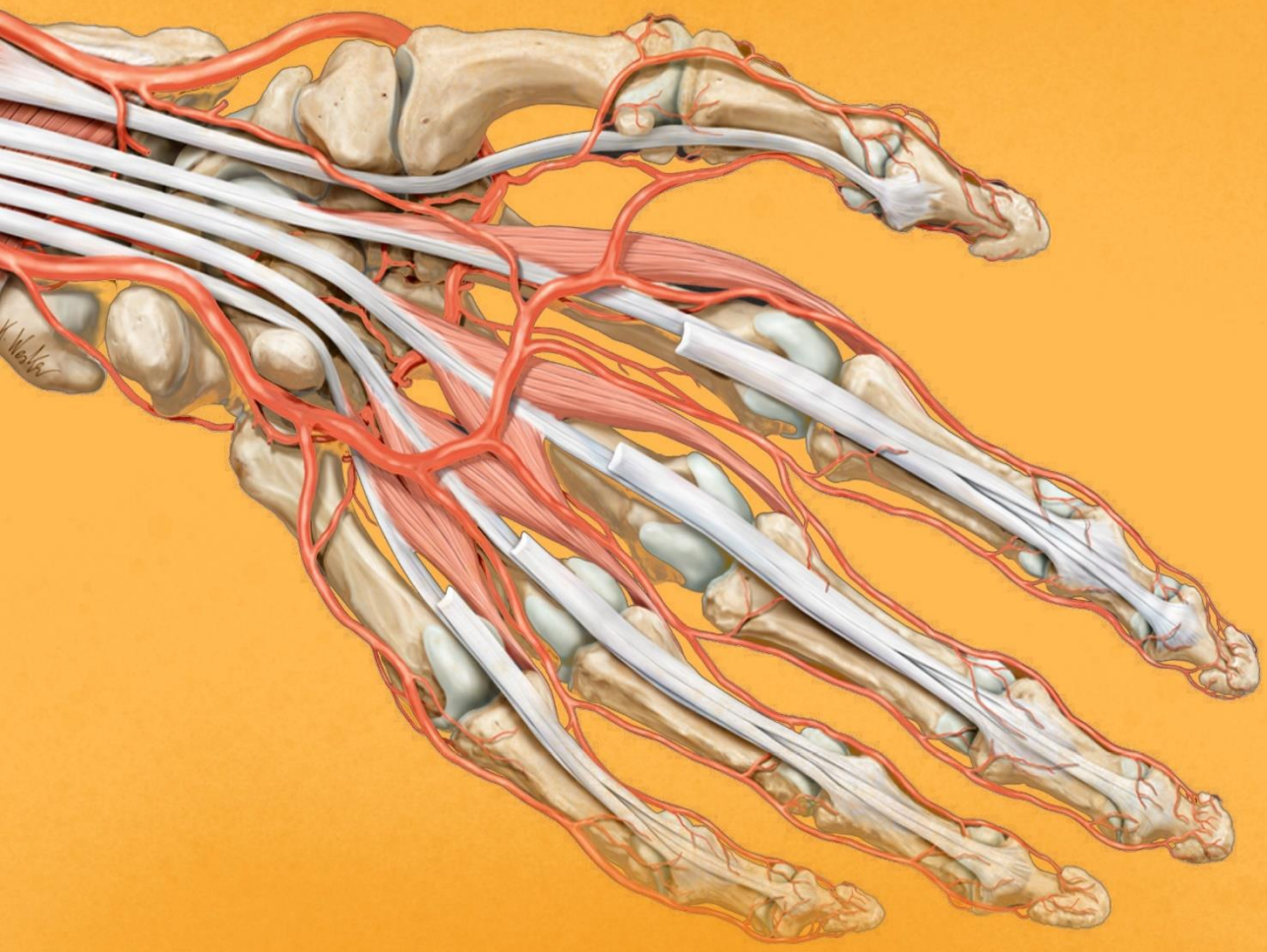
HATAHET ANATOMY



Introduction to Human Anatomy

Lecture: 1

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Lecture 1: Introduction to Human Anatomy

An Introduction

- **Anatomy (علم التشريح)**: the study of organs structures and the relationships between these structures
  - the word **"Anatomy"** is composed of 2 words: [Ana- = open] + [-tomy = cutting], and together it means **(Dissection)**
  - Anatomy is related to **Physiology**, which deals with functions of body parts **(Structure-Function relationship)**

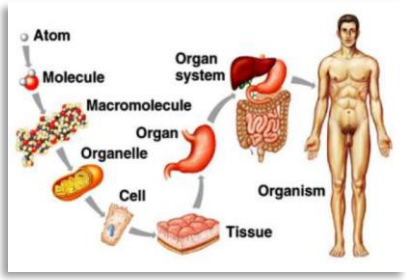
Branches of Anatomy

Branch	Definition
Gross Anatomy	the examination of structures **using naked eye** and without using the microscope
Microscopic Anatomy	the study of structural features of tissues of the body **using microscopes**
Systemic Anatomy	the anatomy of a **specific system** of the body, such as: (Skeletal system, Nervous system, ...)
Regional Anatomy	the anatomy of a **specific area** of the body, such as: (Head and Neck, Axilla, Chest, ...)
Sectional Anatomy	the study of internal structures of the body through **the use of sections**
Surface Anatomy	the surface landmarks of the body through **visualization and palpation (gentle touch)**
Pathological Anatomy	the macroscopic and microscopic structural changes associated with **disease**
Cell Biology	the **microscopical study** of structure & function **of the cell**
Developmental Biology	the study of the historical development **from fertilization until death**
Embryology	the development of the human embryo in **the first 8 weeks after fertilization** & the fetal period
Radiological Anatomy	the visualization internal body structures **using medical imaging**: (X-ray, CT scan, MRI, ...)

Levels of Organization

➢ **Chemical level**

- **Atoms** → the smallest level of organization
- **Molecules & Macromolecules** → an aggregation of several atoms
- **Organelles** → structures inside the cell that do specific functions

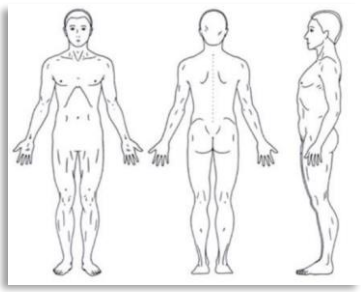


➢ **Cell**, the smallest unit of function and structure and the basic unit of life
➢ **Tissue**, an aggregation of similar cells with the **same function**
➢ **Organ**, more than one type of tissue with different functions
➢ **System**, a group of organs with different functions
➢ **Organism (Human Body)**, a group of systems that aggregate together in order to survive

Standard anatomical position

- **Standard anatomical position**: the position used worldwide to visualize and analyze the human body

- **Body** is in erect position, not sitting or lying down
- **Head** is straight and directed forward
- **Eyes** are looking forward
- **Upper limbs** are on the side of the body
- **Lower limbs** are standing side-by-side, parallel to each other
- **Palms** of the hands are facing forward towards the observer
- **Feet** are flat and straight on the floor
- **Little finger** is near to the body
- **Thumb** is away from the body



Main body regions

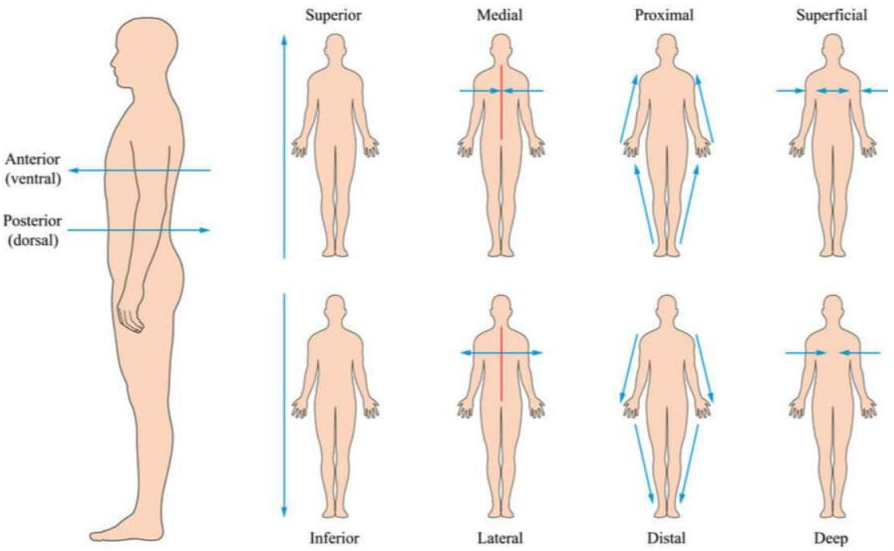
The human body has **5 main regions**, each with its own structures:

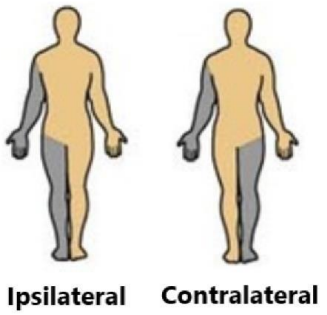
- ❖ **Head**, it has 2 major regions:
  - ◆ **Cranium**, which houses and protects the brain
  - ◆ **Face**, which contains the eyes, nose, and mouth
- ❖ **Neck**, it is the modified portion of the trunk that supports the head and attaches it to the trunk
- ❖ **Trunk**, includes: (Thorax - الصدر, Abdomen - البطن, Pelvis - الحوض)
- ❖ **Upper limbs**, including: (Shoulder, Axilla, Arm, Forearm, Wrist, Hand, Fingers)
- ❖ **Lower limbs**, including: (Buttock, Groin, Thigh, Leg, Ankle, Foot, Toes)

Directional anatomical terms

- **Directional terms**: words used to describe the position of one body part in relation to another one. These terms are:

Terminology	Definition
Anterior (Ventral)	near the front of the body
Posterior (Dorsal)	near the back of the body
Superior	in higher position
Inferior	in lower position
Medial	near the midline
Lateral	away from the midline
Proximal	close to the point where the limb attaches to the trunk
Distal	away from the point where the limb attaches to the trunk
Superficial	near the surface of the body (skin)
Deep	away from the surface of the body (skin)
Internal	toward the inside of a structure
External	toward the outside of a structure
Ipsilateral	one part is at the same side of the midline as another part
Contralateral	one part is at the opposite side of the midline as another part
Intermediate	between two different structures
Cranial	relating a structure to the skull
Rostral	relating a structure to the mouth and nose
Caudal	relating a structure to the tail

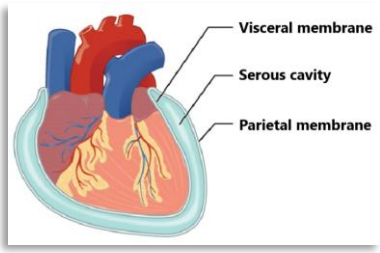




Human Anatomy Analysis

Serous membranes

▪ **Serous membranes**: membranes that line the **cavities of the trunk** without being open to the outside, and organs are invaginated into these membranes



- there are 3 serous membranes in the body
  - **Pericardium**, the serous membrane lining the heart
  - **Pleura**, the serous membrane lining the thoracic cavity
  - **Peritoneum**, the serous membrane lining both abdominal and pelvic cavities
- all these serous membranes share the same structure:

❶ **Visceral membrane**, the membrane that lines the surface of the organ
❷ **Parietal membrane**, the outer-most membrane that lines the body cavity
❸ **Serous cavity**, the small cavity between the visceral and parietal membrane
❹ **Serous fluid**, the fluid that fills the serous cavity, it acts as a shock-absorber to reduce fraction and provide lubrication, especially for motile organs like: (Heart, Lungs, Intestine, ...)

Cavities of Human body

▪ **Body cavities**: spaces within the body that houses, separates, and protects internal organs by the help of some bones, muscles, and ligaments. These cavities are:

➢ **Dorsal cavities**

A. Cranial cavity, where the brain is located & protected by the skull
B. Vertebral (Spinal) cavity, where the spinal cord is located & protected by the vertebral column

➢ **Ventral cavities**

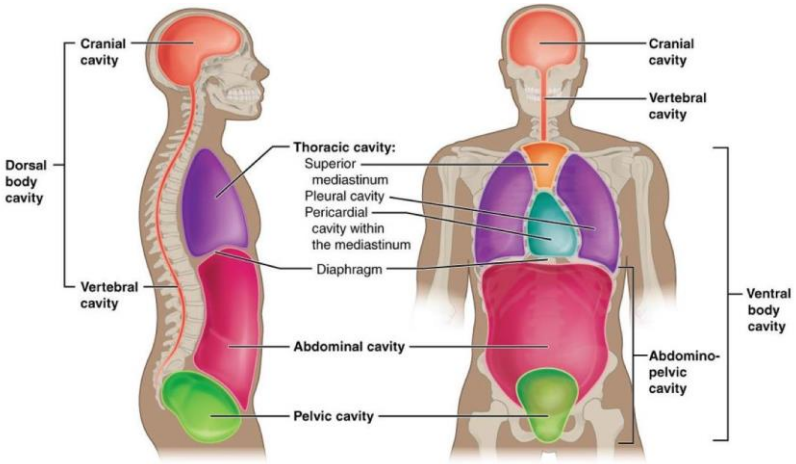
A. Thoracic cavity, where: (lung, heart, esophagus, trachea, thymus gland) are located & protected by the thoracic cage, consists of:

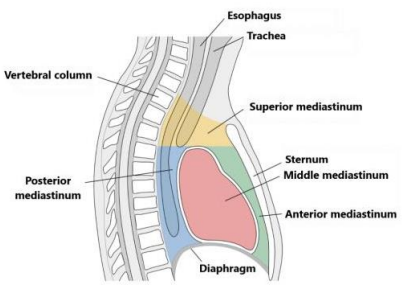
① **Mediastinum**, <u>not a cavity</u>, but an area between the 2 lungs, composed of 2 parts:

- **Superior mediastinum**, houses the esophagus, trachea, thymus gland
- **Inferior mediastinum**, houses the pericardium, further classified into: (anterior, middle, posterior) mediastinum

② **Pericardial cavity**, where the heart is located and protected
③ **Pleural cavities**, where both lungs are located and protected

B. Abdominal cavity, where most of the gastrointestinal tract organs and most of the large intestines are located
C. Pelvic cavity, where reproductive organs, urinary bladder, and part of the colon (large intestine) are located





Anatomical body planes

▪ **Anatomical planes**: imaginary flat surfaces that pass through the body and divide it. There are 3 anatomical planes:

❶ **Horizontal**, include 1 plane:

➢ **Transverse plane (Cross-sectional plane)**, divides the body into **superior & inferior parts**

❷ **Vertical**, include 2 planes:

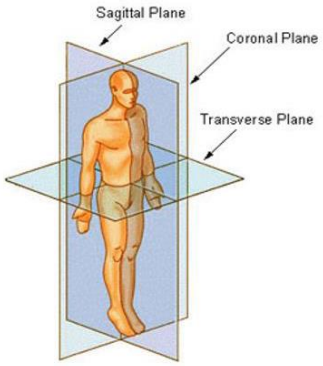
➢ **Sagittal plane**, divides the body into **left & right parts**, can be:

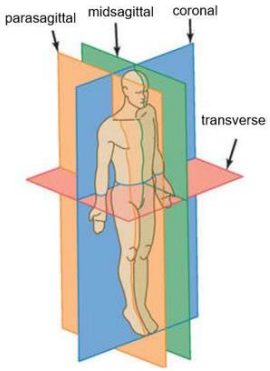
- **Midsagittal plane (Medial plane)** → divides the body into **equal** left and right parts
- **Parasagittal plane** → divides the body into **unequal** left and right parts

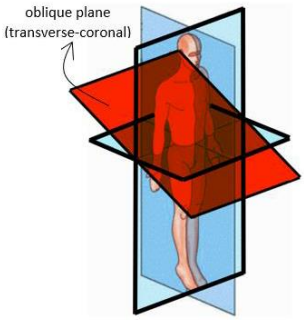
➢ **Coronal plane (Frontal plane)**, divides the body into **anterior & posterior parts**

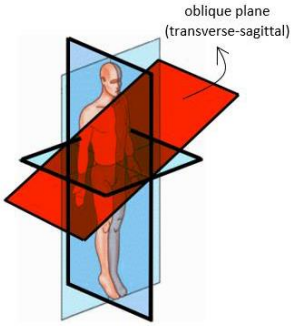
❸ **Oblique**, include any plane that ns through the body in more than 90° angle and divides the body into 2 unequal parts

▪ **Anatomical section**: a cut of the body or an organ made along one of the anatomical planes









Abdominopelvic Region

The abdominal cavity is continuous with the pelvic cavity, so they are often called **(Abdominopelvic region)**, and there are 2 systems used to study the structures within this region:

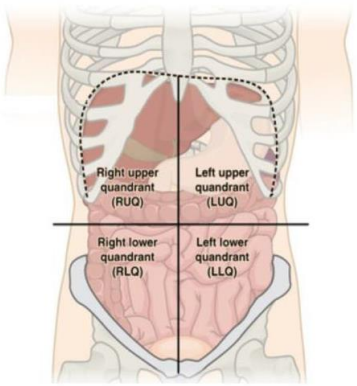
The 4 quadrants system

- used by clinicians to describe the site of **abdominopelvic pain, tumor, or injury**
- made up of 2 lines passing through the umbilicus (السُّرَّة):

  - **Transumbilical line** → a horizontal line that runs parallel to transverse colon
  - **Median line** → a vertical line that passes through midline, from the xyphoid process to pubic symphysis

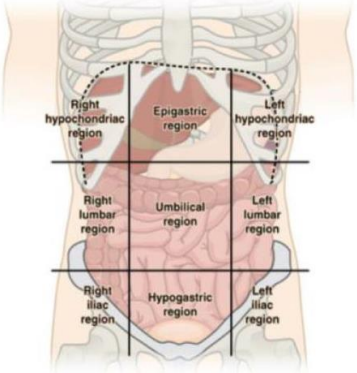
- the 4 quadrants are:

  - **Right Upper Quadrant (RUQ)**
  - **Left Upper Quadrant (LUQ)**
  - **Right Lower Quadrant (RLQ)**
  - **Left Lower Quadrant (LLQ)**



The 9 regions systems

- used by anatomists to study and determine **organ locations**
- made up of 4 lines:
  - **2 Horizontal lines**:
    - **Subcostal line** → goes through the 10th costal cartilage of the thorax
    - **Transtubercular line** → goes from one iliac tubercle to the other one
  - **2 Vertical lines**, each one comes from the middle of each clavicle and goes down, these are called **(Midclavicular lines)**
- the 9 regions are:
  - **Epigastric region**
  - **Umbilical region**
  - **Hypogastric (Suprapubic) region**
  - **R. Hypochondrial region**
  - **L. Hypochondrial region**
  - **R. Lumbar region**
  - **L. Lumbar region**
  - **R. Iliac (Inguinal) region**
  - **L. Iliac (Inguinal) region**



What to memorize for the exam?

The question will be: **"Where is the (organ) located?"**, and the following are what you should memorize for the exam:

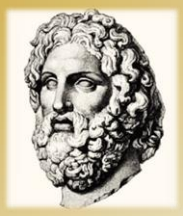
➢ **The 4 Quadrants system organs**

- Ascending colon → RLQ
- Transverse colon → RUQ & LUQ
- Descending colon → LLQ
- Small intestines → RLQ & LLQ
- Stomach & Liver → RUQ & LUQ
- Gall bladder → RUQ
- Right kidney → RLQ
- Left kidney → LLQ
- Appendix → RLQ

➢ **The 9 Regions system organs:**

- Appendix → Right iliac region
- Stomach → Epigastric & Left hypochondriac regions
- Liver → Epigastric & Right hypochondriac regions
- Gall bladder → Right hypochondriac region

Father of Anatomy



Name: Herophilus
Origin: Ancient Greece
Period: 4th century BCE

Herophilus was the first to dissect the human body for detailed observation, his **Humoral Theory** suggested that the human body is composed of 4 fluids: Blood, which represents air, Phlegm, which represents water, Yellow bile, which represents fire, Black bile, which represents earth.

This theory guided scientists for centuries until it failed to explain a lot of anatomical and physiological phenomena.

Father of Modern Anatomy

Name: Andreas Vesalius
Origin: Brussels, Belgium
Period: 16th century

Andreas Vesalius is a Flemish anatomist and physics who established the basic foundation of modern medicine and evidence-based discipline.

At a time when studying human bodies was taboo, Vesalius would sneak into cemeteries at night to dig up corpses for dissection. His groundbreaking work, ***De Humani Corporis Fabrica*** **(On the Fabric of the Human Body)**, shattered centuries-old misconceptions, showing that the human body was far more intricate than previously thought.

Multiple Choice Questions

1) All of the following are correct regarding the standard anatomical position, EXCEPT:

A. body is in erect position
B. Upper limbs are on the sides of the body
C. Eyes are looking forward
D. Lower limbs are crossing each other

Answer: D

2) The Embryology is the science concerned with the studying of the human embryo in the first:

A. 2 weeks
B. 8 weeks
C. 2 months
D. 8 months

Answer: B

3) If one organ is located at the opposite side of the midline in relation to another organ, these 2 organs are _____:

A. Ipsilateral
B. Contralateral
C. Proximal
D. Intermediate

Answer: B

4) Which one of the following definitions is mis-matched?

A. Systemic anatomy ----- the anatomy of one body system
B. Radiological anatomy ----- the use of medical imaging techniques to study the human anatomy
C. Pathological anatomy ----- the study of the structural changes of tissues and organs associated with diseases
D. Embryology ----- the study of the historical development from fertilization until death

Answer: D

5) Regarding the body cavities, which of the following is CORRECT?

A. Dorsal cavities include both cranial cavity & vertebral cavity
B. The serous membrane covering the abdominopelvic cavity is called the Pleura
C. Most of the reproductive organs are located in the abdominal cavity
D. All the listed statements are correct

Answer: A

6) Which of the following statements accurately describes the relationship between the visceral and parietal pericardium? **Very hard Q**

A. The visceral pericardium lines the inner surface of the heart & the parietal pericardium lines the outer surface of the heart
B. The visceral pericardium lines the outer surface of the heart & the parietal pericardium lines the inner surface of the pericardial cavity
C. The visceral pericardium lines the outer surface of the heart & the parietal pericardium lines the inner surface of the thoracic cavity
D. The visceral pericardium lines the inner surface of the pericardial cavity & the parietal pericardium lines the outer surface of the pericardial cavity

Answer: B

7) One of the following is a CORRECT statement regarding the levels of organization:

A. the tissue is an aggregation of cells that have similar and/or different functions
B. the organism (Human) is composed of a group of systems aggregates together in order to survive
C. Chemical level → Cell → Tissue → System → Organ → Organism
D. Two answers are correct

Answer: B

8) Which of the following directional term/s is/are CORRECTLY matched with the associated part?

A. Eyes are lateral to the nose
B. Umbilicus (Belly button) is inferior to the reproductive organs
C. Heart is posterior to the vertebral column
D. Ankle is more proximal than the knee

Answer: A

9) If a section runs through the body in more than 90° angle and divides the body into 2 unequal parts, we call it a:

A. Cross-sectional plane
B. Parasagittal plane
C. Coronal plane
D. None of the above

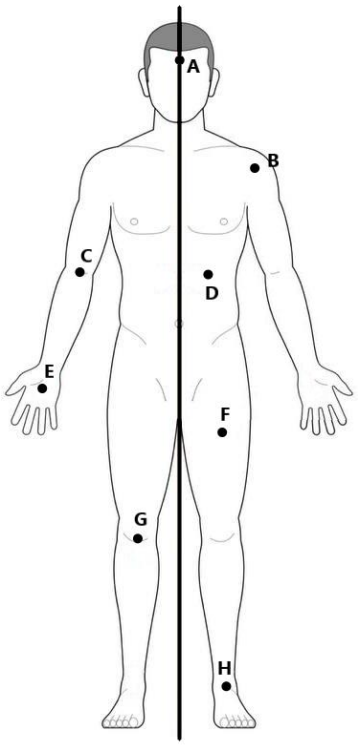
Answer: D

10) All of the following are CORRECT about the nine-regions system of studying the abdominopelvic cavity, EXCEPT:

A. Appendectomy (the surgery of removing the appendix) is performed in the Right iliac region
B. All listed choices are correct
C. The illustration is made by 2 imaginary lines, a horizontal one (Transumbilical line) and a vertical one (Median line)
D. It is used by the anatomist rather than the clinicians

Answer: C

Homework



✪ **Which is more proximal, C or E?**

✪ **Arrange the following from medial → lateral: (A,B,C,D,E)**

_____ → _____ → _____ → _____ → _____

✪ **Which of the following statements is WRONG?**

A. B is superior to D
B. F is more proximal than G
C. D is more lateral than C
D. H is the most inferior point in the diagram

✪ **Complete the sentence: G is more _____ and _____ to H.**

A. proximal, inferior
B. proximal, superior
C. distal, inferior
D. distal, superior

✪ **Give 3 examples on contralateral pairs from the diagram**

- _____ & _____
- _____ & _____
- _____ & _____

✪ **Name the:**

- most medial point: _____
- most superior point: _____
- most proximal point of the upper limbs: _____

DM me to check your answers, ***Good Luck!***