Chapter 1: An Introduction to the Human Body
Terms of importance

1. Anatomy
2. Physiology
3. Palpation
4. Auscultation
5. Percussion
6. Homeostasis
7. Blood
8. Plasma
9. Lymph
10. Cerebrospinal fluid
11. Synovial Fluid
12. Negative feedback
13. Positive feedback
Warm Up

This is defined as a group of cells with similar structure and function.

A. Tissue
B. Organ
C. Molecules
D. Compound
E. Organism
Warm Up

This is the sum of all cellular processes that occur in the body.

A. Metabolism
B. Anabolism
C. Catabolism
D. Auscultation
E. Palpation
Anatomy and Physiology Defined

- Two branches of science that deal with body’s parts and function
  - **Anatomy**
    - The science of body structures
  - **Physiology**
    - The science of body functions
# Subspecialties of Anatomy and Physiology

<table>
<thead>
<tr>
<th>SUBSPECIALTIES OF ANATOMY</th>
<th>STUDY OF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embryology (em’-brē-OL-ō-jē; embry = embryo; -logy = study of)</td>
<td>The first eight weeks of development following fertilization of an egg (in humans).</td>
</tr>
<tr>
<td>Developmental biology</td>
<td>The complete development of an individual from fertilization of an egg to death.</td>
</tr>
<tr>
<td>Cell biology</td>
<td>Cellular structure and functions.</td>
</tr>
<tr>
<td>Histology (his’-TOL-ō-jē; hist. = tissue)</td>
<td>Microscopic structure of tissues.</td>
</tr>
<tr>
<td>Surface anatomy</td>
<td>Surface markings of the body to understand internal anatomy through visualization and palpation (gentle touch).</td>
</tr>
<tr>
<td>Gross anatomy</td>
<td>Structures that can be examined without using a microscope.</td>
</tr>
<tr>
<td>Systemic anatomy</td>
<td>Structure of specific systems of the body such as the nervous or respiratory systems.</td>
</tr>
<tr>
<td>Regional anatomy</td>
<td>Specific regions of the body such as the head or chest.</td>
</tr>
<tr>
<td>Radiographic anatomy (rä-de-ō-GRAF-ik; radio = ray; -graphic = to write)</td>
<td>Body structures that can be visualized with x-rays.</td>
</tr>
<tr>
<td>Pathological anatomy (path’-ō-LO-jik; path. = disease)</td>
<td>Structural changes (from gross to microscopic) associated with disease.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUBSPECIALTIES OF PHYSIOLOGY</th>
<th>STUDY OF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurophysiology (NOOR-ō-fiz-ē-ol-ō-jē; neuro = nerve)</td>
<td>Functional properties of nerve cells.</td>
</tr>
<tr>
<td>Endocrinology (en’-dō-kri-NOL-ō-jē; endo. = within; -crin = secretion)</td>
<td>Hormones (chemical regulators in the blood) and how they control body functions.</td>
</tr>
<tr>
<td>Cardiovascular physiology (kar-de-ō-VAS-kū-lar; cardi = heart; -vascular = blood vessels)</td>
<td>Functions of the heart and blood vessels.</td>
</tr>
<tr>
<td>Immunology (im’-ū-NOL-ō-jē; immun. = not susceptible)</td>
<td>How the body defends itself against disease-causing agents.</td>
</tr>
<tr>
<td>Respiratory physiology (RES-pir-a-to’-rē; respira- = to breathe)</td>
<td>Functions of the air passageways and lungs.</td>
</tr>
<tr>
<td>Renal physiology (RĒ-nal; ren = kidney)</td>
<td>Functions of the kidneys.</td>
</tr>
<tr>
<td>Exercise physiology</td>
<td>Changes in cell and organ functions as a result of muscular activity. Functional changes associated with disease and aging.</td>
</tr>
</tbody>
</table>

**Pathophysiology (PATH-ō-fiz-ē-ol’-ō-jē)**
Systems of the body

1. Integumentary system
2. Skeletal
3. Muscular
4. Nervous
5. Endocrine
6. Cardiovascular
7. Digestive
8. Urinary
9. Lymphatic
10. Respiratory
11. Reproductive
Complete the following:

- Each group will get one system
- Look up the basic components of your assigned system (what is it made up of?)
- Then look up the basic function of your assigned system (what does it do?)
- We will discuss your results.
**Table 1.2**

**The Eleven Systems of the Human Body**

**INTEGUMENTARY SYSTEM (CHAPTER 5)**

*Components:* Skin and structures associated with it, such as hair, nails, sweat glands, and oil glands.

*Functions:* Protects the body; helps regulate body temperature; eliminates some wastes; helps make vitamin D; and detects sensations such as touch, pain, warmth, and cold.

![Integumentary System Image](image)

**SKELETAL SYSTEM (CHAPTERS 6-9)**

*Components:* Bones and joints of the body and their associated cartilages.

*Functions:* Supports and protects the body; provides a surface area for muscle attachments; aids body movements; houses cells that produce blood cells; stores minerals and lipids (fats).

![Skeletal System Image](image)
**MUSCULAR SYSTEM (CHAPTERS 10, 11)**

*Components*: Muscles composed of skeletal muscle tissue, so-named because it is usually attached to bones.

*Functions*: Produces body movements, such as walking; stabilizes body position (posture); generates heat.

**NERVOUS SYSTEM (CHAPTERS 12–17)**

*Components*: Brain, spinal cord, nerves, and special sense organs, such as the eyes and ears.

*Functions*: Generates action potentials (nerve impulses) to regulate body activities; detects changes in the body’s internal and external environments, interprets the changes, and responds by causing muscular contractions or glandular secretions.
Table 1.2

The Eleven Systems of the Human Body

**ENDOCRINE SYSTEM (CHAPTER 18)**

*Components:* Hormone-producing glands (pineal gland, hypothalamus, pituitary gland, thymus, thyroid gland, parathyroid glands, adrenal glands, pancreas, ovaries, and testes) and hormone-producing cells in several other organs.

*Functions:* Regulates body activities by releasing hormones, which are chemical messengers transported in blood from an endocrine gland or tissue to a target organ.

**CARDIOVASCULAR SYSTEM (CHAPTERS 19–21)**

*Components:* Blood, heart, and blood vessels.

*Functions:* Heart pumps blood through blood vessels; blood carries oxygen and nutrients to cells and carbon dioxide and wastes away from cells and helps regulate acid-base balance, temperature, and water content of body fluids; blood components help defend against disease and repair damaged blood vessels.

**DIGESTIVE SYSTEM (CHAPTER 24)**

*Components:* Organs

**URINARY SYSTEM (CHAPTER 26)**

*Components:* Kidneys, ureters, bladder, and urethra.
Table 1.2

Digestive System (Chapter 24)

Components: Organs of gastrointestinal tract, a long tube that includes the mouth, pharynx (throat), esophagus, stomach, small and large intestines, and anus; also includes accessory organs that assist in digestive processes, such as the salivary glands, liver, gallbladder, and pancreas.

Functions: Achieves physical and chemical breakdown of food; absorbs nutrients; eliminates solid wastes.

Urinary System (Chapter 26)

Components: Kidneys, ureters, urinary bladder, and urethra.

Functions: Produces, stores, and eliminates urine; eliminates wastes and regulates volume and chemical composition of blood; helps maintain the acid-base balance of body fluids; maintains body’s mineral balance; helps regulate production of red blood cells.
<table>
<thead>
<tr>
<th>Lymphatic System and Immunity (Chapter 22)</th>
<th>Respiratory System (Chapter 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Components:</strong></td>
<td><strong>Components:</strong></td>
</tr>
<tr>
<td>Lymphatic fluid (lymph) and vessels;</td>
<td>Lungs and air passageways such as</td>
</tr>
<tr>
<td>also includes spleen, thymus, lymph</td>
<td>the pharynx (throat), larynx</td>
</tr>
<tr>
<td>nodes, and tonsils.</td>
<td>(voice box), trachea (windpipe),</td>
</tr>
<tr>
<td></td>
<td>and bronchial tubes leading into</td>
</tr>
<tr>
<td></td>
<td>and out of the lungs.</td>
</tr>
<tr>
<td><strong>Functions:</strong></td>
<td><strong>Functions:</strong></td>
</tr>
<tr>
<td>Returns proteins and fluid to blood;</td>
<td>Transfers oxygen from inhaled air</td>
</tr>
<tr>
<td>carries lipids from gastrointestinal</td>
<td>to blood and carbon dioxide from</td>
</tr>
<tr>
<td>tract to blood; includes structures</td>
<td>blood to exhaled air; helps</td>
</tr>
<tr>
<td>where lymphocytes that protect</td>
<td>regulate acid-base balance of</td>
</tr>
<tr>
<td>against disease-causing microbes</td>
<td>body fluids; air flowing out of</td>
</tr>
<tr>
<td>mature and proliferate.</td>
<td>lungs through vocal cords</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reproductive Systems (Chapter 28)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Components:</strong></td>
</tr>
<tr>
<td>Gonads (testes in males and ovaries in</td>
</tr>
<tr>
<td>females) and associated organs (uterine</td>
</tr>
<tr>
<td>tubes, uterus, and vagina in females</td>
</tr>
<tr>
<td>and epididymis, ductus deferens, and</td>
</tr>
<tr>
<td>epididymis, ductus deferens, and</td>
</tr>
<tr>
<td>testes in males)</td>
</tr>
</tbody>
</table>
REPRODUCTIVE SYSTEMS (CHAPTER 28)

Components: Gonads (testes in males and ovaries in females) and associated organs (uterine tubes, uterus, and vagina in females and epididymis, ductus deferens, and penis in males).

Functions: Gonads produce gametes (sperm or oocytes) that unite to form a new organism; gonads also release hormones that regulate reproduction and other body processes; associated organs transport and store gametes.
Clinical Connection: Noninvasive Diagnostic Techniques

- Used to assess aspects of body structure and function
  - **Inspection** of the body to observe any changes
    - **Palpation**
      - Gently touching body surfaces with hands
    - **Auscultation** or
      - Listening to body sounds (stethoscope)
    - **Percussion**
      - Tapping on the body surface with fingertips and listening to echoes
Living verses the non-living

- What are some of the categories that define something as living?
Characteristics of Living Human Organism

- **Basic Life Processes**
  - Distinguish living from non-living things
  - All living things …
    - Are made of **cells**
    - Require **energy**
    - Reproduce
    - Display **heredity**
    - Respond to **stimuli**
    - **Evolve** or adapt
    - **Homeostasis** (or equilibrium)
Metabolism and Responsiveness

- **Metabolism**
  - Sum of all the chemical processes that occur in the body
    - Catabolism or the breakdown of complex chemical substances into simpler components
    - Anabolism or the building up of complex chemical substances from smaller, simpler components

- **Responsiveness**
  - Body’s ability to detect and respond to changes
    - Decrease in body temperature
    - Responding to sound
    - Nerve (electrical signals) and muscle cells (contracting)
Movement and Growth

**Movement**
- Motion of the whole body
  - Organs, cells, and tiny subcellular structures
  - Leg muscles move the body from one place to another

**Growth**
- Increase in body size
  - Due to an increase in existing cells, number of cells, or both
  - In bone growth materials between cells increase

Differentiation and Reproduction

- **Differentiation**
  - Development of a cell from an unspecialized to specialized state
    - Cells have specialized structures and functions that differ from precursor cells
    - **Stem cells** give rise to cells that undergo differentiation

- **Reproduction**
  - Formation of new cells (growth, repair, or replacement)
  - Production of a new individual
Homeostasis

- A condition of **equilibrium** (balance) in the body’s internal environment
  - Dynamic condition
  - Narrow range is compatible with maintaining life
  - Example
    - Blood glucose levels range between 70 and 110 mg of glucose/dL of blood
    - Whole body contributes to maintain the internal environment within normal limits
Homeostasis and Body Fluids

- Maintaining the volume and composition of body fluids are important
  - **Body fluids** are defined as dilute, watery solutions containing dissolved chemicals inside or outside of the cell
  - **Intracellular Fluid (ICF)**
    - Fluid within cells
  - **Extracellular Fluid (ECF)**
    - Fluid outside cells
    - **Interstitial fluid** is ECF between cells and tissues
Bodily Fluids

- Blood Plasma
- Lymph
- Cerebrospinal fluid (CSF)
- Synovial fluid
- Aqueous humor and vitreous body
ECF and Body Location

- **Blood Plasma**
  - ECF within blood vessels

- **Lymph**
  - ECF within lymphatic vessels

- **Cerebrospinal fluid (CSF)**
  - ECF in the brain and spinal cord

- **Synovial fluid**
  - ECF in joints

- **Aqueous humor and vitreous body**
  - ECF in eyes
Plasma

White blood cells, the “buffy coat”

Red blood cells
PLASMA - 55% of Total Blood Volume
- 91% Water
- 7% Blood Proteins (fibrinogen, albumin, globulin)
- 2% Nutrients (amino acids, sugars, lipids)
  - Hormones (erythropoietin, insulin, etc.)
  - Electrolytes (sodium, potassium, calcium, etc.)

CELLULAR COMPONENTS - 45% of Total Blood Volume

Buffy Coat
- White Blood Cells (7000-9000 per mm³ of blood)
- Platelets (250,000 per mm³ of blood)

Red Blood Cells (RBCs)
- About 5,000,000 per mm³ of blood
Practice Question

Using your fingers to find your pulse on your wrist is an example of

a. auscultation
b. palpation
c. responsiveness
d. anatomy
Feedback System

- Three Basic components
  - Receptor
  - Control center
  - Effector
1. Stimulus: Produces change in variable
2. Change detected by receptor
3. Input: Information sent along afferent pathway to Control center
4. Output: Information sent along efferent pathway to Effector
5. Response of effector feeds back to influence magnitude of stimulus and returns variable to homeostasis
Feedback Systems

- **Receptor**
  - Body structure that monitors changes in a controlled condition
  - Sends *input* to the control center
    - Nerve ending of the skin in response to temperature change
Feedback Systems

- **Control Center**
  - Brain
  - Sets the range of values to be maintained
  - Evaluates input received from receptors and generates **output** command
  - Nerve impulses, hormones
    - Brains acts as a control center receiving nerve impulses from skin temperature receptors
Feedback Systems

- **Effector**
  - Receives output from the control center
  - Produces a response or effect that changes the controlled condition
    - Found in nearly every organ or tissue
    - Body temperature drops the brain sends an impulse to the skeletal muscles to contract
    - Shivering to generate heat
Negative and Positive Feedback systems

- **Negative Feedback systems**
  - **Reverses** a change in a controlled condition
    - Regulation of blood pressure (force exerted by blood as it presses against the walls of the blood vessels)

- **Positive Feedback systems**
  - **Strengthen** or reinforce a change in one of the body’s controlled conditions
    - Normal child birth

- *Know these examples!*
Positive Feedback Loop

1. Head of fetus pushes against cervix
2. Nerve impulses from cervix transmitted to brain
3. Brain stimulates pituitary gland to secrete oxytocin
4. Oxytocin carried in bloodstream to uterus
5. Oxytocin stimulates uterine contractions and pushes fetus toward cervix
Negative Feedback

Stimulus: rising blood glucose level

High blood glucose level is detected by insulin-secreting cells of pancreas.

Pancreas secretes the hormone insulin causing liver cells to take up glucose and store it as glycogen.

Most body cells also take up more glucose.

As body cells take up blood glucose, glucose levels in the blood decline, and insulin release stops (negative feedback).

Return to homeostatic blood glucose level

(a) Negative feedback
Terms to Remember

- Signs
- Symptoms
- Anatomical position
- Prone
- Supine
- Anterior
- Posterior
- Superior
- Inferior
- Proximal

- Distal
- Lateral
- Medial
- Sagittal
- Frontal
- Transverse
- Cranial Cavity
- Thoracic Cavity
- Abdominopelvic cavity

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This is the structure of a feedback system that provides input to the control center.

A. Receptor
B. Muscle
C. Brain
D. Effector
E. Efferent
Questions

A condition NOT regulated by a negative feedback loop would be:
A. Body temp
B. Blood pressure
C. Heart Rate
D. Childbirth
E. Blood sugar
Clinical Connection: Diagnosis of Disease

- Distinguishing one disorder or disease from another
  - **Signs**: physical characteristics
    - Example: Rash, high blood sugar
  - **Symptoms**: Sense of the patient
    - Example: headache, back pain.

- Medical history
  - Present illnesses and past medical problems

- Physical examination
  - Orderly evaluation of the body and its function
  - Noninvasive techniques and other vital signs (pulse)
# Directional Terms

<table>
<thead>
<tr>
<th>Directional Term</th>
<th>Definition</th>
<th>Example of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior (soo'-PÉR-é-or)</td>
<td>Toward the head, or the upper part of a structure.</td>
<td>The heart is superior to the liver.</td>
</tr>
<tr>
<td>(cephalic or cranial)</td>
<td></td>
<td>The stomach is inferior to the lungs.</td>
</tr>
<tr>
<td>Inferior (in'-FÉR-é-or)</td>
<td>Away from the head, or the lower part of a structure.</td>
<td>The sternum (breastbone) is anterior to the heart.</td>
</tr>
<tr>
<td>(caudal)</td>
<td></td>
<td>The esophagus is posterior to the trachea (windpipe).</td>
</tr>
<tr>
<td>Anterior (an-TÈR-é-or)</td>
<td>Nearer to or at the front of the body.</td>
<td>The ulna is medial to the radius.</td>
</tr>
<tr>
<td>(ventral)*</td>
<td></td>
<td>The lungs are lateral to the heart.</td>
</tr>
<tr>
<td>Posterior (pos-TÈR-é-or)</td>
<td>Nearer to or at the back of the body.</td>
<td>The transverse colon is intermediate between the ascending and descending colons.</td>
</tr>
<tr>
<td>(dorsal)</td>
<td></td>
<td>The gallbladder and ascending colon are ipsilateral.</td>
</tr>
<tr>
<td>Medial (MÉ-dé-al)</td>
<td>Nearer to the midline.</td>
<td>The ascending and descending colons are contralateral.</td>
</tr>
<tr>
<td>Lateral (LAT-er-al)</td>
<td>Farther from the midline.</td>
<td>The humerus is proximal to the radius.</td>
</tr>
<tr>
<td>Intermediate (in'-ter-MÉ-dé-at)</td>
<td>Between two structures.</td>
<td>The phalanges are distal to the carpals.</td>
</tr>
<tr>
<td>Ipsilateral (ip-si-LAT-er-al)</td>
<td>On the same side of the body as another structure.</td>
<td>The ribs are superficial to the lungs.</td>
</tr>
<tr>
<td>Contralateral (CON-tra-lat-er-al)</td>
<td>On the opposite side of the body from another structure.</td>
<td>The ribs are deep to the skin of the chest and back.</td>
</tr>
<tr>
<td>Proximal (PROK-si-mal)</td>
<td>Nearer to the attachment of a limb to the trunk; nearer to the origination of a structure.</td>
<td></td>
</tr>
<tr>
<td>Distal (DIS-tal)</td>
<td>Farther from the attachment of a limb to the trunk; farther from the origination of a structure.</td>
<td></td>
</tr>
<tr>
<td>Superficial (soo'-per-FISH-al) (external)</td>
<td>Toward or on the surface of the body.</td>
<td></td>
</tr>
<tr>
<td>Deep (internal)</td>
<td>Away from the surface of the body.</td>
<td></td>
</tr>
</tbody>
</table>

*Note that the terms anterior and ventral mean the same thing in humans. However, in four-legged animals ventral refers to the belly side and is therefore inferior. Similarly, the terms posterior and dorsal mean the same thing in humans, but in four-legged animals dorsal refers to the back side and is therefore superior.

1Recall that the midline is an imaginary vertical line that divides the body into equal right and left sides.

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*Exhibit 1.1 Tortora - PAP 12/e
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Body Positions

- Descriptions of the human body assume a specific stance

**Anatomical position**
- Body upright
- Standing erect facing the observer
- Head and eyes facing forward
- Feet are flat on the floor and forward
- Upper limbs to the sides
- Palms turned forward
**Anatomical position**

- **Prone position**
  - Body is lying face down

- **Supine position**
  - Body is lying face up
Common Directional Terms

- **Anterior**
  - Nearer to the front of the body

- **Posterior**
  - Nearer to the back of the body

- **Superior**
  - Toward the head

- **Inferior**
  - Away from the head
Common Directional Terms

- **Proximal**
  - Nearer to the attachment of a limb to the trunk

- **Distal**
  - Farther from the attachment of a limb to the trunk

- **Lateral**
  - Farther from the midline

- **Medial**
  - Nearer to the midline
Planes and Sections

- Imaginary flat surfaces that pass through the body parts
  - **Sagittal plane**
    - A vertical plane that divides the body into right and left sides
      - **Midsagittal plane** divides body into equal right and left sides
      - **Parasagittal plane** divides body into unequal right and left sides
Planes and Sections

- **Frontal or coronal plane**
  - Divides the body or an organ into anterior (front) and posterior (back) portions

- **Transverse plane**
  - Divides the body or an organ into superior (upper) and inferior (lower) portions
  - Also called cross-sectional or horizontal plane
Planes and Sections

- **Oblique plane**
  - Passes through the body or an organ at an angle
  - Between transverse and sagittal plane
  - Between transverse and frontal plane

- **Sections**
  - Cut of the body made along a plane
Body Cavities

- Cranial cavity
- Vertebral canal
- Thoracic cavity
- Pleural cavity
- Pericardial cavity
- Mediastinum
- Abdominopelvic cavity:
  - Abdominal cavity
  - Pelvic cavity
Thoracic Cavity

- **Mediastinum**
  - Central part of the thoracic cavity
  - Between lungs

- **Diaphragm**
  - Dome shaped muscle
  - Separates the thoracic cavity from the abdominopelvic cavity
Thoracic and Abdominal Cavity Membranes

(c) Sagittal section of thoracic cavity
Nine Abdominopelvic Regions

(b) Anterior view showing location of abdominopelvic regions

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Quadrants

- Vertical and horizontal lines pass through the **umbilicus**
  - Right upper quadrant (RUQ)
  - Left upper quadrant (LUQ)
  - Right lower quadrant (RLQ)
  - Left lower quadrants (LLQ)
ABDOMINAL QUADRANTS

RUQ CONTAINS
LIVER
RIGHT KIDNEY
GALL BLADDER
COLON
PANCREAS

LUQ CONTAINS
STOMACH
LEFT KIDNEY
Spleen
COLON
PANCREAS

RLQ CONTAINS
APPENDIX
COLON
SMALL INTESTINE
URETER
MAJOR VEIN
AND ARTERY
TO RIGHT LEG

LLQ CONTAINS
COLON
SMALL INTESTINE
URETER
MAJOR VEIN
AND ARTERY
TO LEFT LEG

MIDLINE CONTAINS
AORTA, PANCREAS, SMALL INTESTINE
BLADDER, SPINE
Practice Question

All of the following structures are inferior to the heart except the

a. lungs
b. kidneys.
c. abdominal cavity.
d. intestines.
Medical Imaging

- Techniques and procedures used to create images of the human body
  - Allow visualization of structures inside the body
  - Diagnosis of anatomical and physiological disorders
  - Conventional radiography (X-rays) have been in use since the late 1940’s
To preview, let's get into seven groups.

- Each group will get one type of imaging.
  - Be able to provide an overview of that type of imaging.
  - Come up with one positive thing about it.
  - Then come up with one negative thing about it.

- We will share what you put together with the class after the five minutes.
Medical Imaging

- X rays
- Ultrasound
- Computer tomographic scan (CT)
- Positron Emission Tomographic (PET)
- Magnetic Resonance Imaging (MRI)
- Radionuclide Scanning
- Endoscopy
Radiography (insert figures for each image in following slides)

- **X-rays**
  - produce image of interior structures
  - Inexpensive and quick
  - Hollow structures appear black or gray
  - Do not pass easily through dense structure (bone)

- At low dose, useful for soft tissue (breast)
  - Mammography (breast)
  - Bone densitometry (bone density)

Radiograph of the thorax in anterior view

Table 01.03a Tortora - PAP 12/e
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Magnetic Resonance Imaging (MRI)

- High energy magnetic field
- Relatively safe procedure
  - Not used on patients containing metal
- Used for differentiating normal and abnormal tissues
  - Tumors, brain abnormalities, blood flow
Computed Tomography

- Computer-Assisted radiography (CT-Scan)
  - 3-D structures
  - Visualize soft tissue in more detail than conventional radiography
Ultrasound Scanning

- Ultrasound Scanning
  - High frequency sound waves
    - Sonogram
    - Noninvasive, painless, no dyes
    - Pregnancy (fetus)
Radionuclide Scanning

- Radioactive substance given intravenously
- Gamma rays detected by camera
  - Specialized technique used for brain, heart, lungs, and liver
Positron Emission Tomography (PET)

- Positron (positively charged particles) emitting substance injected into the body
  - Gamma rays produced
  - Computer constructed a PET scan image in color
  - study physiology of body structures (metabolism)
Endoscopy

- Endoscope
  - Lighted instrument with lens
  - Image projected onto a monitor
- Colonoscopy
  - Interior of colon
- Laparoscopy
  - Organs in abdominopelvic cavity

Interior view of the colon as shown by colonoscopy

Table 01.03d  Tortora - PAP 12/e
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A 37-year old woman is admitted to the hospital after complaining of chest pains. She admits to having had severe headaches for several days prior to seeking medical help. She is also taking medications for high blood pressure and is four months pregnant. Which medical imaging procedures listed in your text would be the best choice of a physician attempting to determine her condition? (Assume all equipment is available and there are unlimited funds to cover costs incurred.)
Diagnostic Techniques Videos

- mRI: https://youtu.be/MWcOwgWsPHA
- X ray history - https://youtu.be/gsV7SJDDCY4
- Endoscopy - https://youtu.be/Tz2ktVJVVWcl