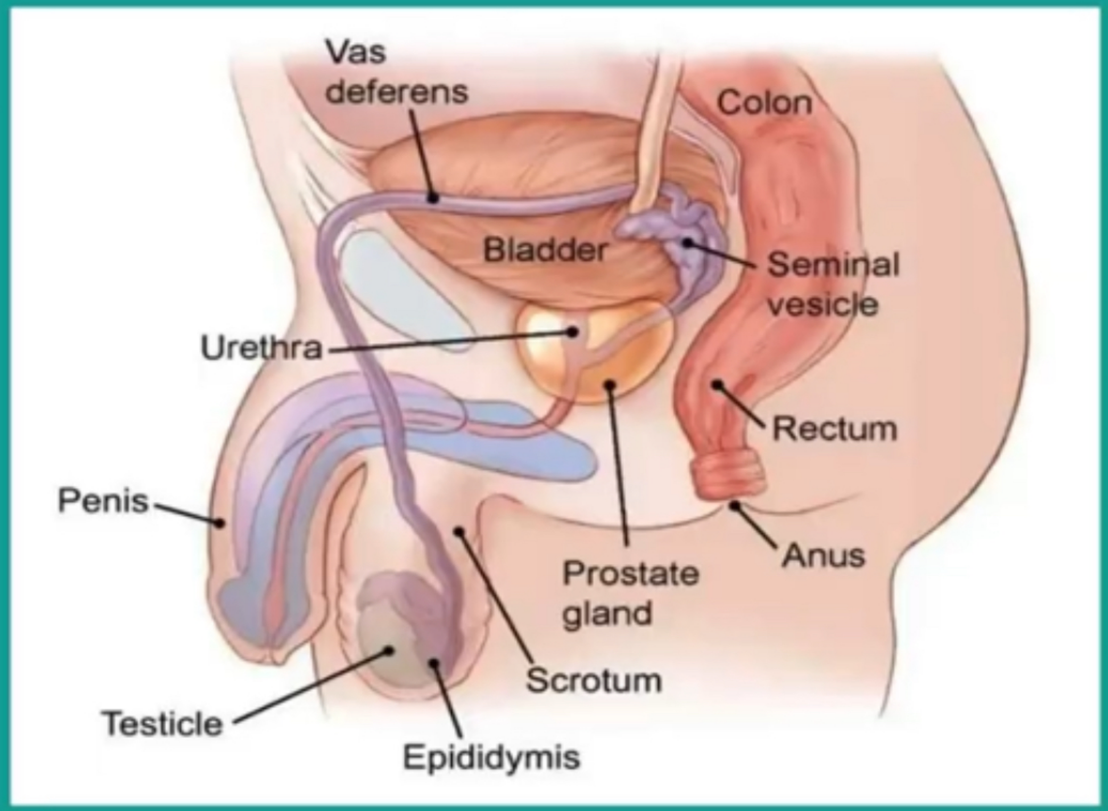
ADRENAL GLANDS

FACTORS AFFECTING ADRENAL GLANDS

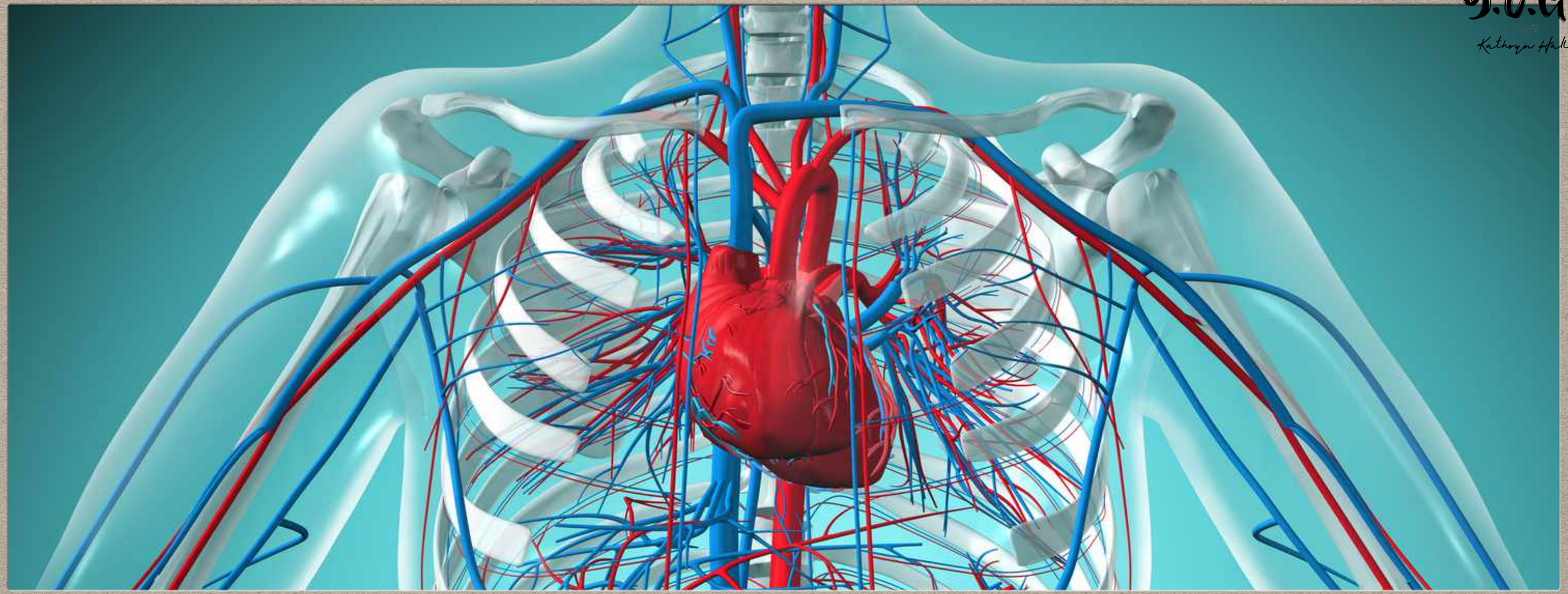



Fallopian Tube
Uterus
Fundus
Uterine Tube
Ovary
Fimbriae
Endometrium
Myometrium
Vagina
Cervix

OVARIES

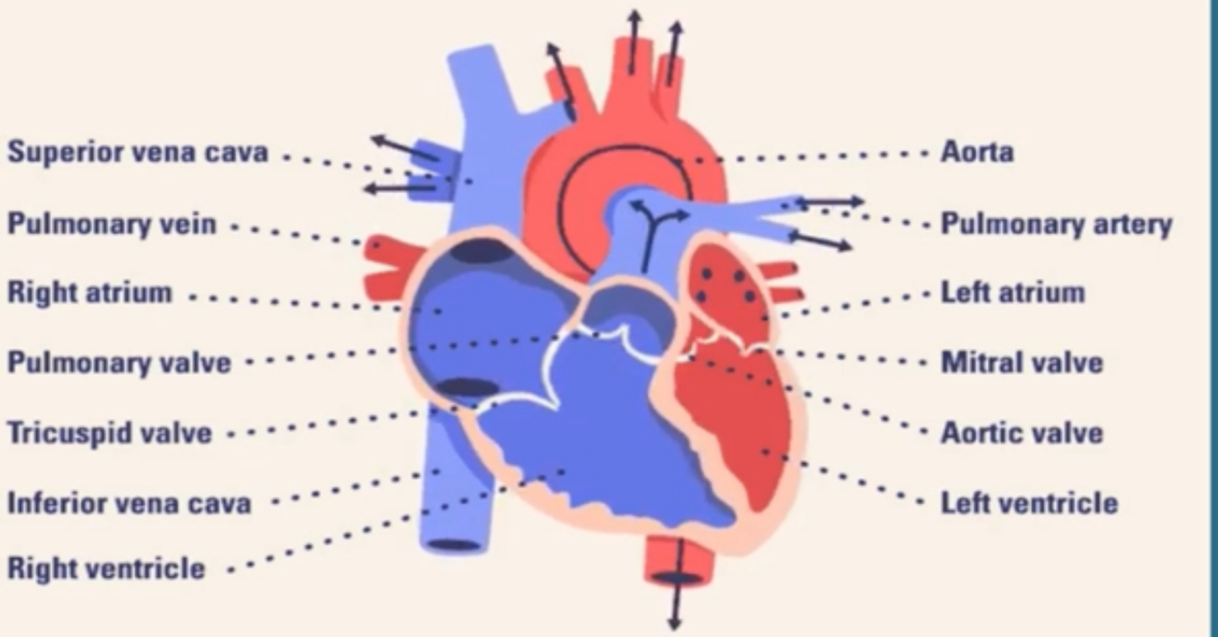

Vas deferens
Colon
Bladder
Seminal vesicle
Urethra
Rectum
Penis
Anus
Prostate gland
Scrotum
Testicle
Epididymis

TESTES



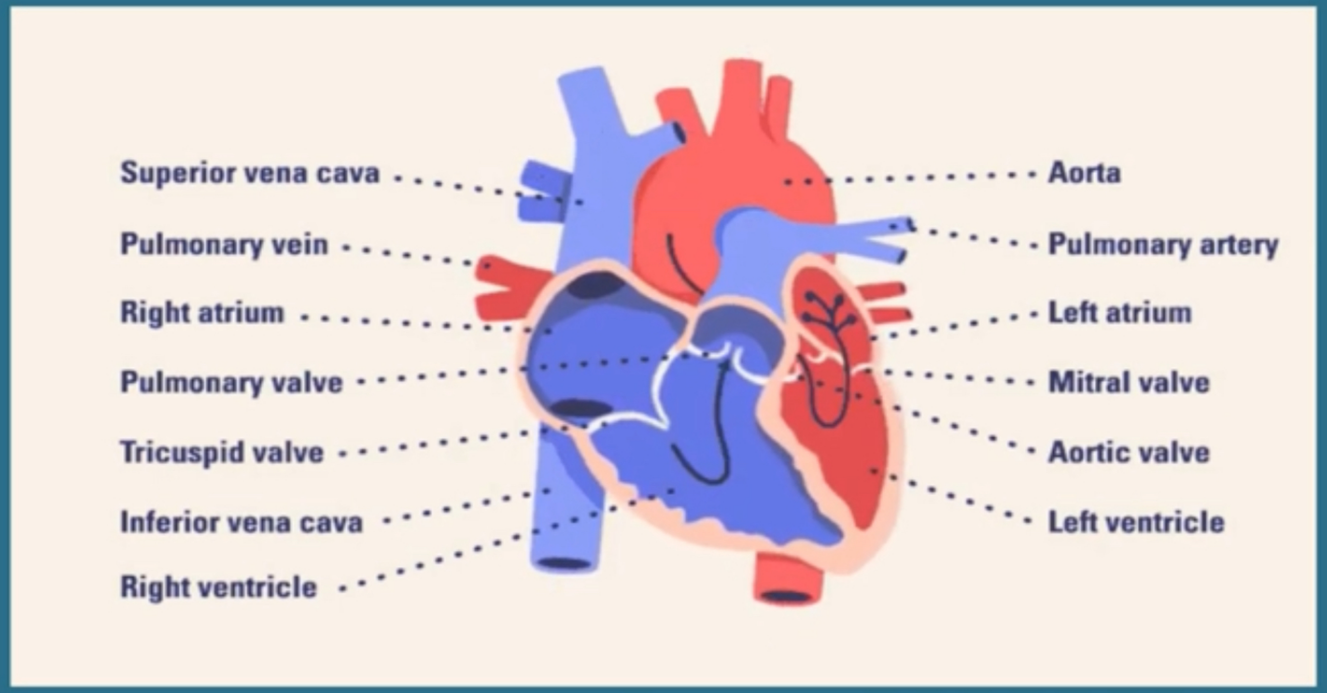
CARDIOVASCULAR SYSTEM

OR CIRCULATORY SYSTEM



HEART

- Left side of the heart: Oxygenated blood
- Right side of the heart: Carbon-dioxide rich blood or the de-oxygenated blood.
- Four chambers or compartments: Two upper chambers known as the left atrium and right atrium and two lower chambers called the left and right ventricles.
- Atria: Receives Blood
- Ventricles: Pumps Blood



VALVES EXPLAINED

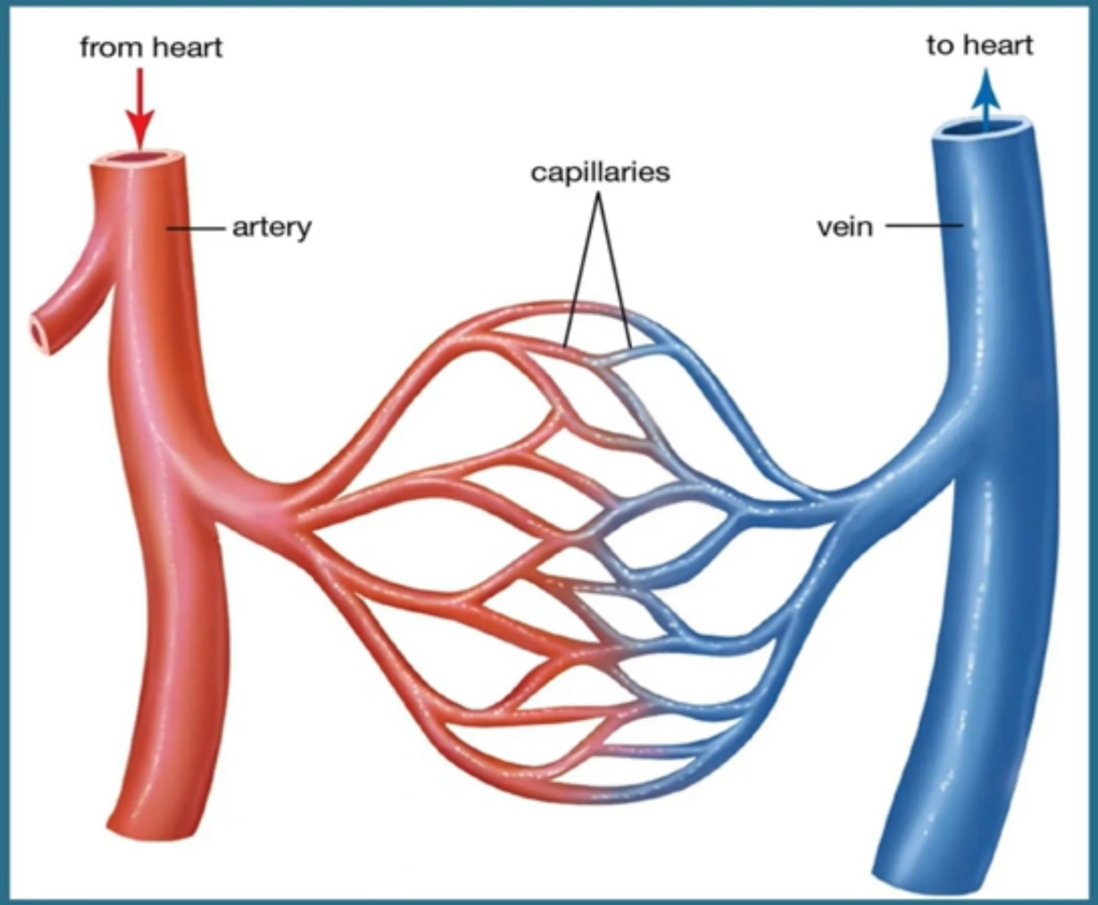
- The atria are separated from the ventricles by the atrioventricular valves: The tricuspid valve separates the right atrium from the right ventricle. whereas, the mitral valve separates the left atrium from the left ventricle.
- Two valves also separate the ventricles from the large blood vessels that carry blood leaving the heart: The pulmonic valve is between the right ventricle and the pulmonary artery, which carries blood to the lungs. Whereas, the aortic valve is between the left ventricle and the aorta, which carries blood to the body.

BLOOD FLOW

- Blue: De-oxygenated Blood
- Red: Oxygenated Blood
- Pulmonary circulation: A short loop from the heart to the lungs and back again.
- Systemic circulation: Carries blood from the heart to all the other parts of the body and back again.

BLOOD VESSELS

- Arteries: They begin with the aorta, the large artery leaving the heart.
- Capillaries: These are small, thin blood vessels that connect the arteries and the veins.
- Veins: These are blood vessels that take blood back to the heart.



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TWO PATHWAYS

PULMONARY CIRCULATION

- This circuit carries blood without oxygen from the heart to the lungs. The pulmonary veins return oxygenated blood to the heart.

SYSTEMIC CIRCULATION

- In this circuit, blood with oxygen, nutrients and hormones travels from the heart to the rest of the body. In the veins, the blood picks up waste products as the body uses up the oxygen, nutrients and hormones.

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HOW THE BLOOD FLOWS

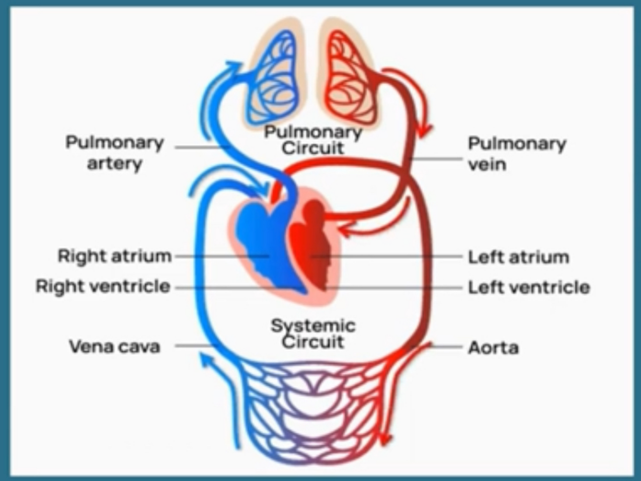
RIGHT SIDE OF THE HEART

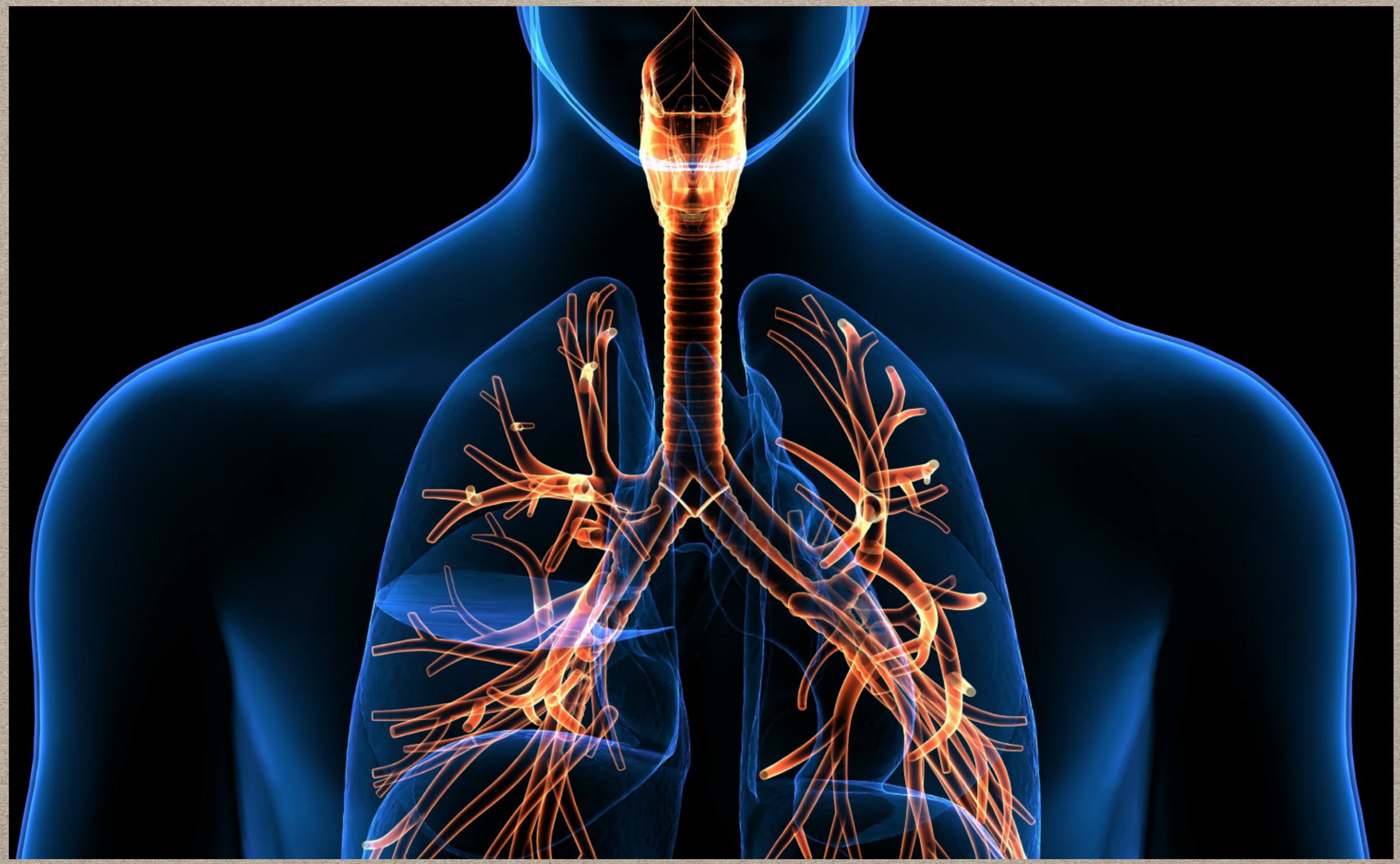
- Blood enters the heart through two large veins, the inferior and superior vena cava, emptying oxygen-poor blood from the body into the right atrium of the heart.
- As the atrium contracts, blood flows from your right atrium into your right ventricle through the open tricuspid valve.
- When the ventricle is full, the tricuspid valve shuts. This prevents blood from flowing backward into the atria while the ventricle contracts.
- As the ventricle contracts, blood leaves the heart through the pulmonic valve, into the pulmonary artery and to the lungs, where it is oxygenated and then returns to the left atrium through the pulmonary veins.

LEFT SIDE OF THE HEART

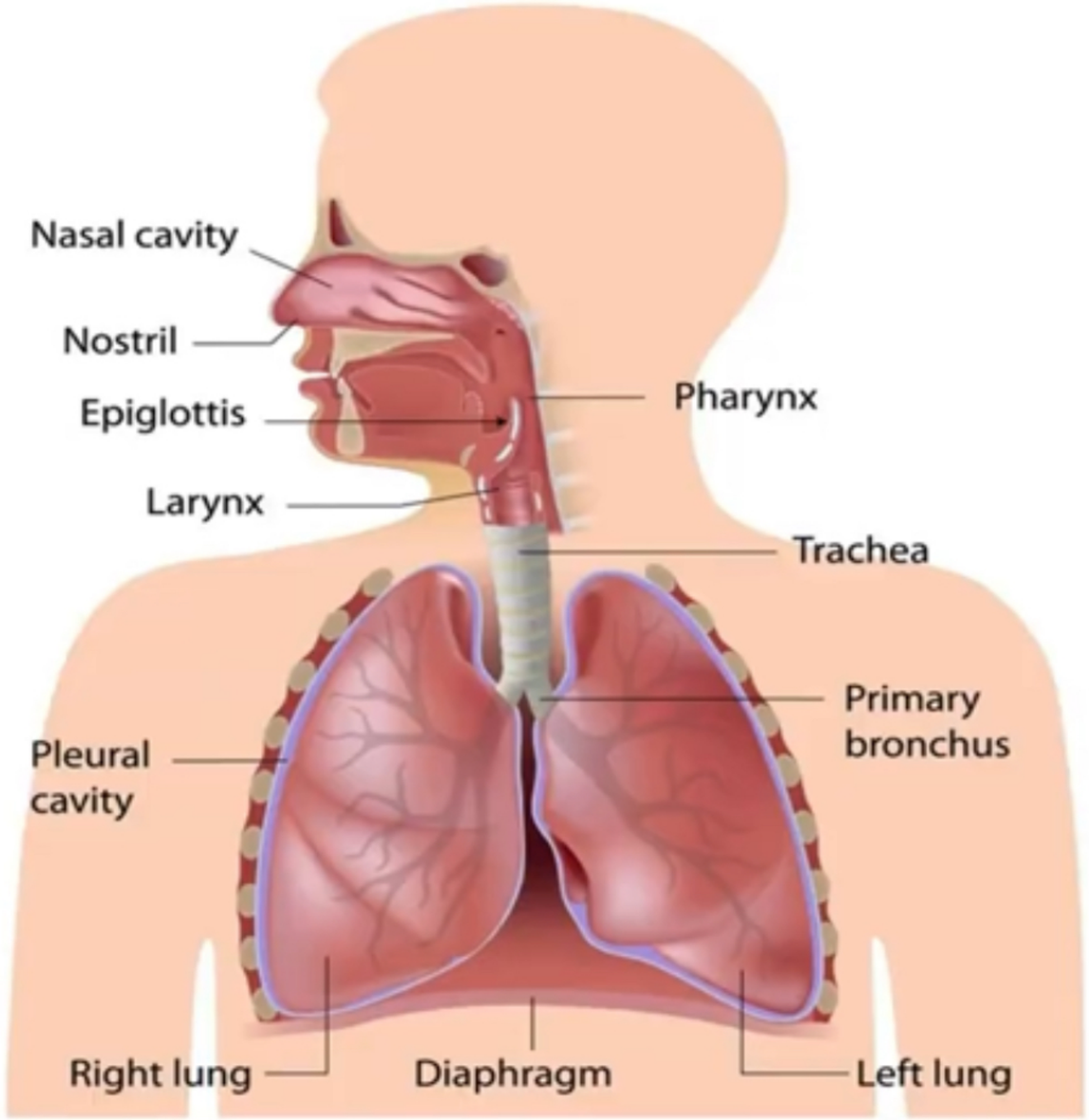
- The pulmonary veins empty oxygen-rich blood from the lungs into the left atrium of the heart.
- As the atrium contracts, blood flows from your left atrium into your left ventricle through the open mitral valve.
- When the ventricle is full, the mitral valve shuts. This prevents blood from flowing backward into the atrium while the ventricle contracts.
- As the ventricle contracts, blood leaves the heart through the aortic valve, into the aorta and to the body.

CIRCULATION





RESPIRATORY SYSTEM


Nasal cavity
Nostril
Epiglottis
Larynx
Pharynx
Trachea
Primary bronchus
Pleural cavity
Right lung
Diaphragm
Left lung

FUNCTIONS OF RESPIRATORY SYSTEM

Has many functions. Besides helping you inhale (breathe in) and exhale (breathe out) it:

- Allows you to talk and to smell
- Warms air to match your body temperature and moisturises it to the humidity level your body needs
- Delivers oxygen to the cells in your body
- Removes waste gases, including carbon dioxide, from the body when you exhale.
- Protects your airways from harmful substances and irritants.

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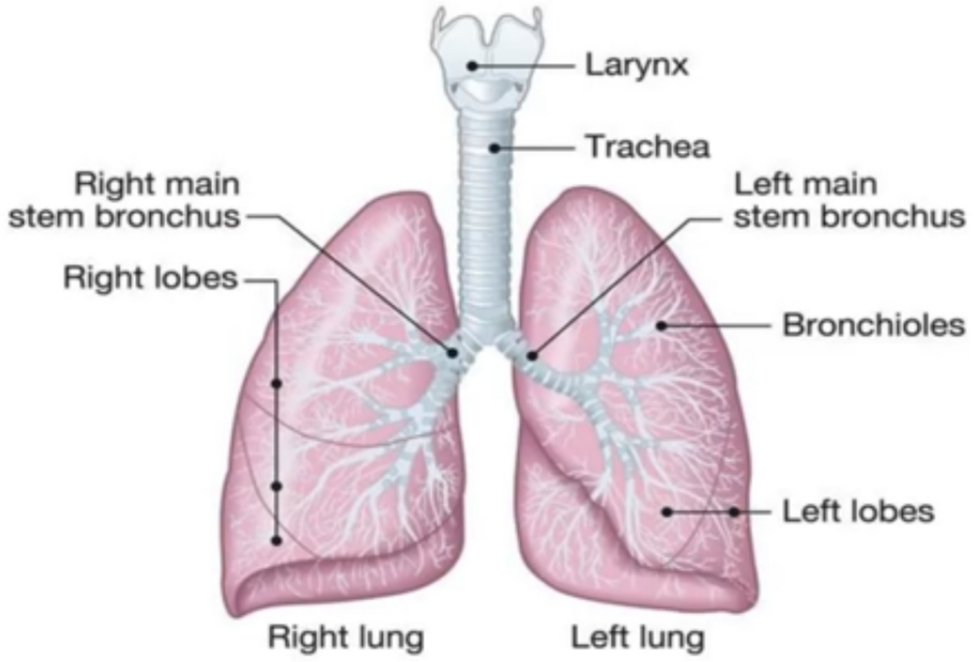
LUNG ANATOMY



TRACHEA

LEFT & RIGHT BRONCHUS

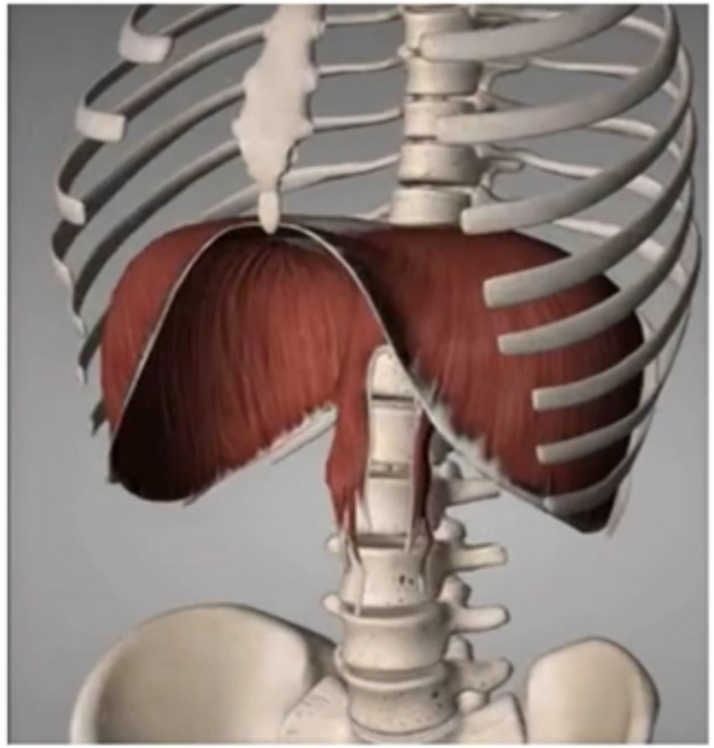
BRONCHIOLES

TERMINAL BRONCHIOLES

ALVEOLI

DIAPHRAGM

PRINCIPLE MUSCLE FOR BREATHING



DIGESTIVE SYSTEM

PERISTALSIS

Peristalsis is the automatic wave-like movement of the muscles that line your gastrointestinal tract. Peristalsis moves food through your digestive system, beginning in your throat when you swallow and continuing through your esophagus, stomach and intestines while you digest.

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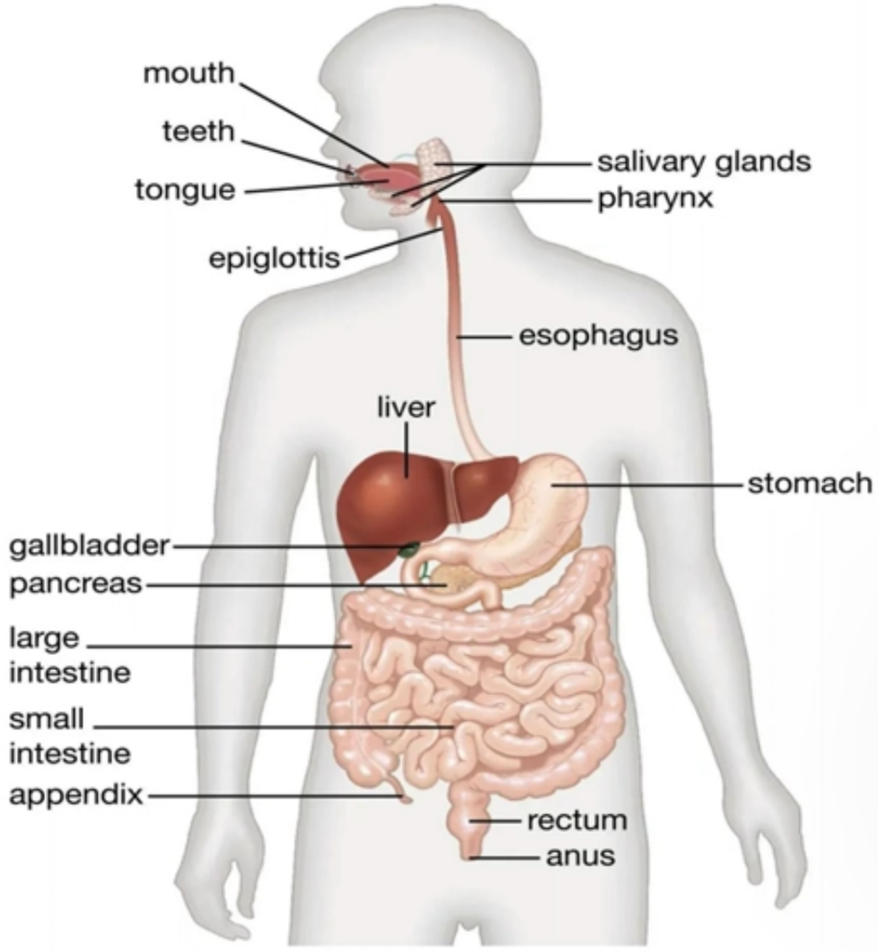
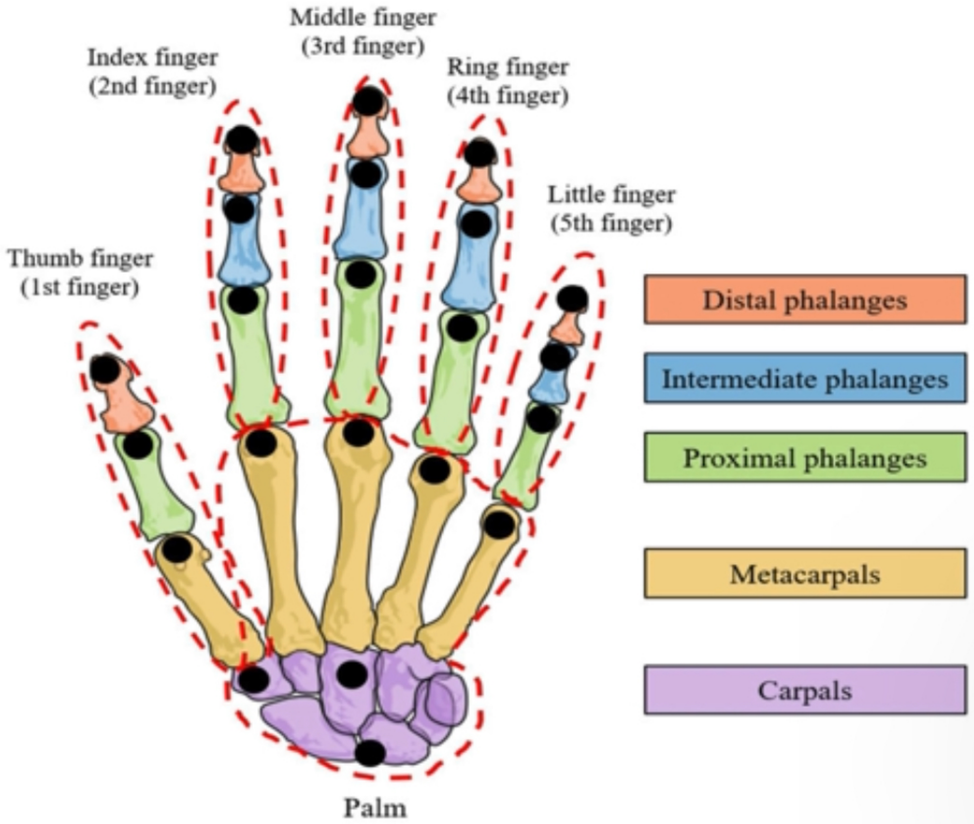
PARTS OF THE DIGESTIVE SYSTEM



Skeleton of the Hand

- Phalanges: The 14 bones that are found in the fingers of each hand and also in the toes of each foot. Each finger has 3 phalanges (the distal, middle, and proximal); the thumb only has 2.
- Metacarpal bones: The 5 bones that compose the middle part of the hand.
- Carpal bones: The 8 bones that create the wrist. The 2 rows of carpal bones are connected to 2 bones of the arm - the ulna bone and the radius bone.



HAND AND WRIST ANATOMY

BONES

SKELETAL SEGMENTS

SKELETAL SYSTEM

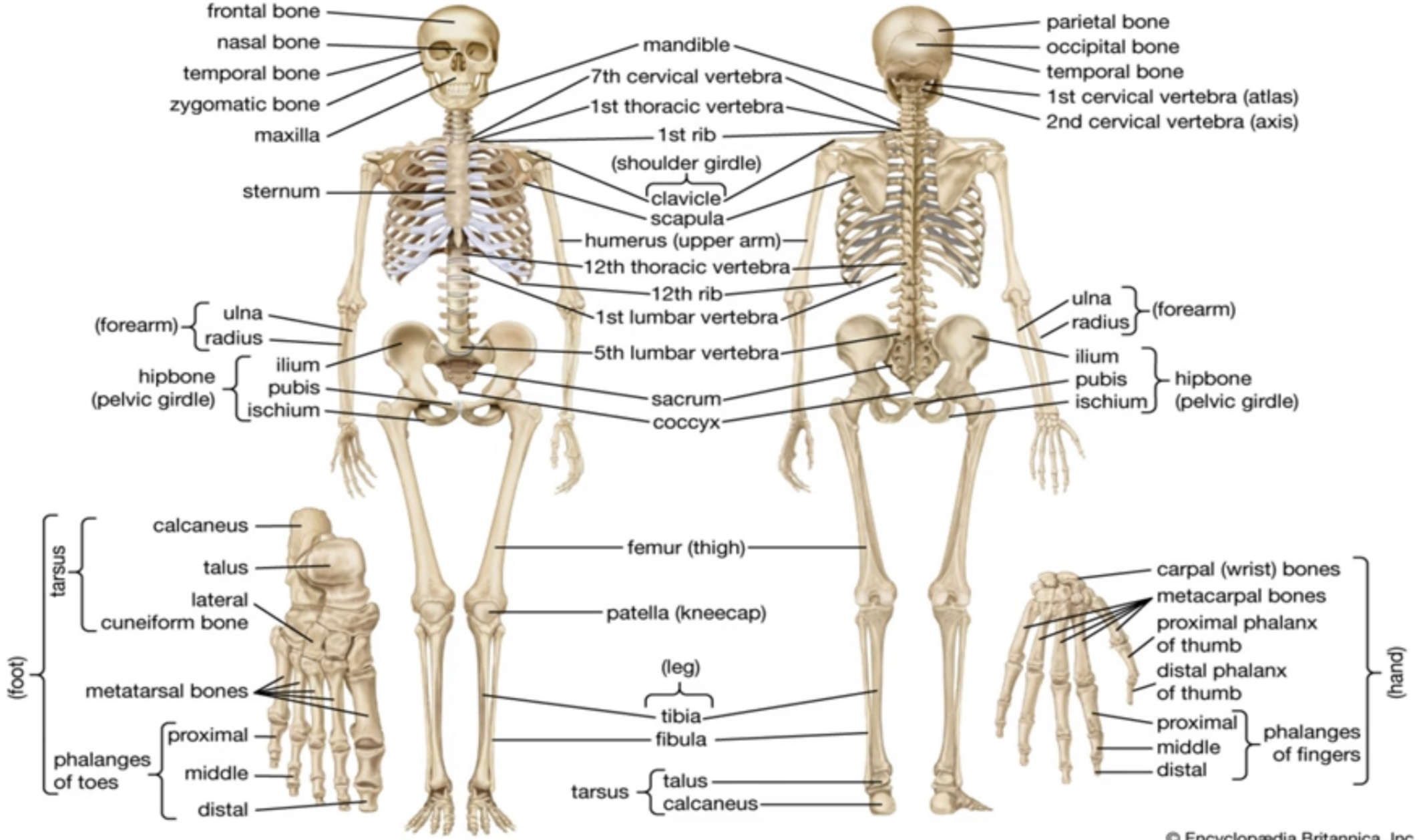
The human skeletal system consists of all the bones, cartilage, tendons and ligaments in the body. Altogether, the skeleton makes up about 20 percent of a person's body weight.

An adults skeleton contains 206 bones. Children skeletons actually contain more bones because some of them, including those of the skull, fuse together as they grow up.

There are also some differences in the male and female skeleton. The male skeleton is usually longer and has a high bone mass. The female skeleton on the other hand has a broader pelvis to accommodate for pregnancy and child-birth.

Regardless of age or sex, the skeletal system can be broken down into two parts:

- Axial Skeleton
- Appendicular skeleton.



DIVISIONS

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COMPARATIVE/ AESTHETIC APPROACH

01

Axial Skeleton: Skull, Spine, Ribs and Sternum

02

Appendicular Skeleton: Upper, Limbs, Lower Limbs and Girdles (shoulder and pelvic girdle)

This perspective is a generic way of studying the human body, and ignores the human variations, specially the skeletal variations.

FUNCTIONAL APPROACH

01

It talks about the different shapes, lengths, widths, proportions and orientations of the bones in each particular individual.

02

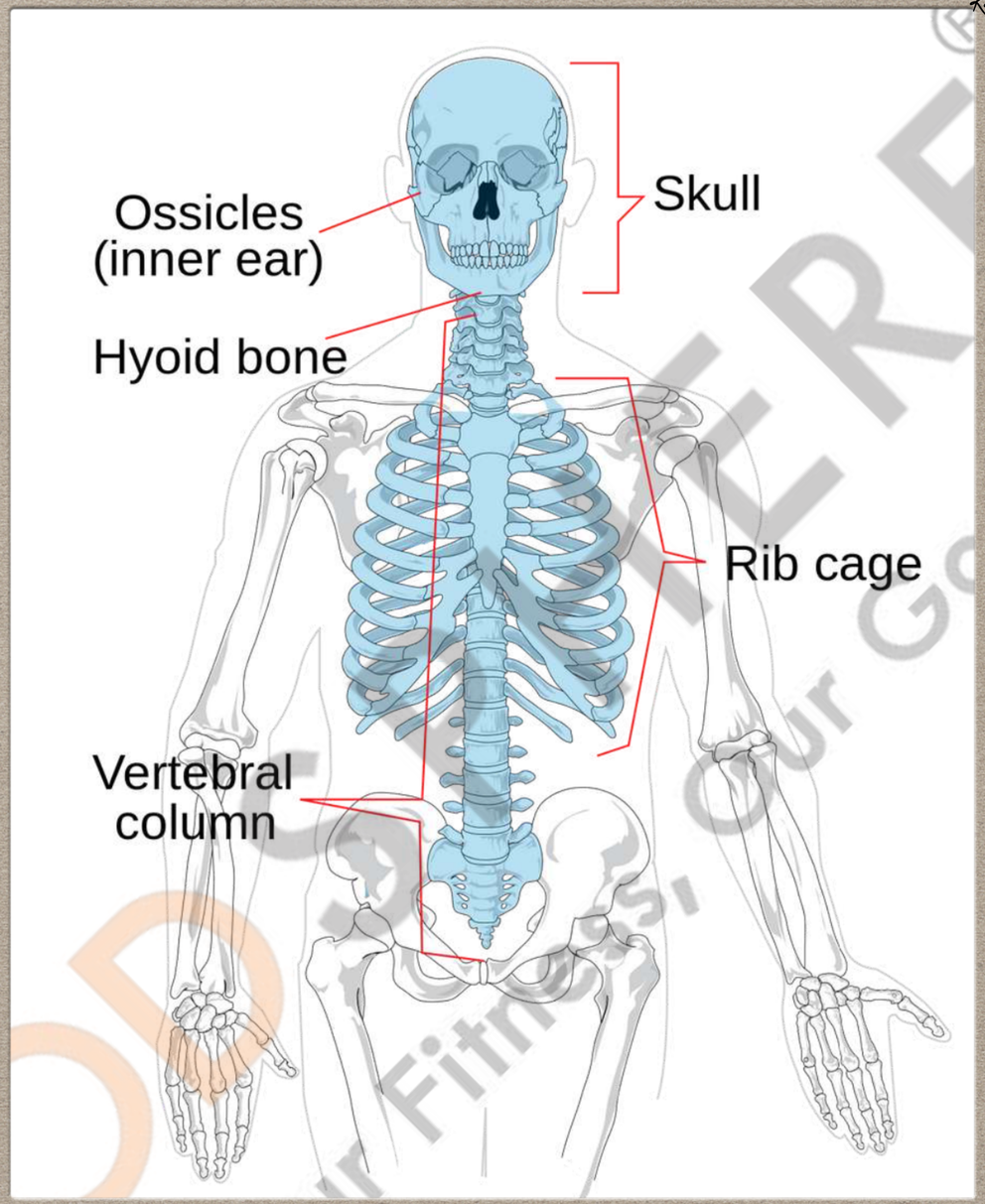
According to this approach, all the bones of thebody can be grouped functionally into 14 skeletal segments.

AXIAL SKELETON

The adult axial skeleton consists of 80 bones. Its made up of the bones that form the vertical axis of the body, such as the bones of the head, neck, chest and spine.

It runs along the body's midline axis and is present in the following regions:

- Skull
- Hyoid
- Auditory Ossicles
- Ribs and sternum
- Sternum
- Vertebral column

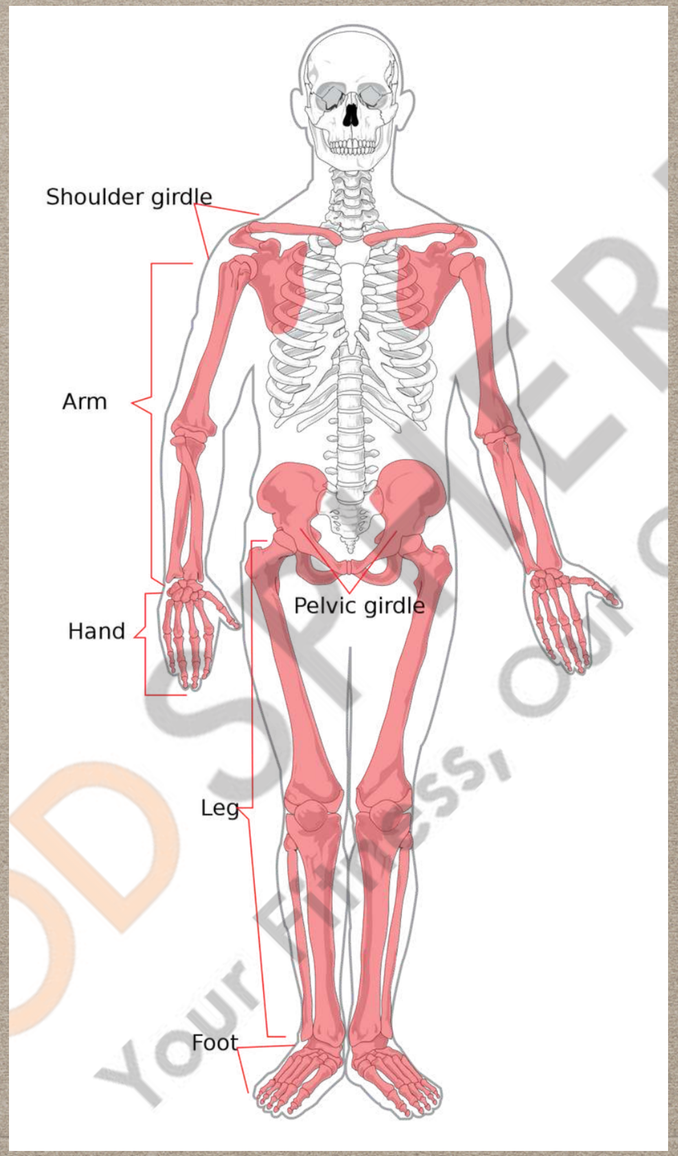


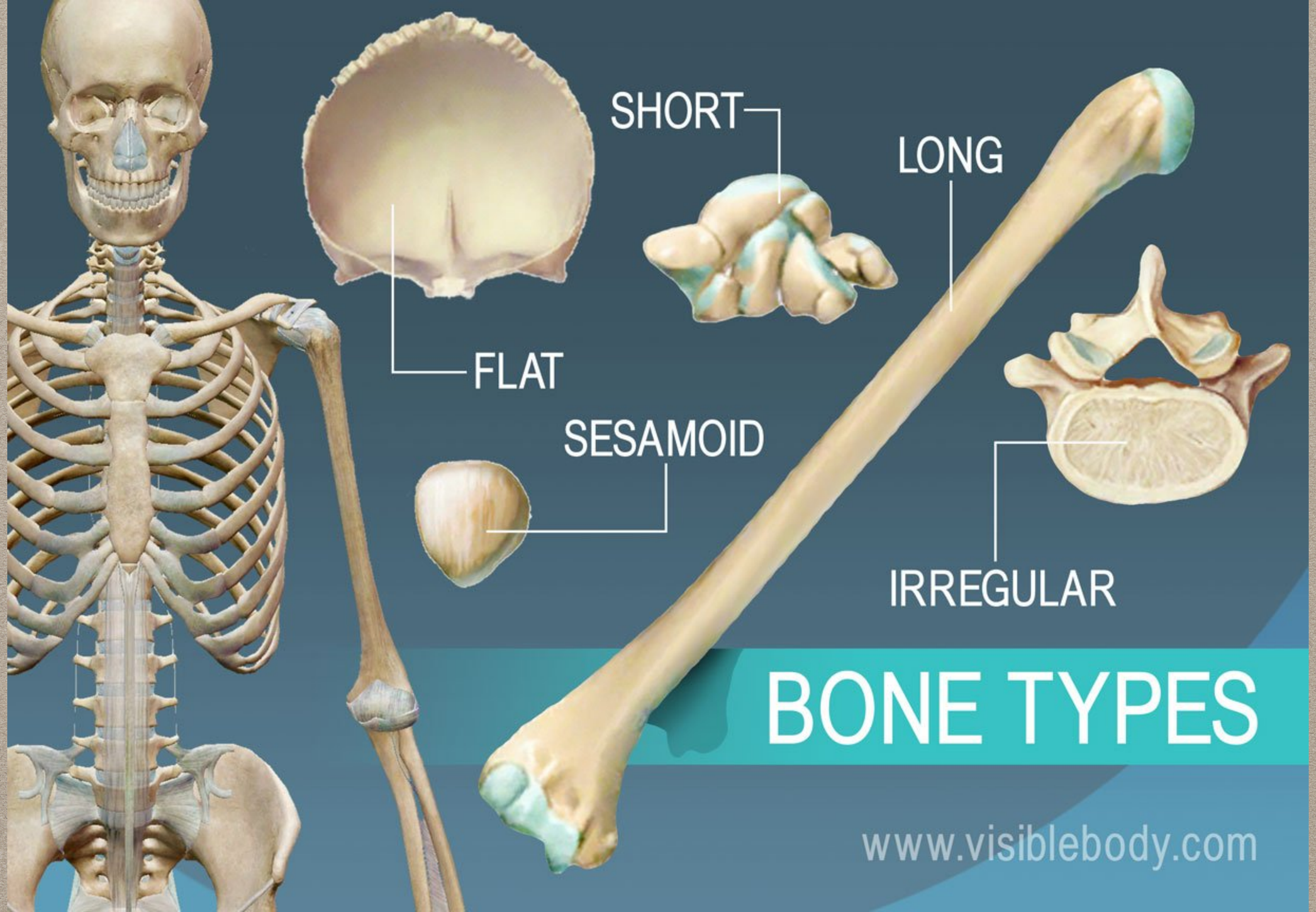
AXIAL APPENDICULAR SKELETON

There are a total of 126 bones in the appendicular skeleton.

It is present in the following regions:

- Upper limbs
- Lower limbs
- Pelvic girdle
- Pectoral (shoulder) girdle

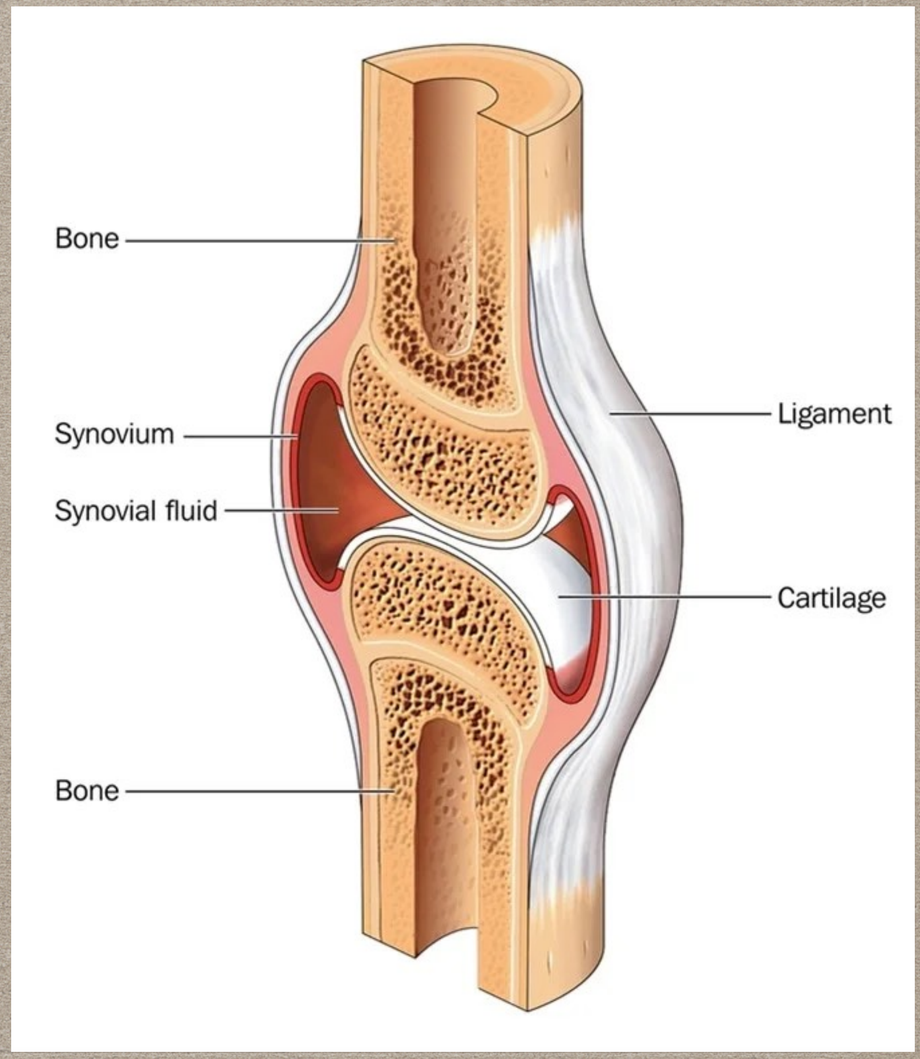




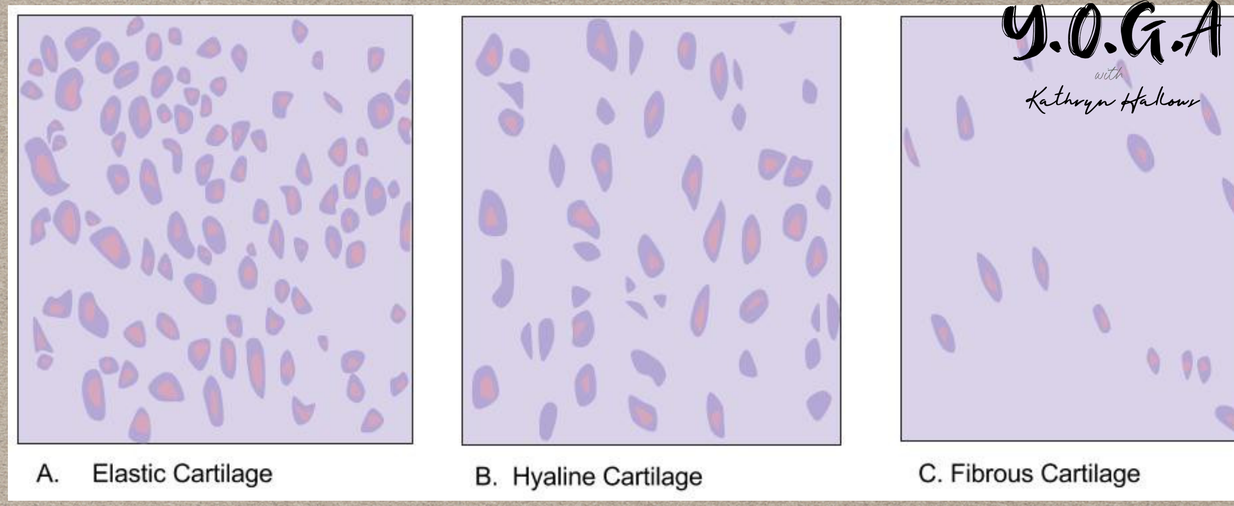
CARTILAGE

Cartilage is an avascular flexible connective tissue located throughout the body that provides support and cushioning for adjacent tissues. It is the flexible part of your ear, the end of your nose and the cushioning between the joints. It is also what the skeleton of animals like sharks is made up of.

Cartilage is also a connective tissue like muscle or bone but it does not have nerves.



TYPES OF CARTILAGE



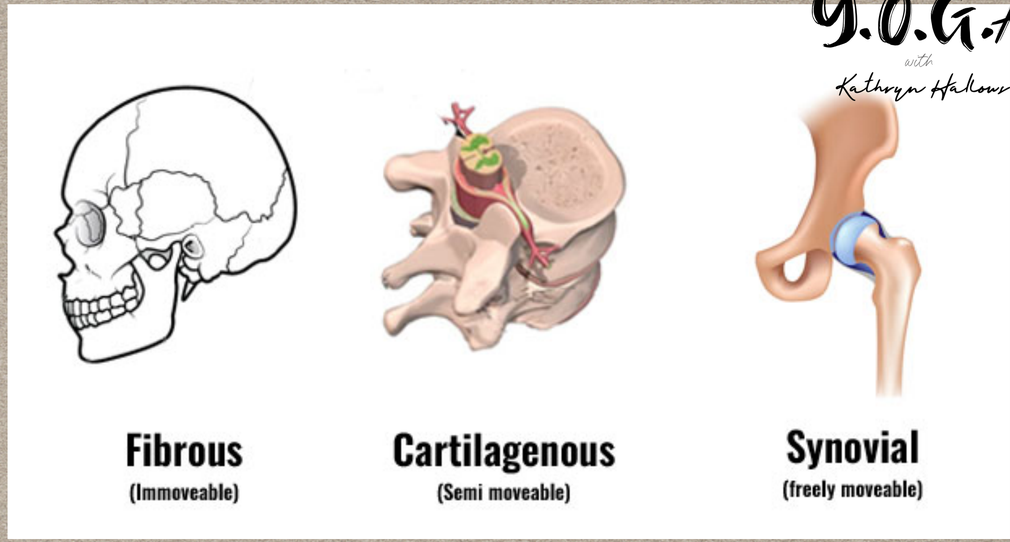
- **Hyaline Cartilage** - most widespread cartilage type and in adults, it forms the articular surfaces of long bones, the rib tips, the rings of the trachea and parts of the skull. Predominantly collagen (yet with few collagen fibres) and its name refers to its glassy appearance. It is smooth and tough with minimal flexibility. Helps our joints glide smoothly.

- **Elastic Cartilage** - provides strength and elasticity and maintains the shape of certain structures such as the external ear. Elastic cartilage, which is yellow in appearance, is more pliable than the other two forms because it contains elastic fibres in addition to collagen.

- **Fibrocartilage** - lots of collagen fibres (type 1 and type 2) and it tends to grade into dense tendon and ligament tissue. White fibrocartilage consists of a mixture of white fibrous tissue and cartilaginous tissue in various proportions. It owes its flexibility and toughness to the fibrous tissue, and its elasticity to the cartilaginous tissue. It is the only type of cartilage that contains the 1 collagen in addition to the normal type 2.

JOINTS

Joint is an articulation - the place of union or junction between two or more bones or parts of the bones or skeleton.



- **Synovial** - defined by the presence of a fluid -filled joint cavity contained within a fibrous capsule. They are freely movable (diarthrosis) and are the most common type of joint found in the body. E.g. ball and socket, hinge, pivot, saddle and plane joints.
- **Fibrous** - where the bones are bound by a tough, fibrous tissue. These are typically joints that require strength and stability over range of movement. E.g. sutures of the skull.
- **Cartilaginous** - connected entirely by cartilage (fibrocartilage or hyaline. They allow more movement between bones than a fibbers joint but less than the highly mobile synovial joint. The joint between the manubrium and the sternum and intervertebral discs are an example.

14 SKELETAL SEGMENTS

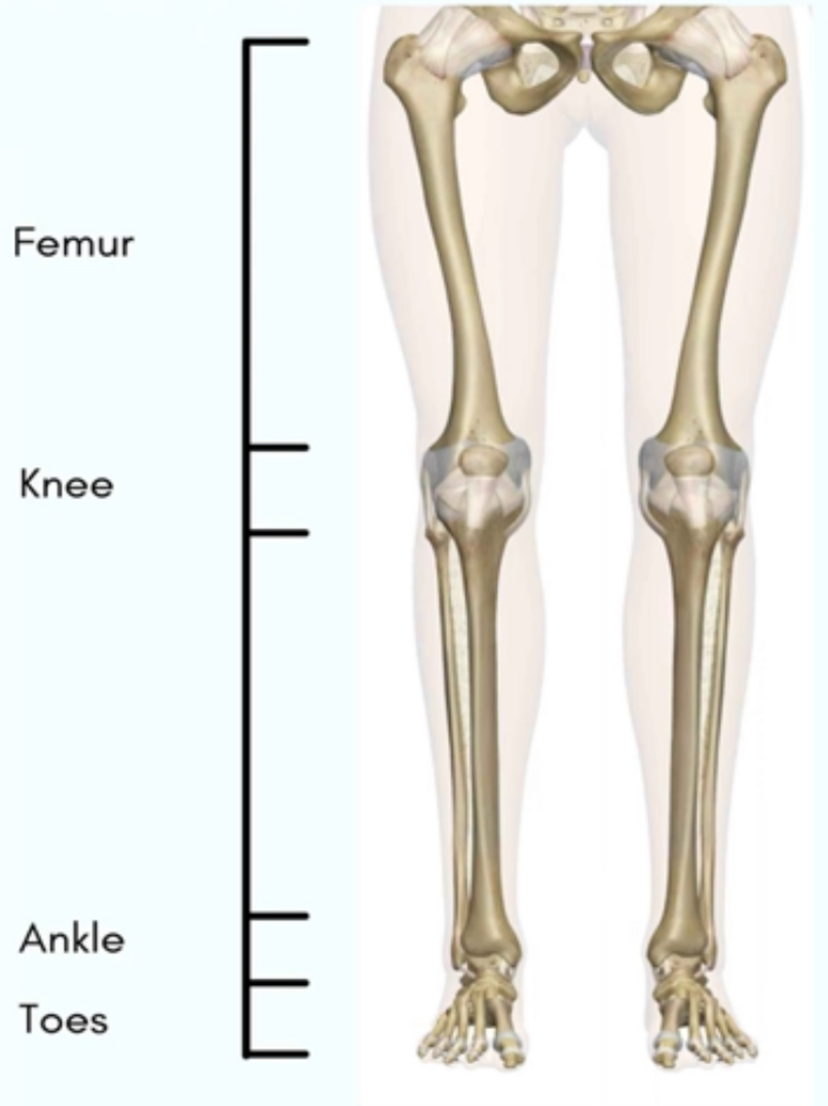
4 SEGMENTS
IN EACH LEG

4 SEGMENTS
IN THE AXIS

6 SEGMENTS
IN EACH ARM

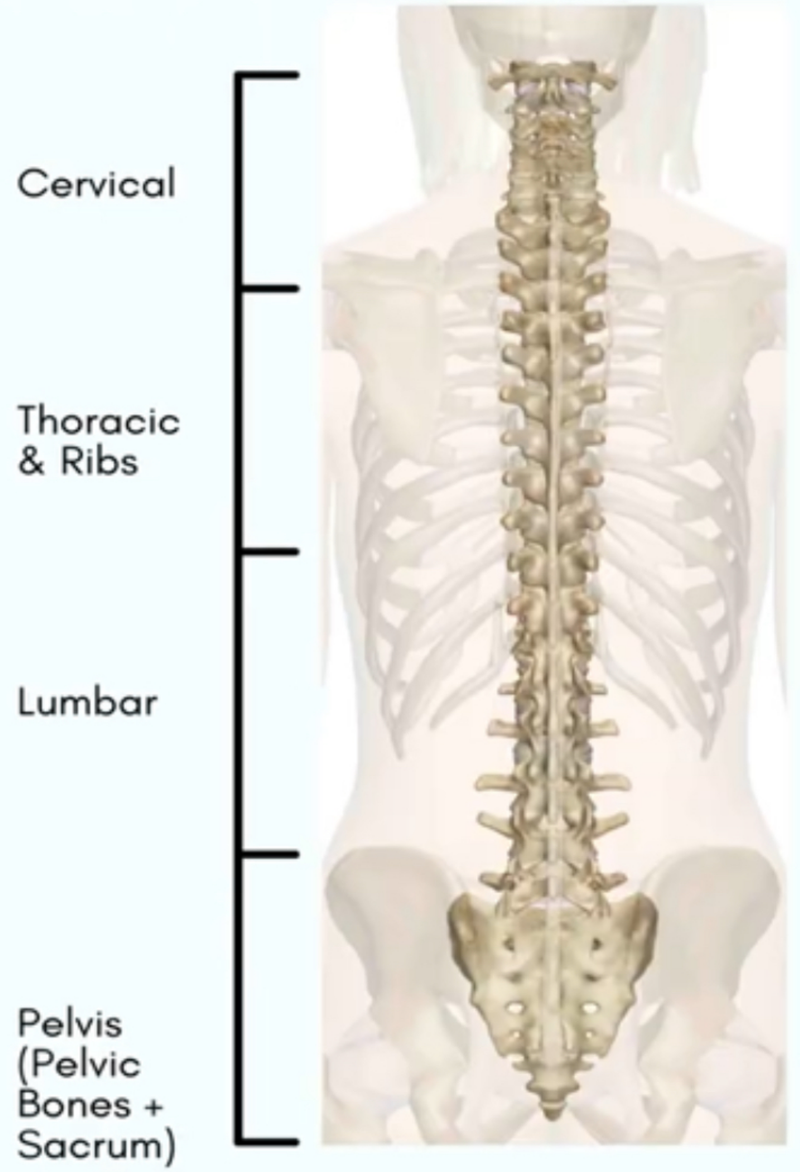
SEGMENTS OF THE LEGS

- Femur
- Knee
- Ankle
- Toes



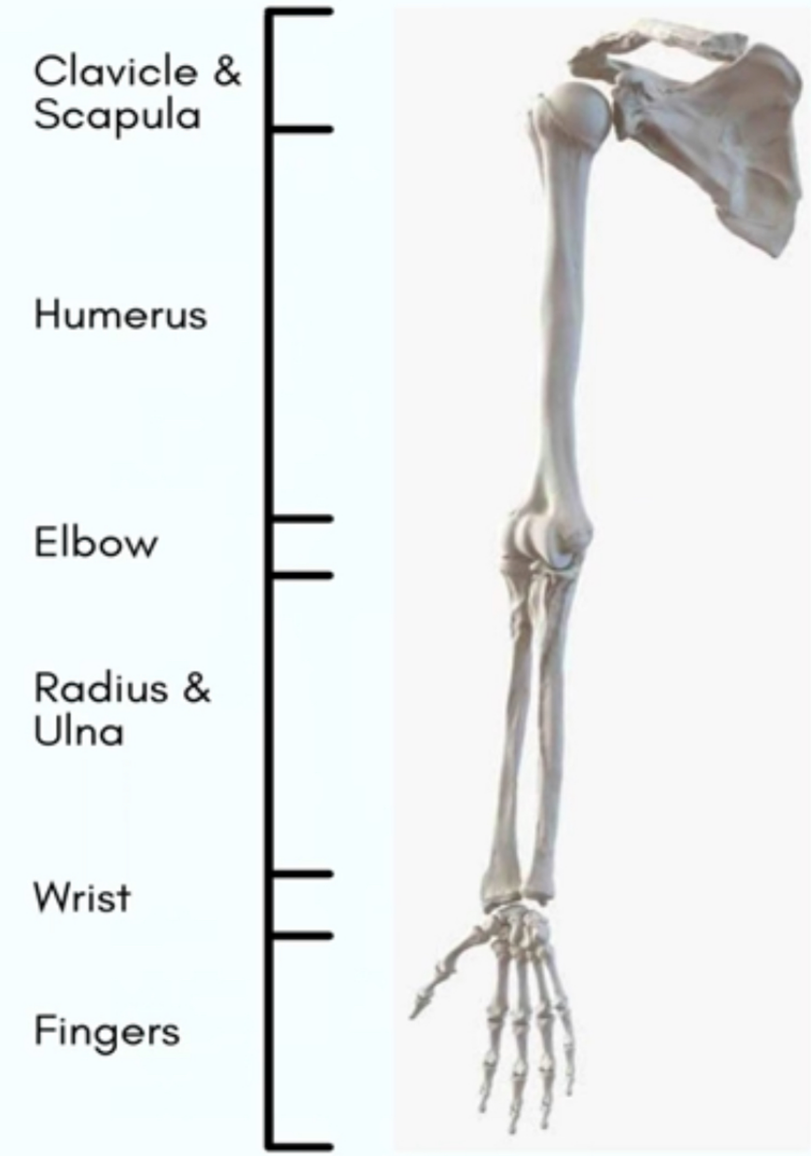
SEGMENTS OF THE AXIS

- Cervical
- Thoracic & Ribs
- Lumbar
- Pelvis



SEGMENTS OF THE ARMS

- Clavicle & Scapula
- Humerus
- Elbow
- Radius & Ulna
- Wrist
- Fingers



THE SKULL/CRANIUM

Supports and protects the face and the brain. The adult skull has a total of 22 individual bones.

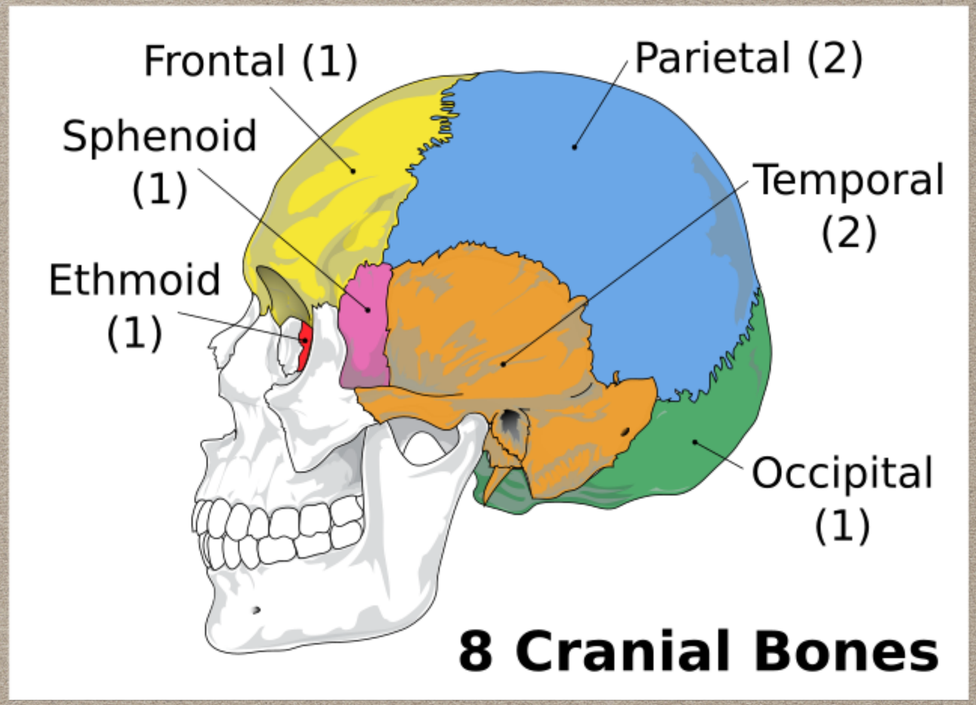
During foetal development, the bones of the skull form within tough, fibrous membranes. As these bones grow throughout foetal and childhood development, they begin to fuse together, forming a single skull. The only bone that remains separate from the rest of the skull is the mandible or jaw bone. Upon reaching maturity our skull bones fuse to produce a rigid protective shell for the soft nervous tissue of our brain.

Early separation of the bones provides the foetal skull with the flexibility necessary to pass through the tight confines of the birth canal.

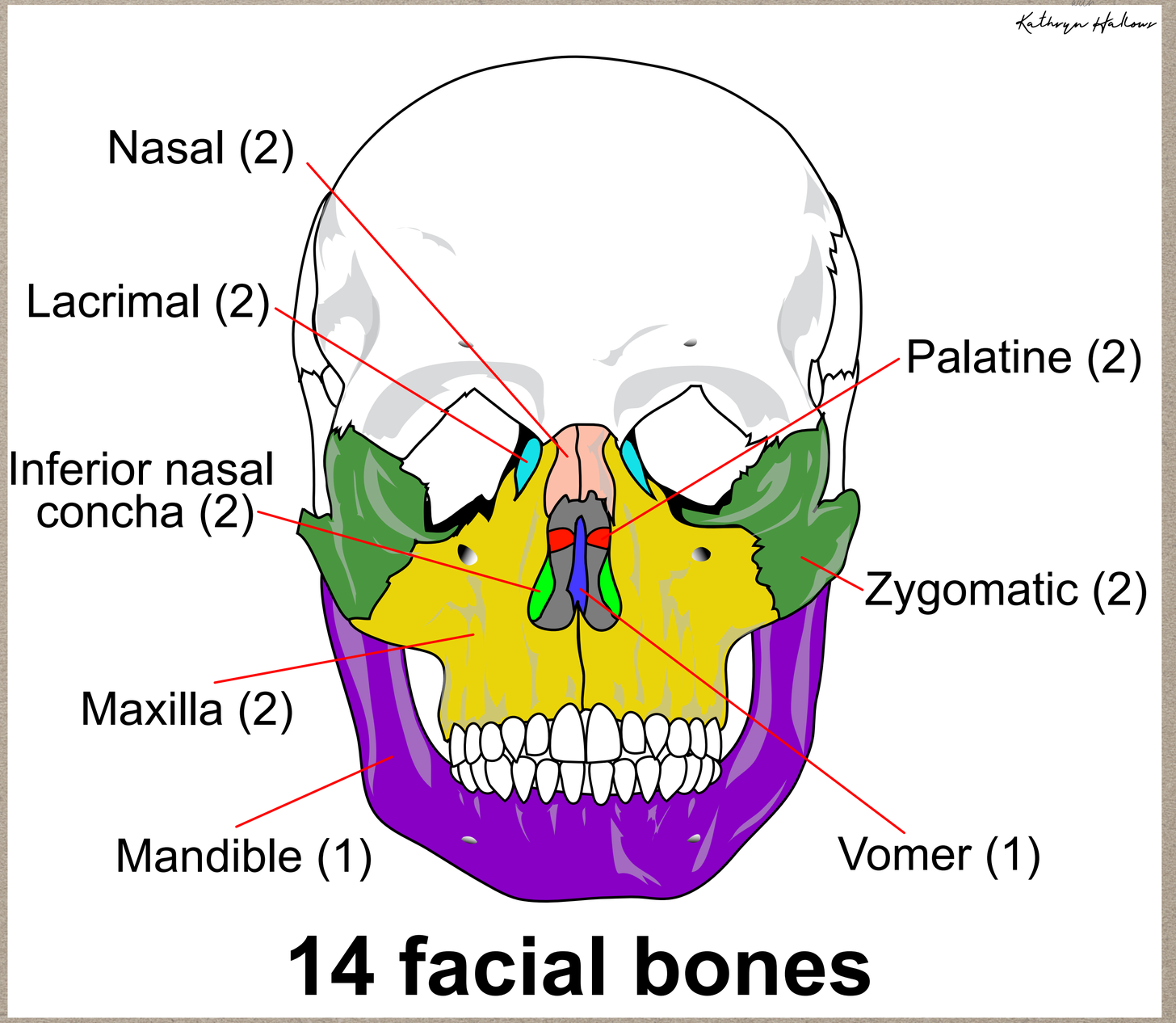
BONES OF THE CRANIUM

- **Frontal bone**
- **Two parietal bones**
- **Two temporal bones**
- **Occipital bone**
- **Ethmoid bone**
- **Sphenoid bone**

Collectively these bones provide a wall around the brain with only a few openings for nerves and blood vessels. Our occipital bone contains the foramen magnum, the hole through which the spinal cord enters the skull to attach to the brain. The occipital bone also forms the atlanto-occipital joint with the atlas (the first cervical vertebra in our spine). The frontal, ethmoid and sphenoid bones contain small hollow spaces known as paranasal sinuses. They help reduce the weight of the bone and increase the resonance of the voice during speech, singing and humming.



FACIAL BONES



MUSCLE GROUPS

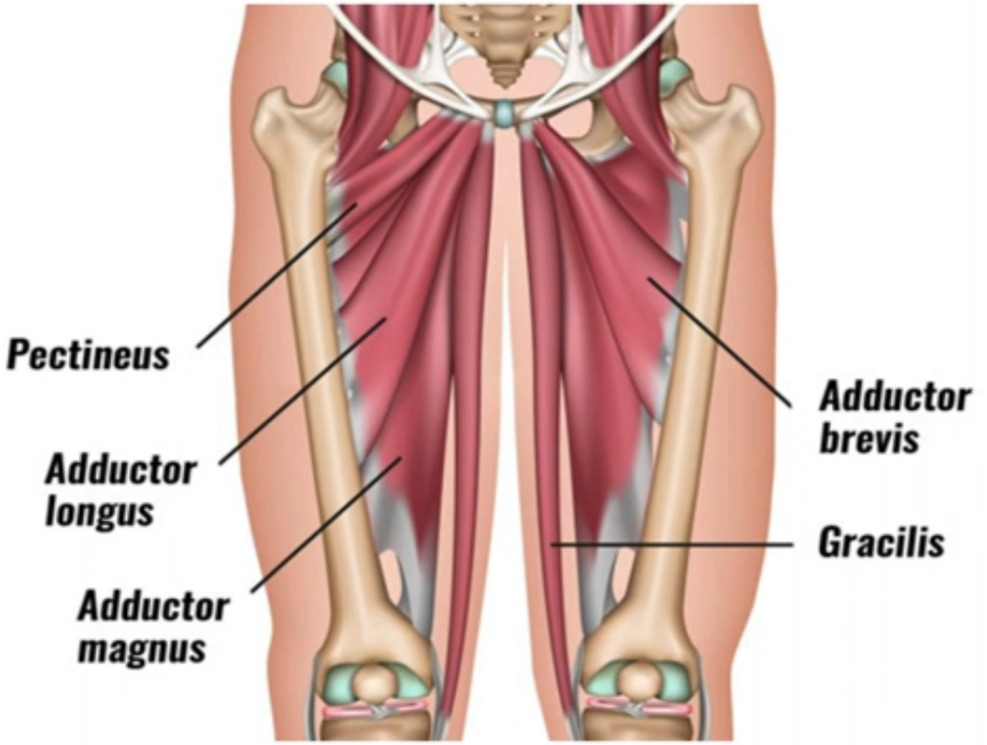
THERE ARE 650 SKELETAL MUSCLES.

MUSCLE GROUPS

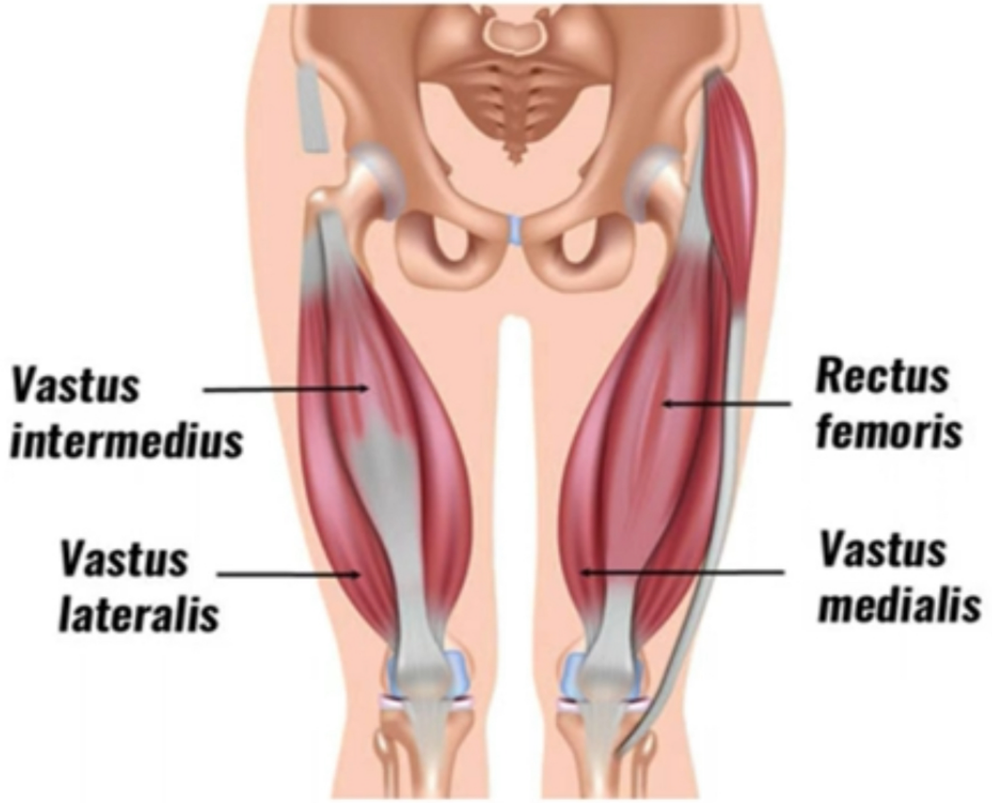
LOWER BODY	5 Groups of Muscles
UPPER BODY	5 Groups of Muscles

LOWER BODY
ANTERIOR MUSCLES

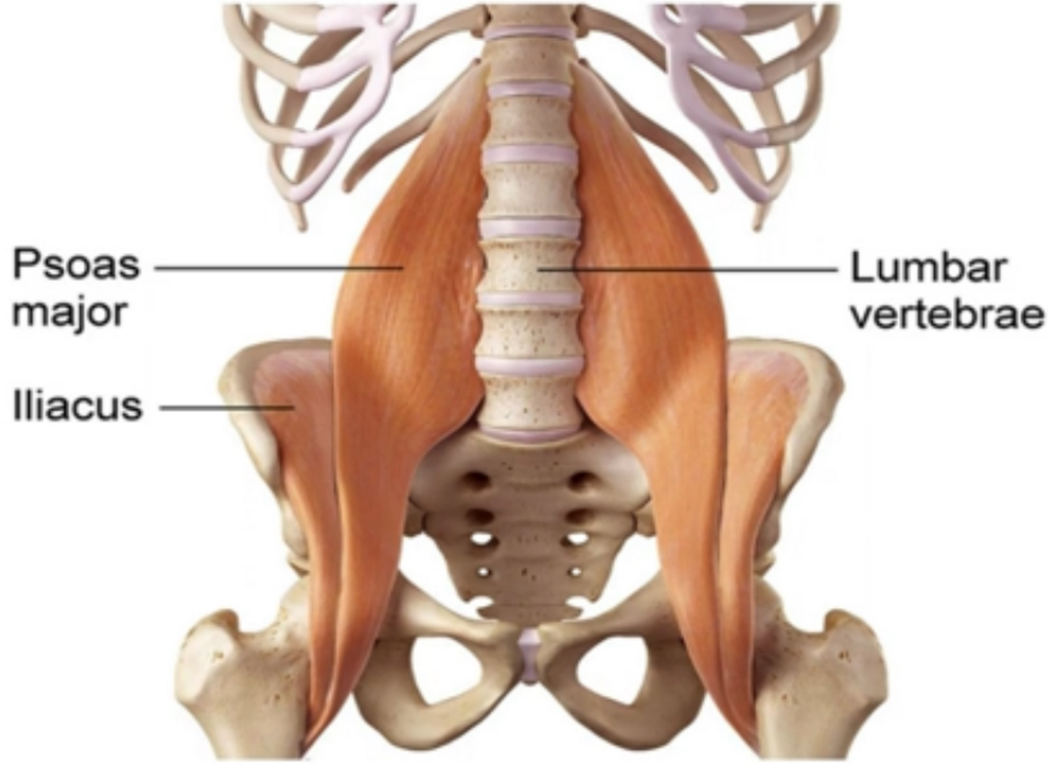
BODSPHERE
Your Fitness, Our Goal



GROIN MUSCLES
(5 MUSCLES)



QUADRICEPS MUSCLES (4 MUSCLES)



HIP FLEXORS
(4 MUSCLES)

RECTUS FEMORIS

SARTORIUS

BODSPHERE
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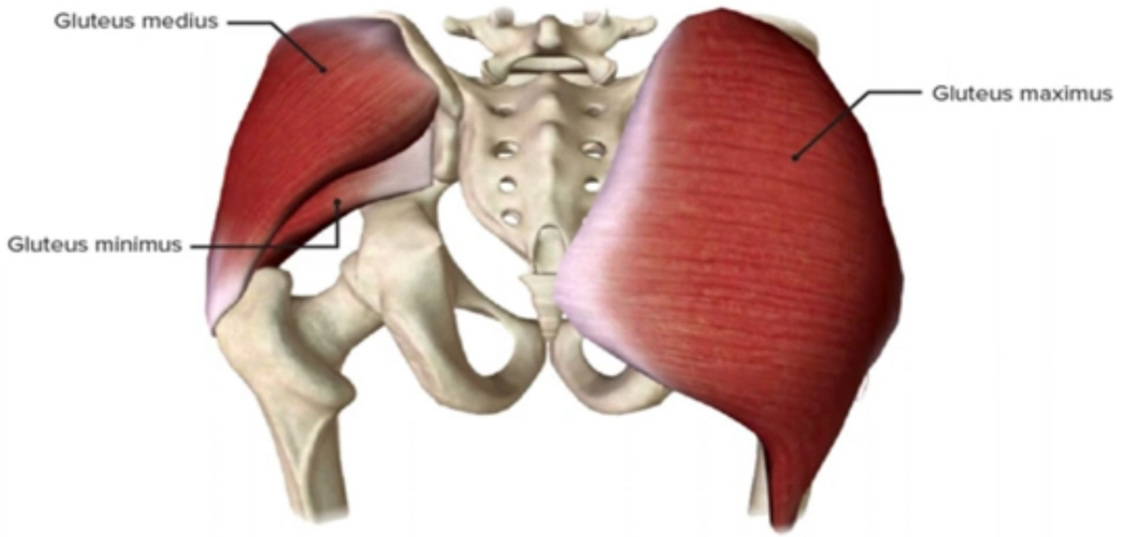
LOWER BODY
POSTERIOR MUSCLES



GLUTEAL MUSCLES
(3 MUSCLES)

BODSPHERE
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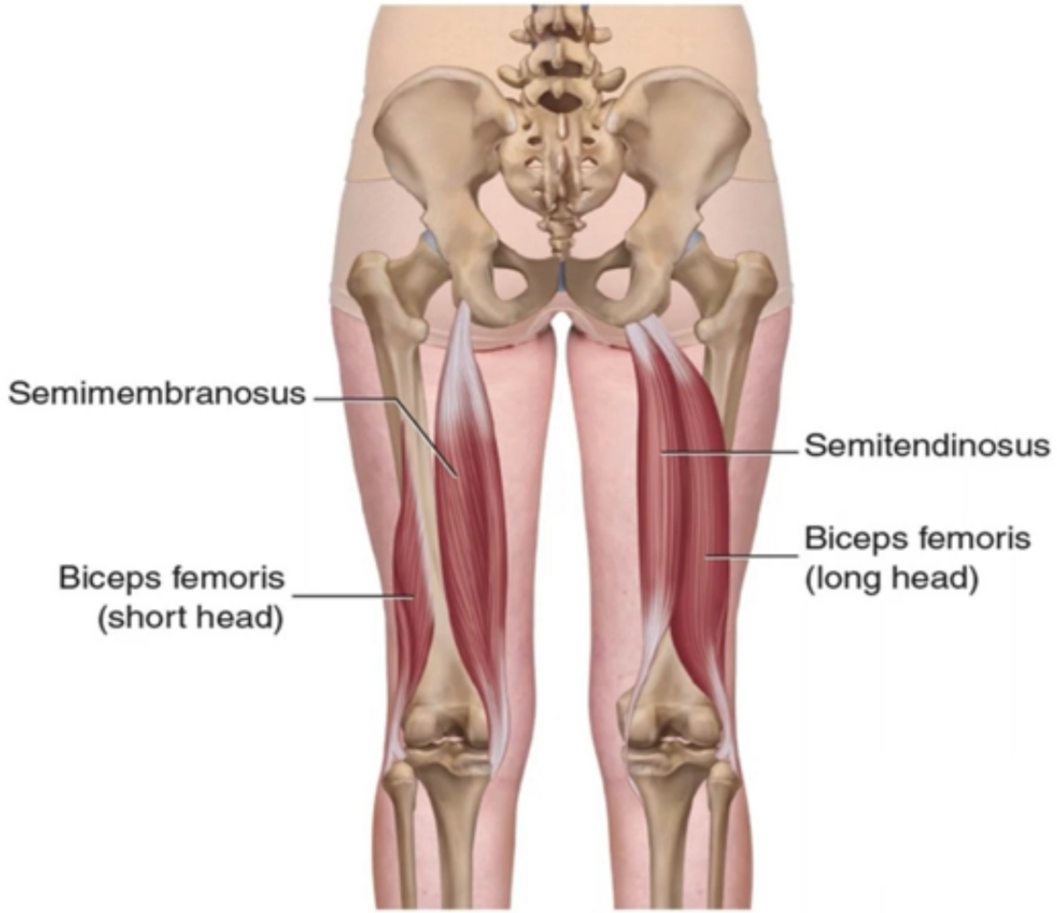

HAMSTRINGS
(4 MUSCLES)

BODSPHERE®
Your Fitness, Our Goal

UPPER BODY
ANTERIOR MUSCLES

RECTUS ABDOMINIS

BODSPHERE®
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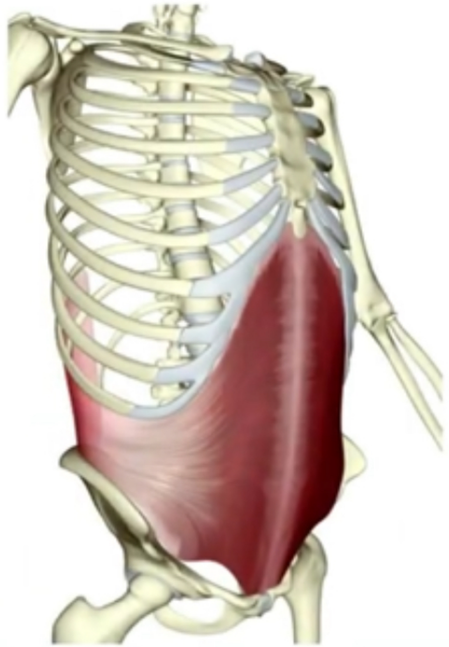
OBLIQUES (INTERNAL & EXTERNAL)

BODSPHERE
Your Fitness, Our Goal

UPPER BODY
POSTERIOR MUSCLES



QLT(QUADRATUS LUMBORUM &
TRANSVERSE ABDOMINIS)

Y.O.G.A
with
Kathryn Hallows

BODSPHERE
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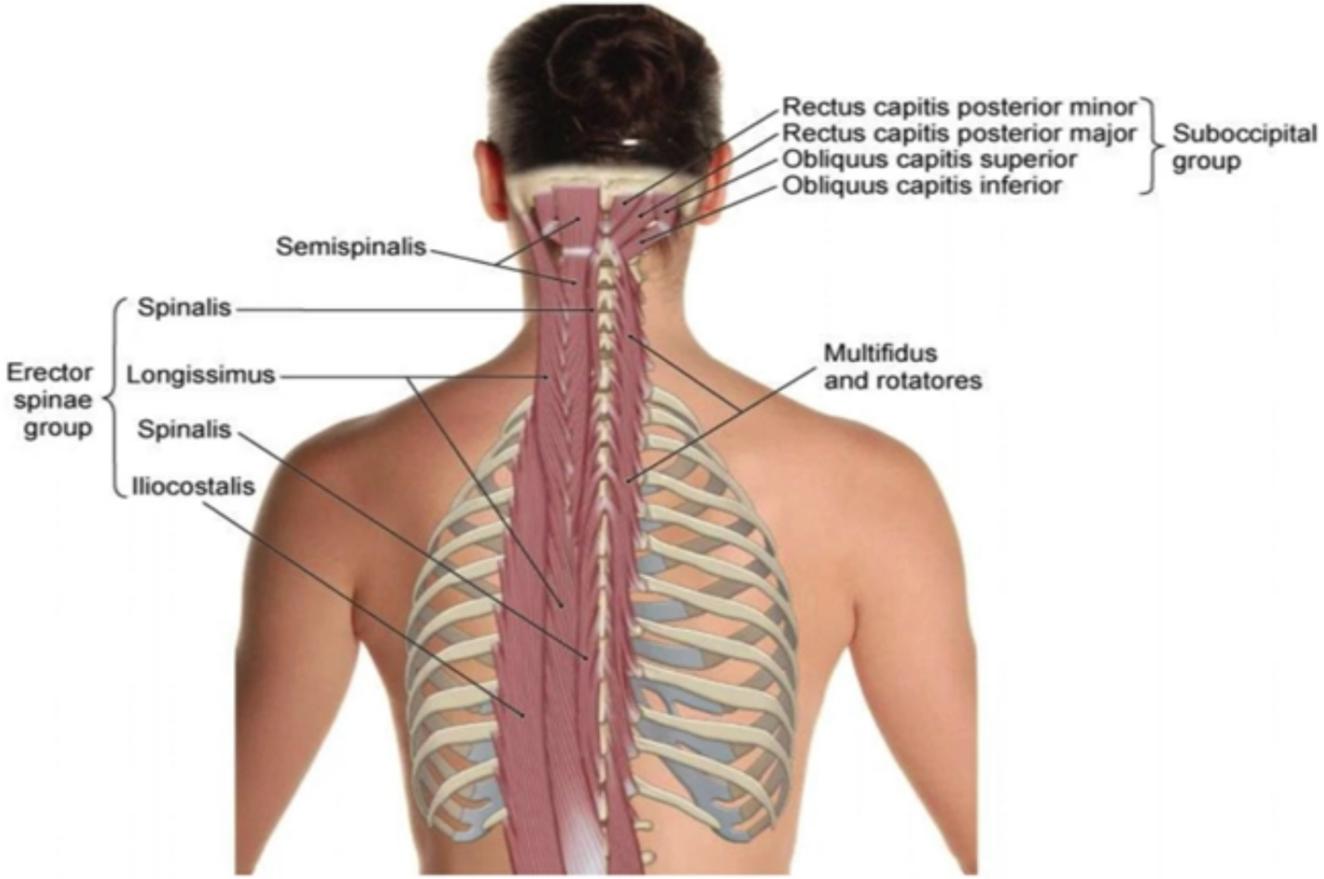
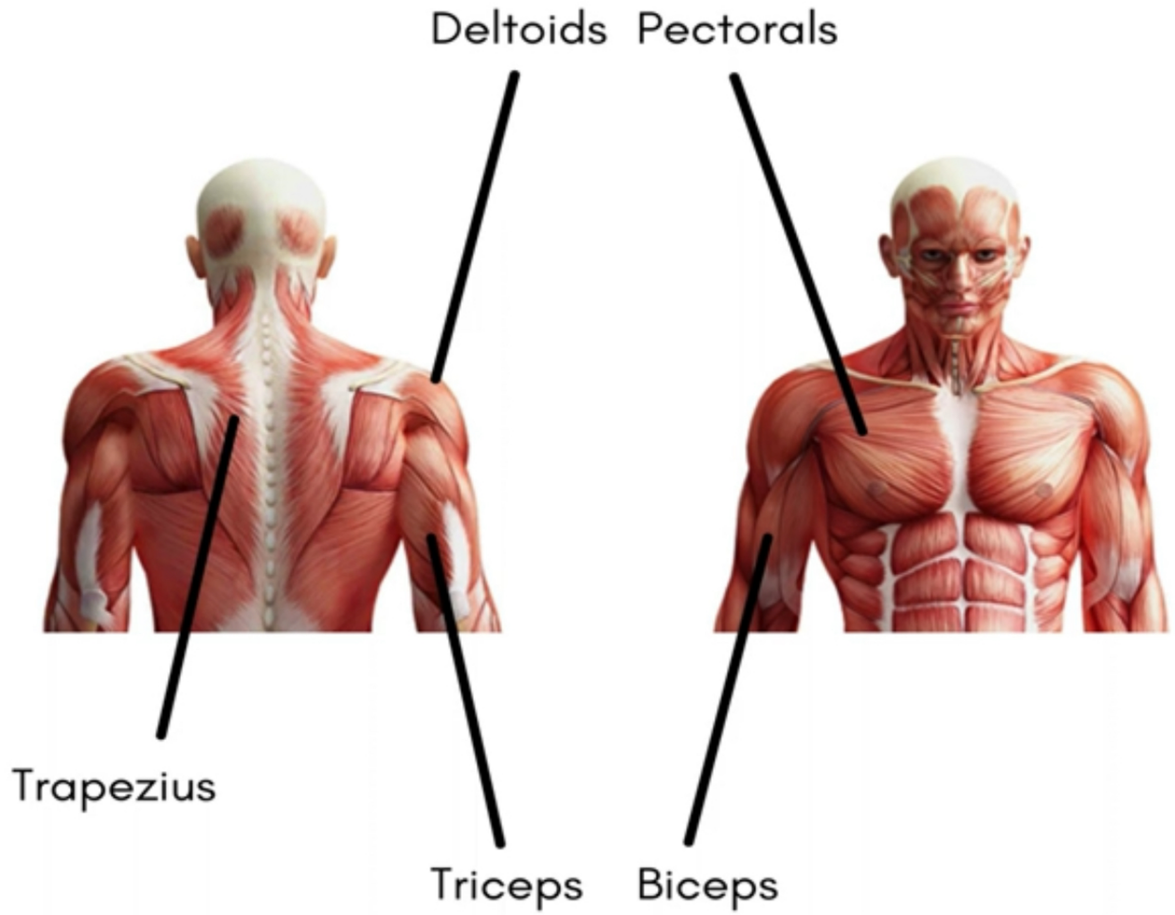


THORACOLUMBAR

BODSPHERE
Your Fitness, Our Goal

UPPER BODY MUSCLES

- DELTOIDS
- PECTORALS
- TRAPEZIUS
- TRICEPS
- BICEPS



"No two structures will ever be the same, the anatomy of every person will differ."

-Samarthya Bhatnagar