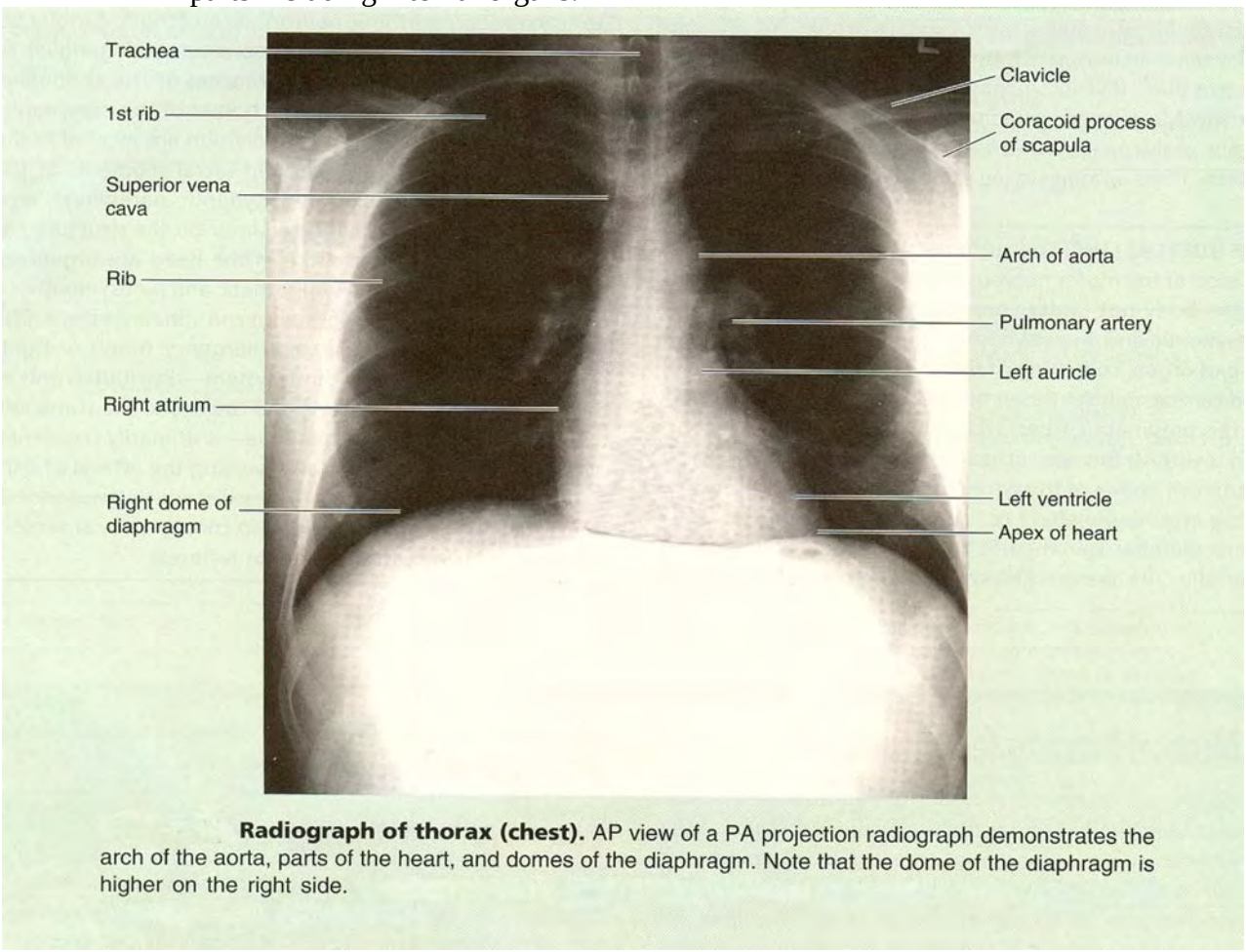
Introduction to Anatomy

Definition:

Anatomy is the branch of Medical Sciences concerned with the study of the structures of the human body and how the structures relate to one another. The word Anatomy is a Greek word which means “To cut up” or “To take apart”

Subdivisions of Anatomy:

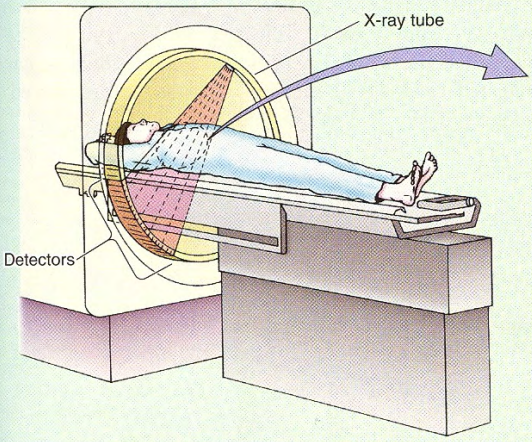
- Gross Anatomy (Macroscopic Anatomy)
- Histology (Microscopic Anatomy)
- Developmental Anatomy (Embryology)
- Surface Anatomy (Living Anatomy)
    1. Inspection (Observation)
    2. Palpation
    3. Percussion
    4. Auscultation
- Medical Imaging Techniques (Living Anatomy)
    1. **X-Ray:** This procedure utilizes beams of electromagnetic wave to reveal the image of body parts including internal organs.

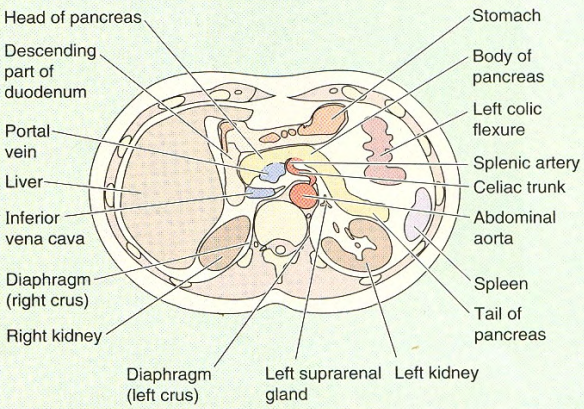


Radiograph of thorax (chest). AP view of a PA projection radiograph demonstrates the arch of the aorta, parts of the heart, and domes of the diaphragm. Note that the dome of the diaphragm is higher on the right side.

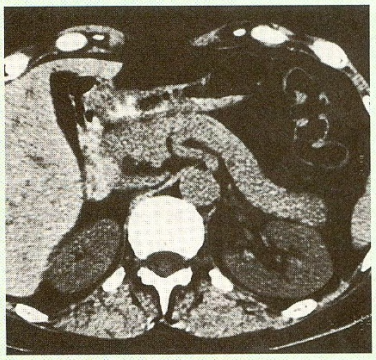
2. CT (Computed Tomography)/CAT (Computerized Axial Tomography)

This is a refined X-ray procedure which X-rays the body in slices removing the problem of overlap of structures associated with the X-ray technique.

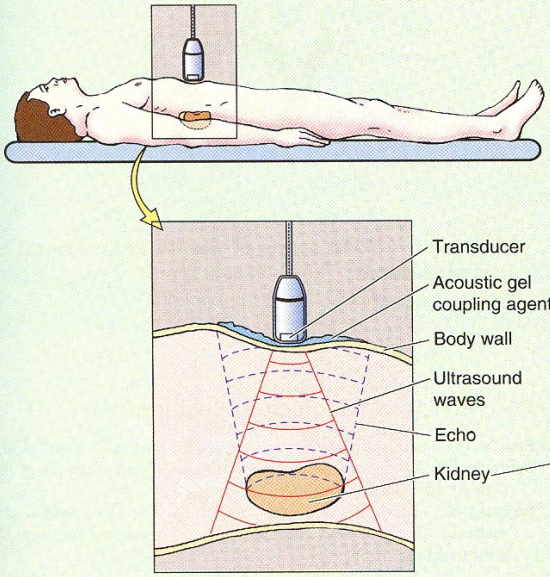




CT image of the upper abdomen

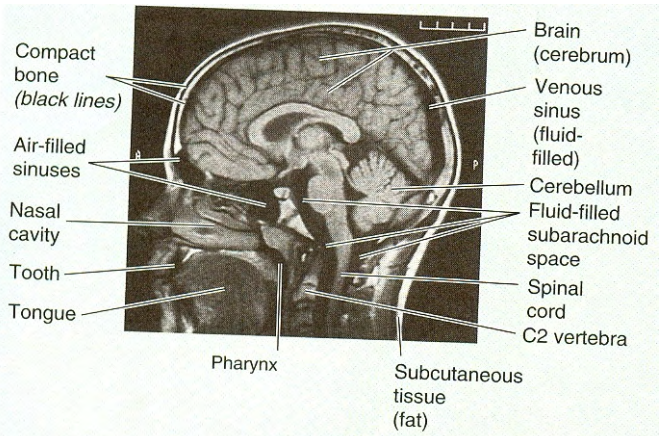


Technique for producing an abdominal CT scan. The X-ray tube rotates around the person in the CT scanner and sends a fan-shaped beam of X-rays through the upper abdomen from a variety of angles. X-ray detectors on the opposite side of the body measure the amount of radiation that passes through a horizontal section. A computer reconstructs the images from several scans, and an abdominal CT scan is produced. The scan is oriented so it appears the way an examiner would view it when standing at the foot of the bed and looking toward a supine person's head.



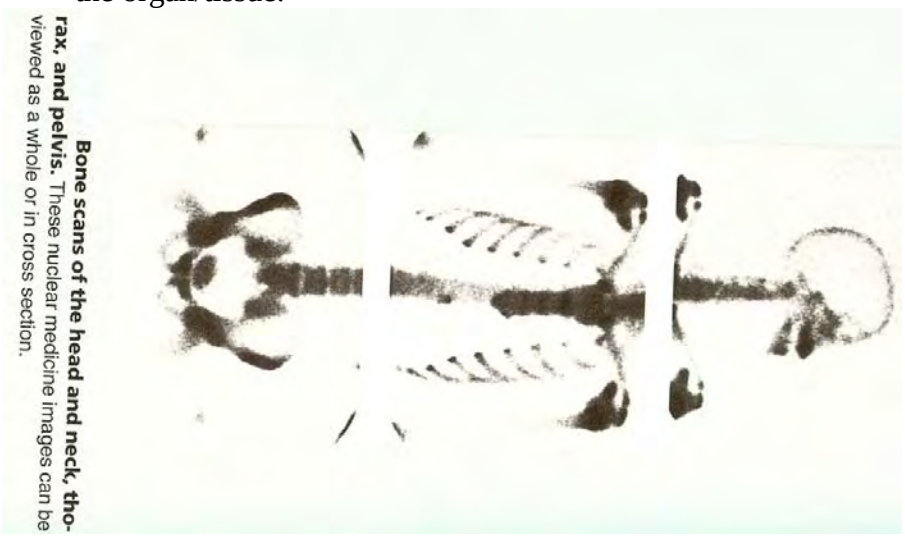
Technique for producing an abdominal ultrasound image of the upper abdomen. The image results from the echo of ultrasound waves from abdominal structures of different densities. The ultrasound image of the right kidney is displayed on a monitor.

3. **<u>Ultrasonography (Sonography):</u>** This procedure records pulses of ultrasonic waves (High frequency sound waves) bouncing off the organs and tissues of the body. It is a more readily accessible procedure (Portable machine) and cheaper than CT and MRI. Furthermore, it is frequently used in obstetrics practice because it is radiation free. It can however not be used in investigations of the CNS and the Lungs because of the protective bony enclosures and the air in the lungs.
4. **<u>MRI (Magnetic Resonance Imaging):</u>** This imaging system is similar to CT except that it differentiates the tissue better than CT does. Furthermore slices of different parts can be taken in different planes.



Median MRI of the head. Many details of the CNS and structures in the nasal and oral cavities and upper neck are seen in this study. The black low signal areas superior to the anterior and posterior aspects of the nasal cavity are the air-filled frontal and sphenoidal sinuses.

5. **<u>Nuclear Medicine Imaging:</u>** This procedure entails the administration of a radioactive substance into the body. The material is absorbed by the target organ which is then scanned to reveal the structure of the organ/tissue.

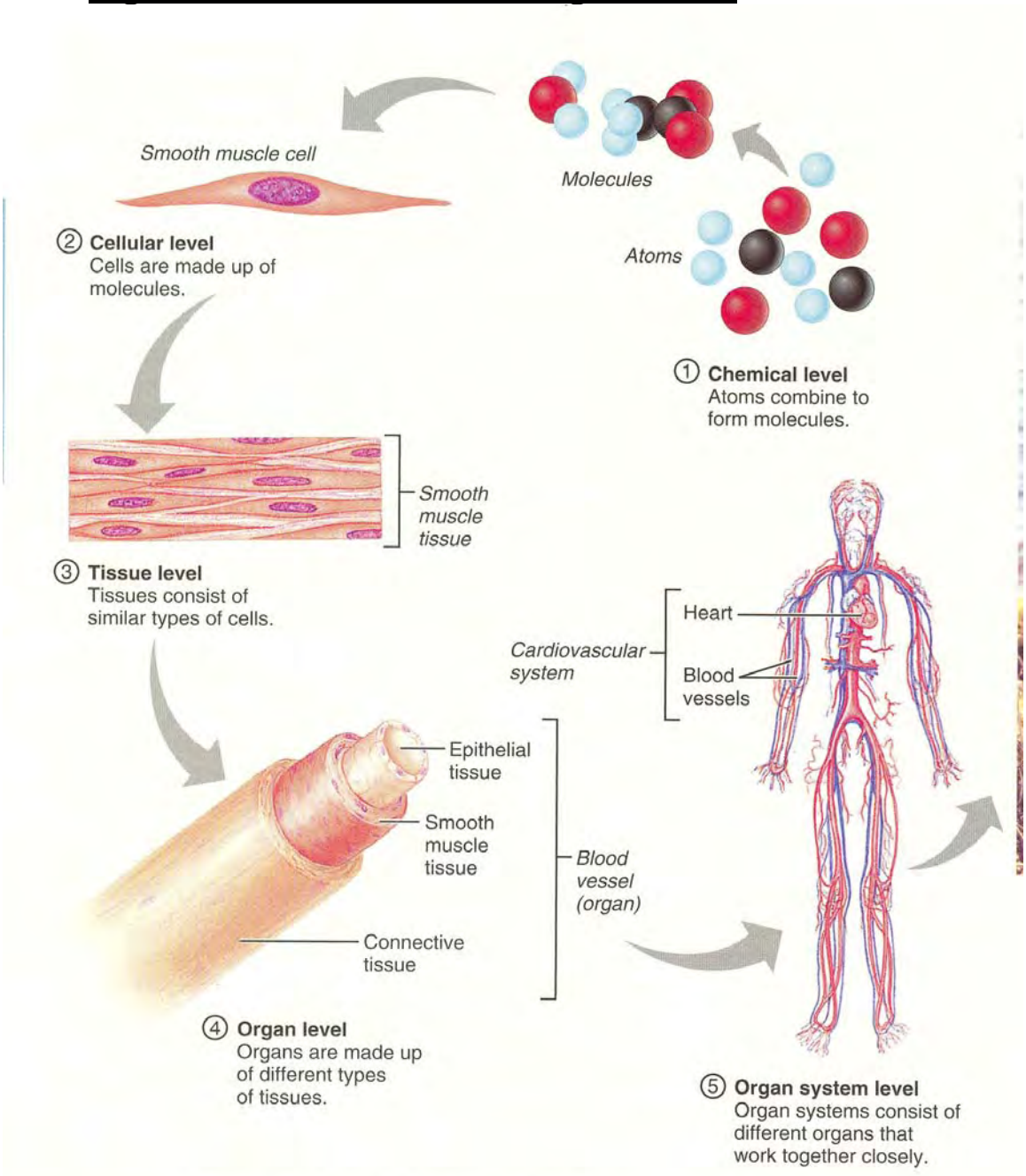


Bone scans of the head and neck, thorax, and pelvis. These nuclear medicine images can be viewed as a whole or in cross section.

Levels of structural organization used in studying anatomy Fig. 1

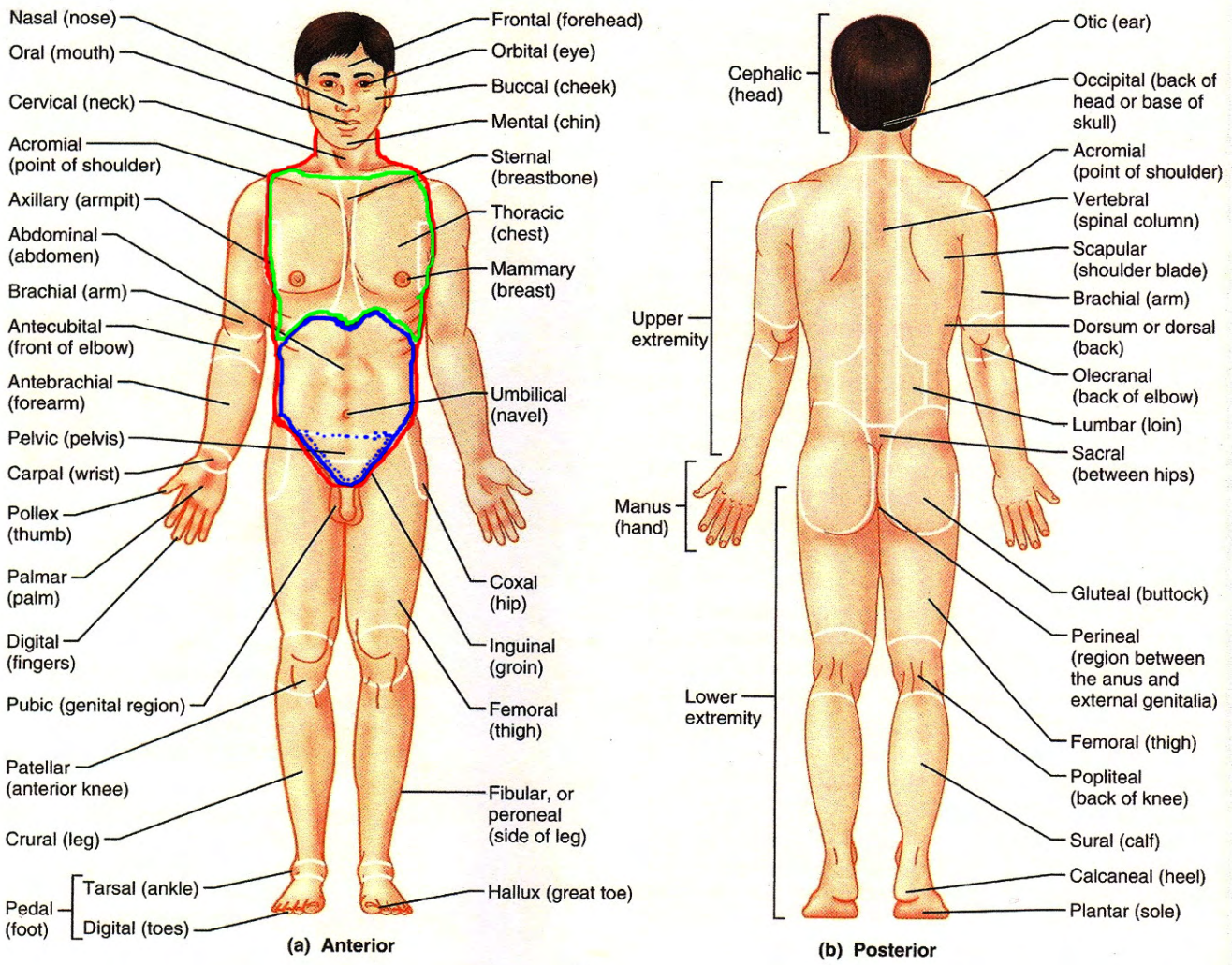
Atom < Molecule < Cell > Tissue > Organ > Body Systems < The Organism.

Fig. 1 Levels of structural Organization



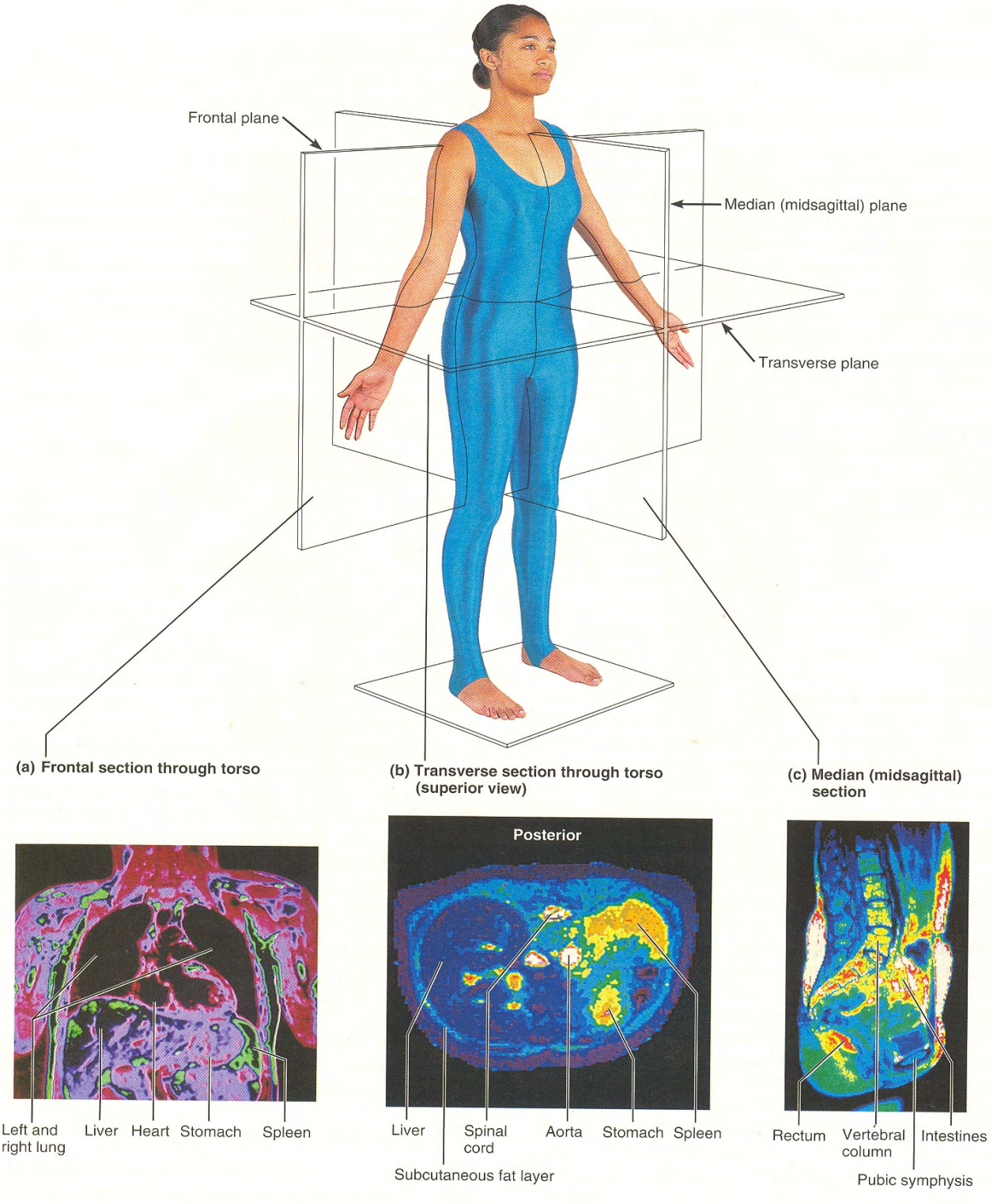
Levels of structural organization. Components of the cardiovascular system illustrate the levels of structural organization in a human being.

Anatomical Position and Descriptive Terminologies



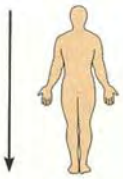
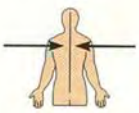
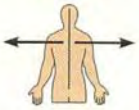
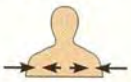
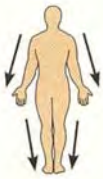
Regional terms used to designate specific body areas. (a) The anatomical position. **(b)** The heels are raised slightly to show the plantar surface of the foot, which is actually on the inferior surface of the body.

Body Planes and Sections



Planes of the body—frontal, transverse, and median (midsagittal) with corresponding magnetic resonance imaging (MRI) scans.

Body Orientation and Sense of Direction

TERM	DEFINITION	EXAMPLE	
Superior (cranial)	Toward the head end or upper part of a structure or the body; above		The head is superior to the abdomen
Inferior (caudal)	Away from the head end or toward the lower part of a structure or the body; below		The navel is inferior to the chin
Ventral (anterior)*	Toward or at the front of the body; in front of		The breastbone is anterior to the spine
Dorsal (posterior)*	Toward or at the back of the body; behind		The heart is posterior to the breastbone
Medial	Toward or at the midline of the body; on the inner side of		The heart is medial to the arm
Lateral	Away from the midline of the body; on the outer side of		The arms are lateral to the chest
Intermediate	Between a more medial and a more lateral structure		The collarbone is intermediate between the breastbone and shoulder
Proximal	Closer to the origin of the body part or the point of attachment of a limb to the body trunk		The elbow is proximal to the wrist
Distal	Farther from the origin of a body part or the point of attachment of a limb to the body trunk		The knee is distal to the thigh
Superficial (external)	Toward or at the body surface		The skin is superficial to the skeletal muscles
Deep (internal)	Away from the body surface; more internal		The lungs are deep to the skin

The terms *ventral* and *anterior* are synonymous in humans, but this is not the case in four-legged animals. Whereas *anterior* refers to the leading portion of the body (abdominal surface in humans, head in a cat), *ventral* specifically refers to the "belly" of a vertebrate animal and thus 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.

BODY PLANES AND SECTIONS

In order to view organs/structures in their relative positions within the body, the body is often cut into fragments called SECTIONS along imaginary lines referred to as PLANES on the surface of the body.
Conventionally, three planes located at right angles to each other are recognized for sectioning the body. These are: (See diagram):

1. **The median (Sagital/Midsagital) Plane:**

This is a longitudinal (Vertical) plane dividing the body anteroposteriorly into two equal right and left halves. Planes taken parallel to the left or right of the median plane are called paramedian (Parasagital) planes.

2. **The Coronal (Frontal) Plane**

This is also a vertical plane dividing the body from one lateral aspect of the body to the other into anterior and posterior parts that may or may not be equal. This plane is also perpendicular to the median and paramedian planes.

3. **The Transverse (Horizontal) Plane:**

This plane runs across the body horizontally, dividing the body into upper and lower parts that may or may not be equal. It is also perpendicular to the median and frontal planes.
These planes are used to subdivide the entire body as well as the internal organs (Viscera) of the body. The choice of the plane used at any time is determined by what one wishes to view in the body or organs.