Anatomical Terminology

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Anatomy

- **Anatomy**: is the study of structures or body parts and their relationships to one another.

- **Anatomy**: Gross anatomy - macroscopic.
  
  Histology - microscopic.

- **Anatomical position**: body is erect, feet together, palms face forward and the thumbs point away from the body.
Directional Terms

• Superior: means the part is above another or closer to head (cranial).
  Vs.
• Inferior: means the part is below another or towards the feet (caudal).
• Anterior: means towards the front (the eyes are anterior to the brain) - [ventral].
  Vs.
• Posterior: means toward the back (the pharynx is posterior to the oral cavity) - [dorsal].
• Medial: relates to the imaginary midline dividing the body into equal right and left halves (the nose is medial to the eyes).
  Vs.
• Lateral: means to words the side with respect to the imaginary midline (the ears are lateral to the eyes).
<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior (cranial)</td>
<td>Toward the head end or upper part of a structure or the body; above</td>
<td>The head is superior to the abdomen.</td>
</tr>
<tr>
<td>Inferior (caudal)</td>
<td>Away from the head end or toward the lower part of a structure or the body; below</td>
<td>The navel is inferior to the chin.</td>
</tr>
<tr>
<td>Anterior (ventral)*</td>
<td>Toward or at the front of the body; in front of</td>
<td>The breastbone is anterior to the spine.</td>
</tr>
<tr>
<td>Posterior (dorsal)*</td>
<td>Toward or at the back of the body; behind</td>
<td>The heart is posterior to the breastbone.</td>
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*The terms ventral and anterior are synonymous in humans, but this is not the case in four-legged animals. Anterior refers to the leading portion of the body (abdominal surface in humans, head in a cat), but ventral specifically refers to the “belly” of a vertebrate animal, so it is the inferior surface of four-legged animals. Likewise, although the dorsal and posterior surfaces are the same in humans, the term dorsal specifically refers to an animal’s back. Thus, the dorsal surface of four-legged animals is their superior surface.
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<tbody>
<tr>
<td>Medial</td>
<td>Toward or at the midline of the body; on the inner side of</td>
<td>The heart is medial to the arm.</td>
</tr>
<tr>
<td>Lateral</td>
<td>Away from the midline of the body; on the outer side of</td>
<td>The arms are lateral to the chest.</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Between a more medial and a more lateral structure</td>
<td>The collarbone is intermediate between the breastbone and shoulder.</td>
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</table>
• Ipsilateral: the same side (the spleen and descending colon are ipsilateral).

Vs.

• Contralateral: refers to the opposite side (the spleen and gallbladder are contralateral).

• Proximal: is used to describe a part that is closer to the trunk of the body or closer to another specified point of reference than another part (the elbow is proximal to the wrist).

Vs.

• Distal: it means that a particular body part is farther from the trunk or farther from another specified point of reference than another part (fingers are distal to the wrist).

• Superficial: means situated near the surface. Peripheral also means outward or near the surface.

Vs.

• Deep: is used to describe parts that are more internal.
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<tr>
<td>Proximal</td>
<td>Closer to the origin of the body part or the point of attachment of a limb to the body trunk</td>
<td>The elbow is proximal to the wrist.</td>
</tr>
<tr>
<td>Distal</td>
<td>Farther from the origin of a body part or the point of attachment of a limb to the body trunk</td>
<td>The knee is distal to the thigh.</td>
</tr>
<tr>
<td>Superficial (external)</td>
<td>Toward or at the body surface</td>
<td>The skin is superficial to the skeletal muscles.</td>
</tr>
<tr>
<td>Deep (internal)</td>
<td>Away from the body surface; more internal</td>
<td>The lungs are deep to the skin.</td>
</tr>
</tbody>
</table>
Regional Terms

• **Axial part**: includes the head, neck, and trunk.

• **Appendicular part**: Includes the limbs which are attached to the body's axis.
Levels of Organization

- Particles $\rightarrow$ atom $\rightarrow$ molecule $\rightarrow$ macromolecule $\rightarrow$ organelle $\rightarrow$ cell $\rightarrow$ tissue $\rightarrow$ organ $\rightarrow$ organ system $\rightarrow$ organism.
Body organization

1. Body cavities – hollow spaces within the human body that contain internal organs.
   a) **The dorsal cavity:** located toward the back of the body, is divided into the cranial cavity (which holds the brain) and vertebral or spinal cavity (which holds the spinal cord).
   b) **The ventral cavity:** located toward the front of the body, is divided into abdominopelvic cavity and thoracic cavity by the diaphragm.

   The abdominopelvic cavity is subdivided into abdominal cavity (which holds liver, gallbladder, stomach, pancreas, spleen, kidney, small, and large intestines) and the pelvic cavity (which holds the urinary bladder and reproductive organs).

   The thoracic cavity is subdivided into the pleural cavity (which holds the lungs) and pericardial cavity (which holds the heart).
Dorsal and ventral body cavities

**Dorsal body cavity**
- Cranial cavity (contains brain)
- Thoracic cavity (contains heart and lungs)
- Vertebral cavity (contains spinal cord)

**Abdominal cavity**
- Contains digestive viscera
- Diaphragm
- Pelvic cavity (contains urinary bladder, reproductive organs, and rectum)

**Ventral body cavity**
- Abdominopelvic cavity (thoracic and abdominopelvic cavities)
- Cranial cavity
- Vertebral cavity
- Superior mediastinum
- Pleural cavity
- Pericardial cavity within the mediastinum

**Viewing perspectives**
(a) Lateral view
(b) Anterior view
Body membranes

- Body membranes – tissue linings of body cavities and coverings of internal organs.
- Parietal membrane – lining of body cavity (e.g. parietal pleural membrane lines the pleural cavity).
- Visceral membrane – covering of internal organ (e.g. visceral pleural membrane lines the surface of the lungs).
Eleven organ systems

1. Integumentary, skeletal, muscular, nervous, endocrine, digestive, respiratory, Circulatory, lymphatic, urinary, and reproductive systems.
2. The reproductive system is mainly involved in transmitting genetic information from one generation to another, while the remaining 10 organ systems are important in maintaining homeostasis.
3. These 11 organ systems may be classified by their functions:
   - **Protection** – integumentary system.
   - **Support and movement** – skeletal and muscular systems.
   - **Integration and coordination** – nervous and endocrine systems.
   - **Processing and transport** – digestive, respiratory, circulatory, lymphatic, and urinary systems.
   - **Reproduction and development** – reproductive system.
Body Sections

- **Sagittal plane** – divides the body into left and right sections.
- **Midsagittal (median) plane** – divides the body into equal halves at midline.
- **Frontal (coronal) plane** – divides the body into anterior and posterior sections.
- **Transverse (horizontal) plane** – divides the body into superior and inferior sections.
Body regions

- The abdominal area is subdivided into 9 regions:

<table>
<thead>
<tr>
<th>Right Hypochondriac</th>
<th>Epigastric</th>
<th>Left Hypochondriac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Lumbar</td>
<td>Umbilical</td>
<td>Left Lumbar</td>
</tr>
<tr>
<td>Right Iliac</td>
<td>Hypogastric</td>
<td>Left Iliac</td>
</tr>
</tbody>
</table>
The nine abdominopelvic regions

(a) Nine regions delineated by four planes

(b) Anterior view of the nine regions showing the superficial organs
The four abdominopelvic quadrants

- Right Upper
- Right Lower
- Left Upper
- Left Lower
Common Terms

- **abdominal** = region between thorax and pelvis.
- **antebrachial** = the forearm.
- **antecubital** = the front of elbow.
- **axillary** = the armpit.
- **brachial** = the upper arm.
- **celiac** = the abdomen.
- **cephalic** = the head.
- **cervical** = the neck.
- **costal** = the ribs.
- **cubital** = the elbow.
- **femoral** = the thigh.
- **gluteal** = the buttock.
- **lumbar** = the lower back.
Medical imaging

• Techniques that are essential for diagnosing a wide range of disorders.

• **Conventional radiography** = X-rays pass through the body and expose on X-ray film, producing a negative image called a roentgenogram.

• **Computed tomography scanning (CT) or computerized axial tomography (CAT)** = X-rays pass through the body, tissues absorb small amounts of radiation depending on their densities, and the absorption is indicated on a monitor. Effective for tumor, kidney stones, gallstones, etc.
CT Scan

(a) A CT scan through the superior abdomen. By convention, cross sections of the body are shown as though the patient is lying on their back and the view is from the feet toward the head.
• **Magnetic resonance imaging (MRI)** = magnetism is applied to the human Body, and the response of atoms' nuclei in a tissue will produce a computerized image. Hydrogen ion nuclei is most popular.

• **Ultrasound (US)** = high – frequency sound waves are applied to body. When sound waves make contact with an object, certain amount of sound bounces back and be detected as image called sonogram.
MRI

(b) Frontal (coronal) plane

Right lung  Heart  Left lung

Liver  Stomach  Spleen