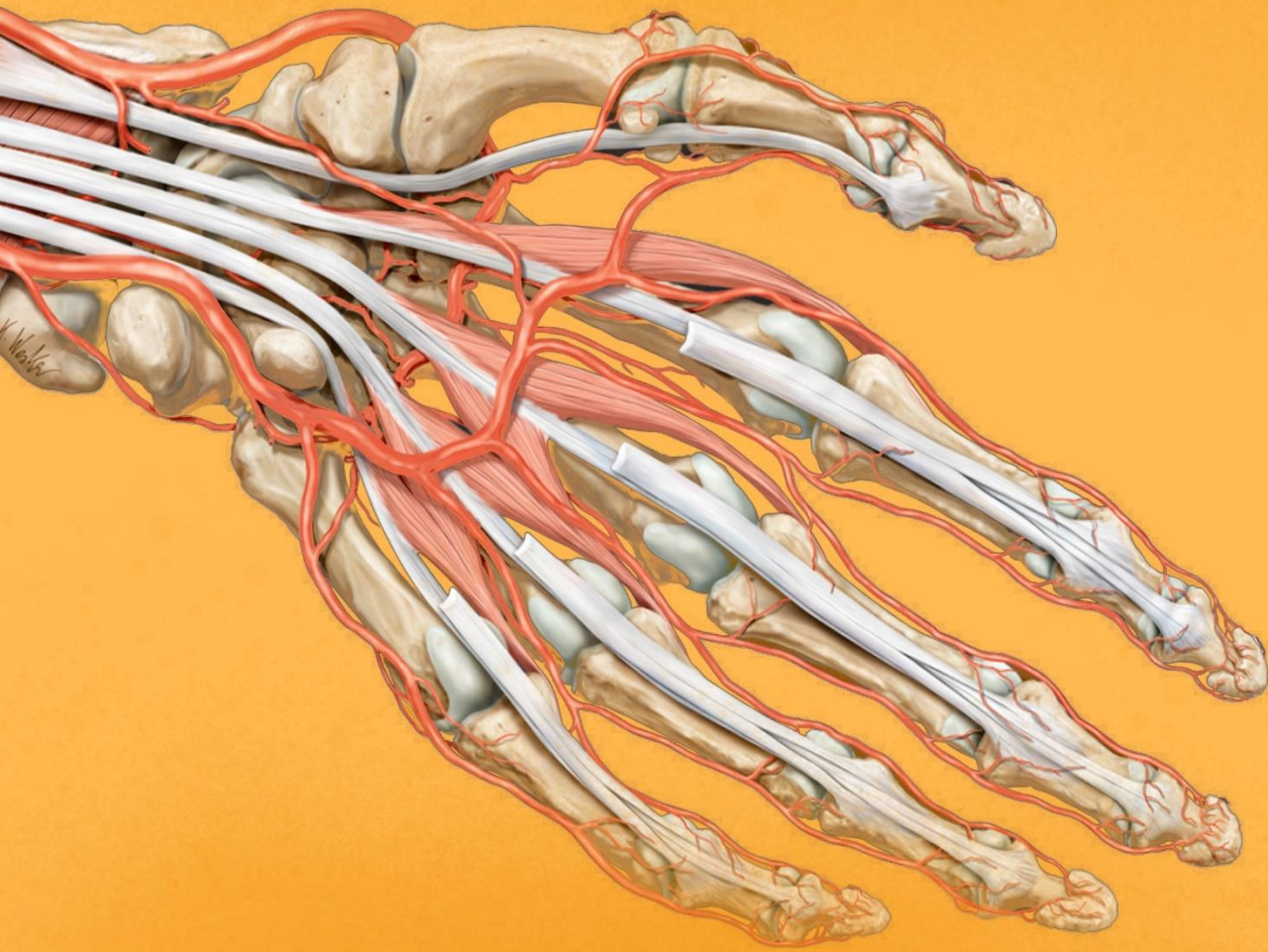


HATAHET ANATOMY



Introduction to Human body

Lecture: 1

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Lecture 1: Introduction to Human body

What is Anatomy?

- **Anatomy** (علم التشريح): the study of the structures and the relationships among these structures.

The word "Anatomy" is composed of 2 words: [Ana- = open] & [-tomy = cutting], and together means (Dissection).

Anatomy is related to **Physiology**, which deals with functions of body parts; because functions can't be separated completely from structure (Structure-Function relationship).

Branches of Anatomy

Branch	Definition
Gross anatomy	the examination of structures using naked eye and without using the microscope
Microscopic anatomy (Histology)	the study of structural features of tissues of the body using microscopes
Systemic anatomy	anatomy of a specific system of the body, such as: (Skeletal system, Nervous system, ...)
Regional anatomy	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	surface landmarks of the body through visualization and palpation (gentle touch)
Pathological anatomy	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
Radiological anatomy (Medical imaging)	the visualization internal body structures using X-ray, CT scan and MRI

Levels of organization

- ❶ **Chemical level**, consists of:

- Atoms → smallest level of organization.
- Molecules & Macromolecules → aggregation of similar or different atoms.
- Organelles → specific structures inside the cell that do specific functions.

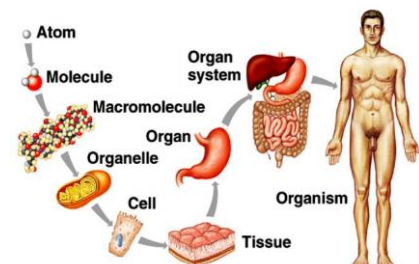
- ❷ **Cell**: the smallest unit of function and structure and the basic unit of life.

- ❸ **Tissue**: aggregation of similar cells that have the same function.

- ❹ **Organ**: one or more tissues that have different functions.

- ❺ **System**: a group of organs with different functions.

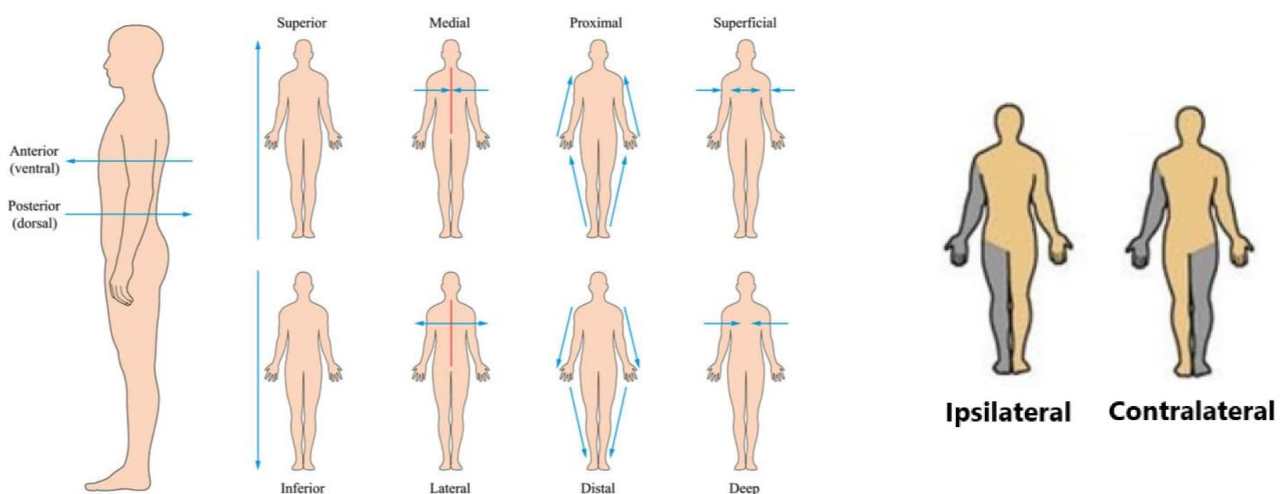
- ❻ **Organism (Human body)**: a group of systems aggregate together in order to survive.



Directional anatomical terms

▪ **Directional terms:** words used to describe the position of one body part related to another one. These terms are:

Medial	near to the midline
Lateral	away from the midline
Superior	in higher position
Inferior	in lower position
Anterior (Ventral)	near to the front of the body
Posterior (Dorsal)	near to the back of the body
Proximal	near to the limb attachment point to the trunk
Distal	away from the limb attachment point to the trunk
Superficial	near to the surface of the body
Deep	away from the surface of the body
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	region between two structures
Cranial	relating to the skull or head
Rostral	relating to nose and mouth
Caudal	relating to the tail or near the tail



Standard anatomical position

- **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 (medial)
- **Thumb** is away from it (lateral)



Anatomical body planes

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

1) Horizontal planes, include:

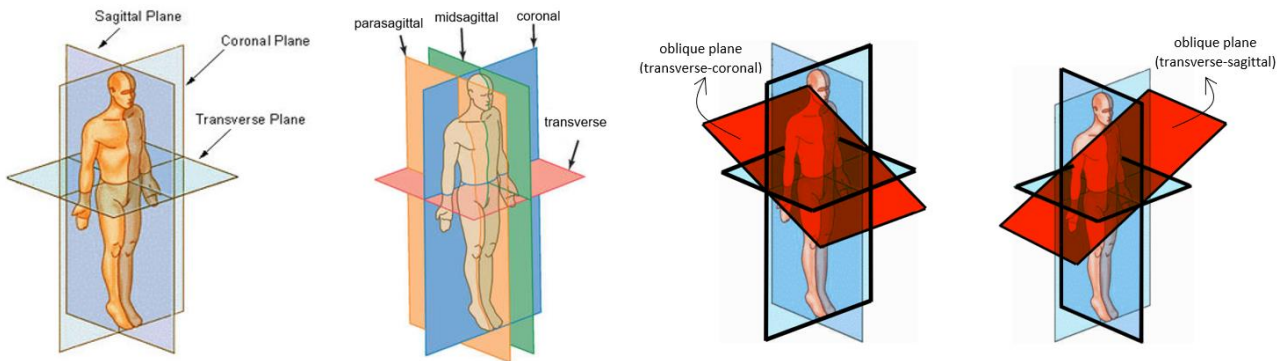
- **Transverse plane (Cross-sectional)**, divides the body into superior part and inferior part

2) Vertical planes, include:

- **Sagittal plane**, divides the body into left and right parts, can be:
 - **Midsagittal (Medial) plane** → divides the body into equal left and right parts
 - **Parasagittal plane** → divides the body into unequal left and right parts
- **Coronal (Frontal) plane**, divides the body into anterior (ventral) part and posterior (dorsal) part

▪ **Section:** a cut of the body or an organ made along one of the planes.

3) Oblique planes, any plane that runs through the body in more than 90° angle and divides the body into 2 unequal parts, can be: (transverse - coronal / transverse - sagittal)



The body regions

1 Head, has 2 major regions:

- Cranium (Skull), which houses and protects the brain
- Face, the anterior part of the head

2 Neck, it's the modified portion of the trunk that supports the head and attaches it to the trunk

3 Trunk, includes:

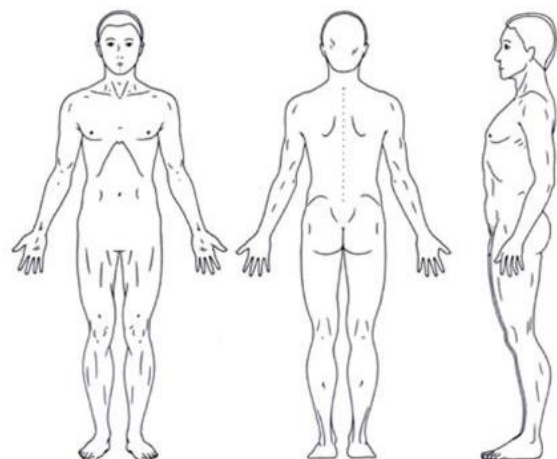
- Thorax (Chest) • Abdomen • Pelvis

4 Upper limbs (Upper extremities), includes:

- Shoulder • Axilla (Armpit) • Arm (from shoulder to elbow)
- Forearm (from elbow to wrist) • Wrist • Hand

5 Lower limbs (lower extremities), includes:

- Buttock (Butt) • Gluteal region • Inguinal region (Groin)
- Thigh (from buttock to knee) • Leg (from knee to ankle) • Foot



Body cavities

▪ **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:

1) Dorsal cavities:

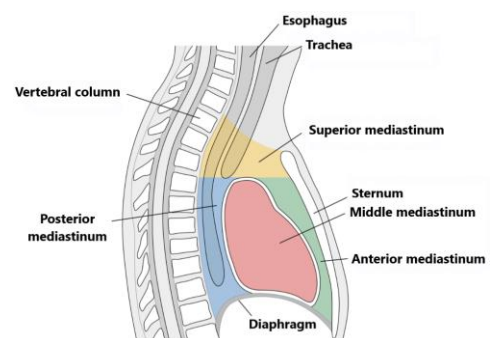
- A. **Cranial cavity**, where the brain is located and protected by the skull.
- B. **Vertebral cavity**, where the spinal cord is located and protected by the vertebral column and meninges.

2) Ventral cavities:

A. **Thoracic cavity**, where the lung, heart, esophagus, trachea and thymus gland are all located and protected by the thoracic cage, consists of:

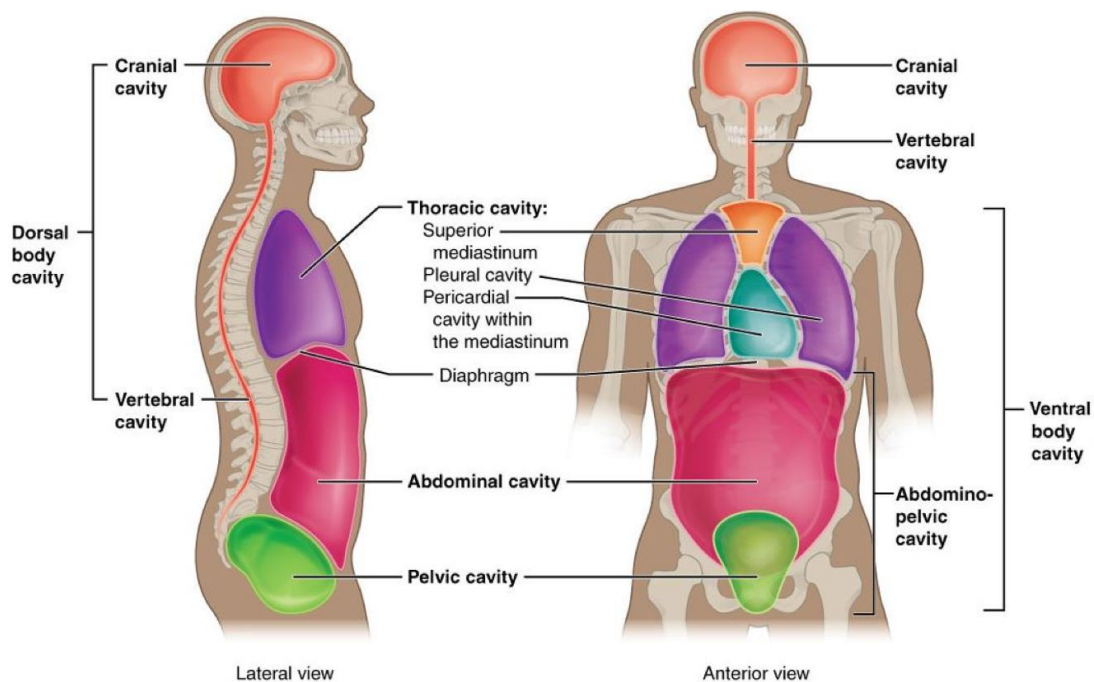
- ① **Mediastinum**, **not a cavity**, but it's an area between the two lungs that consists of:

- **Superior mediastinum**, houses the esophagus, trachea, and 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 **2 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 part of the large intestines are located.



***Note: The diaphragm is a muscle that separates the thoracic cavity and the abdominal cavity from each other.

***Note: The pelvic cavity is continuous with the abdominal cavity, so they are often called (**Abdominopelvic cavity**).

The Serous membranes

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

- Heart → Pericardium
- Thoracic organs → Pleura
- Abdominal & Pelvic organs → Peritoneum

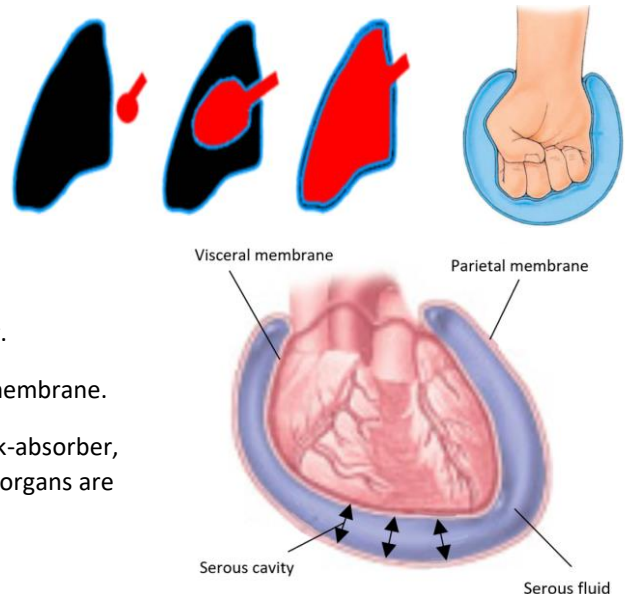
➤ All serous membranes share the same structure:

❶ **Visceral membrane:** the membrane that lines (touches) the surface of the organ (viscera) itself.

❷ **Parietal membrane:** the outer-most membrane of the cavity.

❸ **Serous cavity:** the cavity between the visceral and parietal membrane.

❹ **Serous fluid:** a fluid in the serous cavity which acts as a shock-absorber, reduces friction and provides lubrication; because invaginated organs are usually motile.



The Abdominopelvic region

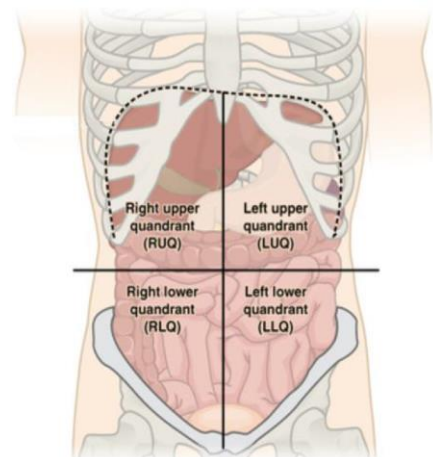
There are 2 systems used to examine and study the abdominopelvic region, which are:

[1] **The Four-quadrant system**, used by **clinicians** to describe the site of abdominopelvic pain, tumor or injury, made up of 2 lines passing through the umbilicus:

- **Horizontal line**, parallel to the transverse colon called (**Transumbilical line**).
- **Vertical line**, passes through midline, starting from xyphoid process and finishing at the pubic symphysis called (**Median line**).

❖ **The 4 quadrants are:**

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



[2] **The nine-regions system**, used by **anatomists** to study and determine organ locations, made up of 4 lines:

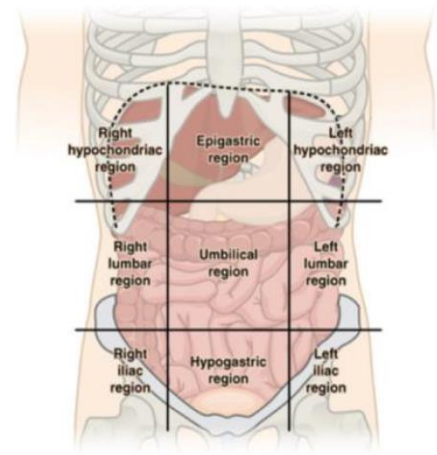
• **2 Horizontal lines:**

- one goes through the 10th costal cartilage of the thorax called (**Subcostal line**).
- one goes from one iliac tubercle to the other one called (**Transtubercular line**).

• **2 Vertical lines**, each one comes from the middle of each clavicle and goes down, these lines are called (**Midclavicular lines**).

❖ **The 9 regions are:**

- Epigastric region
- Umbilical region
- Hypogastric region (Suprapubic region)
- Hypochondriac region [Right & Left]
- Lumbar region [Right & Left]
- Iliac (Inguinal) region [Right & Left]



The question now is..... **What to memorize from the organs in both systems?**

➤ ***The 4 Quadrants system:***

- 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:***

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

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. All of the listed are correct

2) If one organ of the body is located at the opposite side of the midline as another organ, these 2 organs are _____:

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

3) 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

4) 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

5) The body system that regulates the body activities by secreting hormones into the bloodstream is the:

- A. Nervous system
- B. Digestive system
- C. Urine system
- D. Endocrine system

6) 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

7) 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 dorsal to the vertebral column
- D. Two answers are correct

8) 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

9) The part of the lower limbs that extend from the knee joint to the ankle joint is called the:

- A. Foot
- B. Buttock
- C. Thigh
- D. Leg

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

Answers

1	2	3	4	5	6	7	8	9	10
D	B	D	A	D	B	A	D	D	C