

Anatomy vs. Physiology

anatomy: structure of an organism (what does it look like?)

physiology: function of an organism (what does it do?)

Human Body Systems

digestive	immune
circulatory	integumentary
nervous	lymphatic
excretory	reproductive
respiratory	endocrine
skeletal	muscular

Excretory System

anatomy: **physiology:**

kidneys 1) removes waste products from cellular metabolism (urea, water, carbon dioxide)

ureters 2) filters blood

bladder

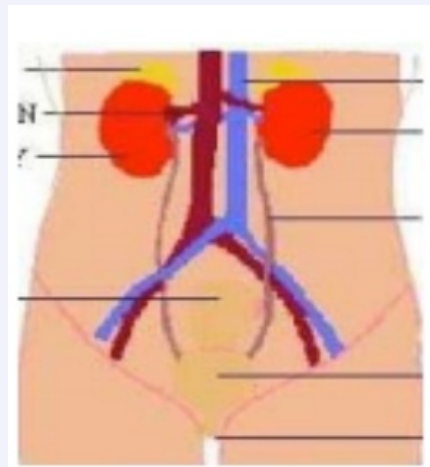
urethra

lungs

skin (sweat glands)

liver (produces urea)

Excretory System Image



Skeletal System

anatomy: **physiology:**

bones 1) protects organs

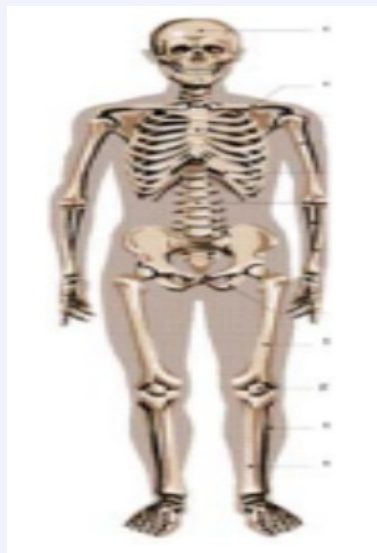
cartilage 2) provides shape, support

ligaments 3) stores materials (fats, minerals)

4) produces blood cells

5) allows movement

Skeletal System Image



Endocrine System

anatomy: **physiology:**

glands (produce hormones) 1) regulates body activities using hormones. slow response, long lasting

~hypothalamus

~pituitary

~thyroid

~thymus

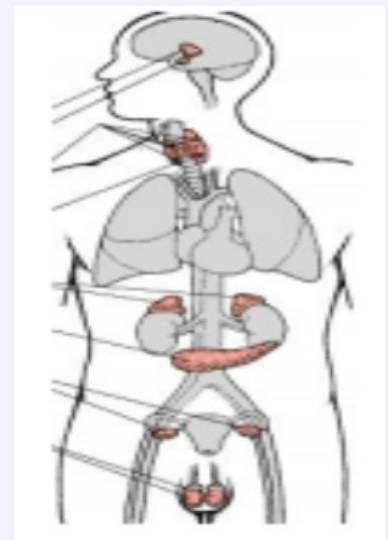
~adrenal

~pancreas

~ovaries

~testes

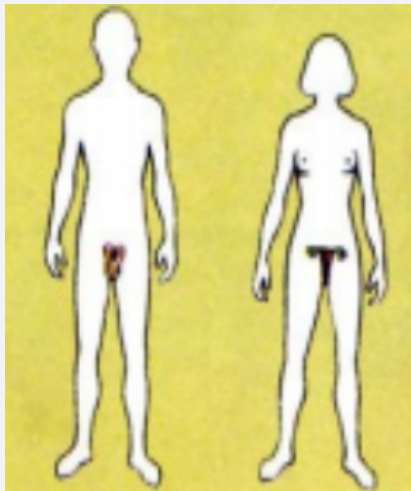
Endocrine System Image



Reproductive System

anatomy: physiology:
 ovaries 1) allows organisms to
 (produce reproduce which prevents their
 eggs) species from becoming extinct
 testes (produce sperm)

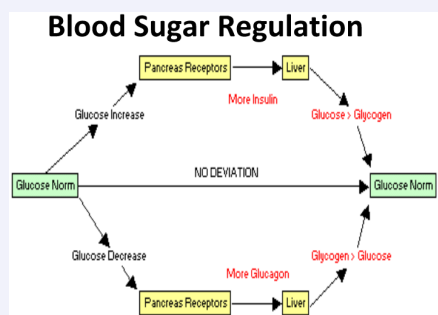
Reproductive System Image



Negative Feedback

when the effector(s) activated by the control center oppose or eliminate stimulus
 ex) blood sugar regulation

Negative Feedback Image (Blood Sugar Regulation)



Regional Terms: Posterior View

cephalic: otic: ear occipital: back of head or base of skull
 head

acromial: vertebral: spinal scapular: shoulder blade
 point of column

lumbar: brachial: arm olecranal: back of elbow
 loin

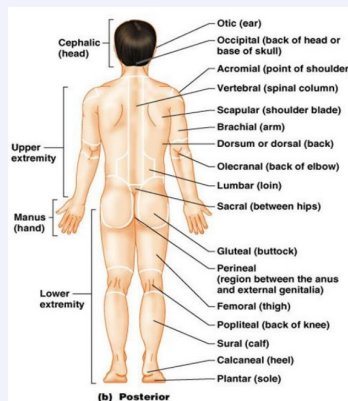
dorsum/ manus: hand sacral: between hips
 dorsal: back

gluteal: perineal: region femoral: thigh
 buttock between anus and external genitalia

popliteal: sural: calf calcaneal: heel
 back of knee

plantar: sole

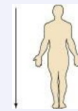
Regional Terms: Posterior View Image



Inferior (Orientation and Directional Term)

also known as caudal
 away from the head end or toward the lower part of a structure or the body; below
 ex) the navel is inferior to the breastbone

Inferior (Orientation and Directional Term) Image



Intermediate (Orientation and Directional Term)

between a more medial and a more lateral structure
 ex) the armpit is intermediate between the breastbone and shoulder

Intermediate (Orientation and Directional Term) Im



Superficial (Orientation and Directional Term)

toward or at the body surface
 ex) the skin is superficial to the skeleton

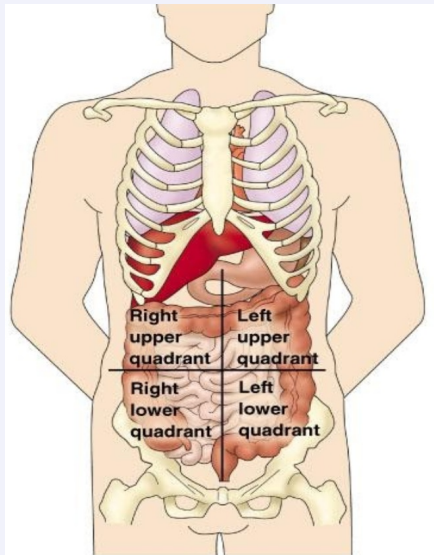
Superficial (Orientation and Directional Term) Img



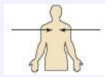
Deep (Orientation and Directional Term)

away from the body surface; more internal
ex) the lungs are deep to the rib cage

Abdominopelvic Quadrants Image



Deep (Orientation and Directional Term) Image



CT

full name:
computed tomography

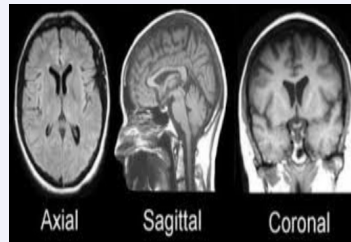
how does it work?
different tissues absorb the electromagnetic radiation in various amount

what does it show?
shows cross sectional pictures of the body region scanned

CT (cont)

when is it used?
used to evaluate brain and abdominal problems without the need of exploratory surgery

CT Image



MRI

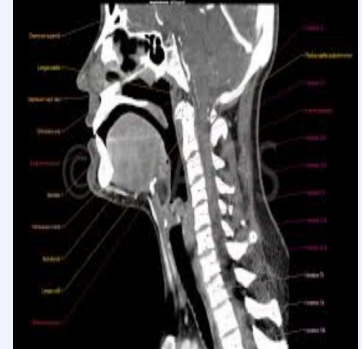
full name:
magnetic resonance imaging

how does it work?
magnetic energy causes the spin of hydrogen molecules, and their energy is enhanced by radio waves; when the radio waves are turned off, energy is released and translated by a computer into a visual image

what does it show?
dense structures do not show and soft tissue, like the the brain, can be evaluated

when is it used?
to evaluate soft tissue, brain, intervertebral pads and cartilage to detect degenerative disease

MRI Image



Levels of Organization

atoms -> molecules -> macromolecules -> organelles -> cells -> tissues -> organs -> organ systems -> organism

8 Necessary Life Functions (Human)

- 1) maintain boundaries: inside is separate from the outside
- 2) movement: whole body and cellular level
- 3) responsiveness/irritability: sense and respond to changes in the environment
- 4) digestion: breaking down food to nutrients
- 5) metabolism: breaking down and building molecules for energy
- 6) excretion: remove wastes from the body
- 7) reproduction: cellular or organismal level
- 8) growth: cellular or organismal level



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Circulatory System

anatomy: physiology:
 heart 1) transport materials to and from cells
 veins
 arteries
 capillaries
 blood

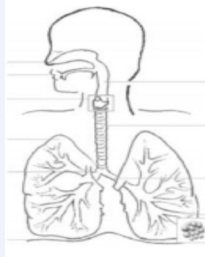
Circulatory System Image



Respiratory System

anatomy: physiology:
 nose 1) takes in oxygen and removes carbon dioxide and water
 trachea
 bronchi
 bronchioles
 alveoli
 lungs

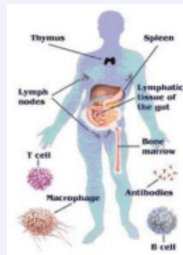
Respiratory System Image



Immune System

anatomy: physiology:
 white blood cells 1) fights off foreign invaders in the body
 ~T cells
 ~B cells (produce antibodies)
 ~macrophages
 skin

Immune System Image



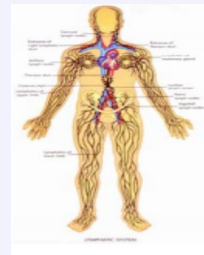
Lymphatic System

anatomy: physiology:
 lymph (liquid part of blood - plasma, when it is in lymph vessels) 1) stores and carries white blood cells that fight disease

Lymphatic System (cont)

lymph vessels 2) collects excess fluid and returns it to blood (second circulatory system - reaches places other one can't - between cells)
 lymph nodes
 contain white blood cells

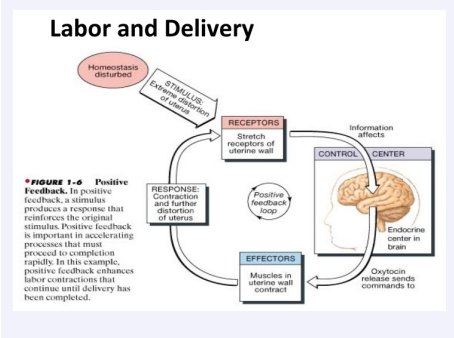
Lymphatic System Image



Positive Feedback

initial stimulus produces a response that exaggerates or enhances its effects; less common
 ex) labor and delivery

Positive Feedback Image (Labor and Delivery)



The Language of Anatomy

special terminology is used to prevent misunderstandings

exact terms are used for:

~position

~regions

~direction

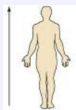
~structures

Superior (Orientation and Directional Term)

toward the head end or upper part of a structure of the body; above

ex) the forehead is superior to the nose

Superior (Orientation and Directional Term) Image



Anterior (Orientation and Directional Term)

also known as ventral

toward or at the front of the body; in front of

ex) the breastbone is anterior to the spine

Anterior (Orientation and Directional Term) Image



Lateral (Orientation and Directional Term)

away from the midline of the body; on the outer side of

ex) the arms are lateral to the chest

Lateral (Orientation and Directional Term) Image



Distal (Orientation and Directional Term)

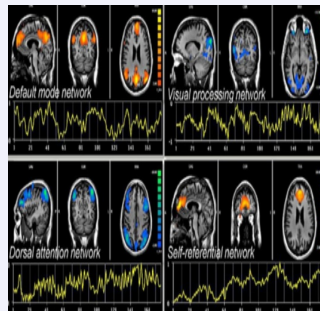
farther from the origin of a body part or the point of attachment of a limb to the body trunk

ex) the knee is distal to the thigh

Distal (Orientation and Directional Term) Image



fMRI Image



fMRI

full name:

functional magnetic resonance imaging

how does it work?

follows blood flow in the brain in real time

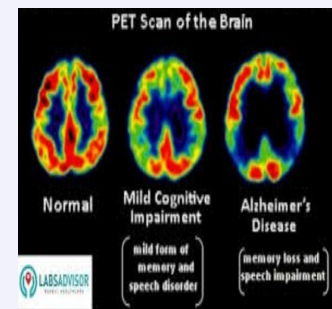
what does it show?

shows brain activity

when is it used?

to diagnose brain disease; can not be used in the presence of metal in the body, pacemakers, and tooth fillings

PET Scan Image



PET Scan

full name:

positron emission tomography

how does it work?

requires an injection of short-lived radioisotopes that have been tagged to biological molecules (ie. glucose) in order to view metabolic processes



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PET Scan (cont)

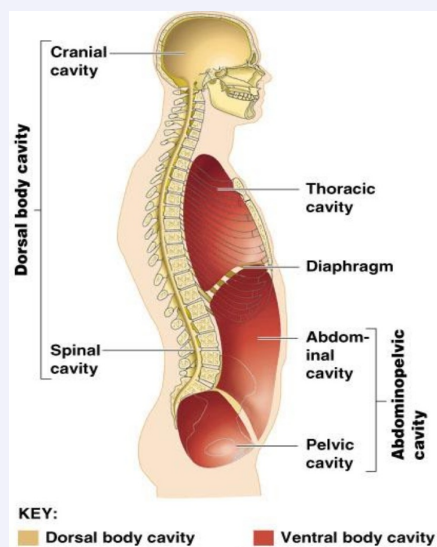
what does it show?

provides insights into brain activity in people affected by mental illness, Alzheimer's disease, and epilepsy

when is it used?

to diagnose areas of impairment in the brain

Body Cavities Image



Body Cavities

dorsal body cavity ventral body cavity

~cranial cavity ~thoracic cavity
(brain) (lungs)

~spinal cavity ~abdominopelvic cavity
(spinal cord) cavity

~~abdominal cavity
(abdomen)

~~pelvic cavity
(pelvis)

Digestive System

anatomy: physiology:

mouth 1) take in food (ingestion)

esophagus 2) digest food into smaller molecules and absorb nutrients

small intestine 3) remove undigested food from body (feces)

large intestine

rectum

anus

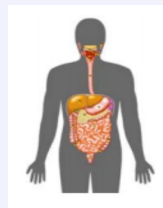
salivary glands

pancreas

liver

gallbladder

Digestive System Image



Nervous System

anatomy: physiology:

brain 1) gathers and interprets information

spinal cord 2) responds to information

nerves 3) helps maintain homeostasis

hypothalamus

Nervous System Image



Muscular System

anatomy: physiology:

cardiac muscle 1) allows for movement by contracting

smooth muscle

skeletal muscle

tendons

Muscular System Image



Integumentary System

anatomy: physiology:

skin 1) barrier against infection (first line of defense)

~epidermis 2) helps regulate body temperature

~dermis 3) removes excretory waste (urea, water)

~~sweat gland 4) protects against sun's UV rays

Integumentary System (cont)

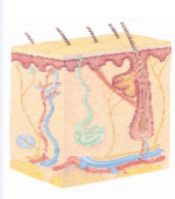
~~sebaceous gland 5) produces vitamin D

~~hair follicle

~~blood vessels

~~nerves

Integumentary System Image



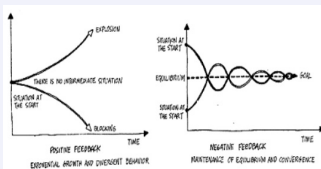
Homeostasis

"homeo-" = same

"-stasis" = standing or status

goal: to maintain a relatively constant internal environment

Positive Feedback vs. Negative Feedback



Regional Terms: Anterior View

axial: head, neck, and trunk

appendicular: appendages or limbs

nasal: nose oral: mouth cervical: neck

frontal: forehead orbital: eye buccal: cheek

Regional Terms: Anterior View (cont)

mental: chin acromial: point of shoulder axillary: armpit

abdominal: abdomen sternal: breastbone thoracic: chest

mammary: breast umbilical: naval (belly button) brachial: arm

antecubital: front of elbow antebrachial: forearm carpal: wrist

pollex: thumb palmar: palm digital: fingers

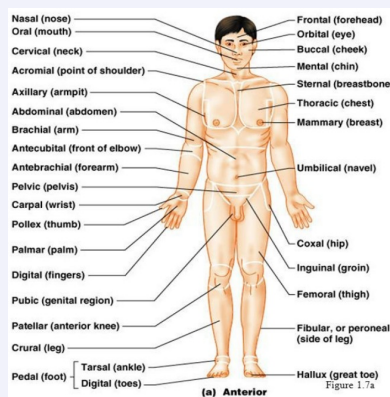
coxal: hip pelvic: pelvis inguinal: groin

pubic: genital region femoral: thigh patellar: anterior knee

crural: leg fibular/peroneal: side of leg pedal: foot

tarsal: ankle digital: toes hallux: big toe

Regional Terms: Anterior View Image



Posterior (Orientation and Directional Term)

also known as dorsal

toward or at the backside of the body; behind

ex) the heart is posterior to the breastbone

Posterior (Orientation and Directional Term) Image

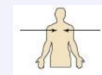


Medial (Orientation and Directional Term)

toward or at the midline of the body; on the inner side of

ex) the heart is medial to the arm

Medial (Orientation and Directional Term) Image



Proximal (Orientation and Directional Term)

close to the origin of the body part or the point of attachment of a limb to the body trunk

ex) the elbow is proximal to the wrist (elbow is closer to shoulder or attachment point of arm than wrist)

Proximal (Orientation and Directional Term) Image



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Ultrasound

full name:

ultrasonography

how does it work?

high frequency sound waves is its energy source; the sound waves go through the tissues without harming them, and the echoes are recorded

what does it show?

it shows visual images of body organs

when is it used?

preferred method for fetal evaluation

Ultrasound Image



Xray Image



Xray

full name:

radiograph

how does it work?

shadowy negative image of internal structures produced by directing electromagnetic waves of very short wavelength at the body

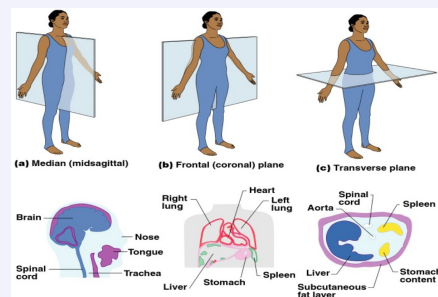
what does it show?

best to visualize hard, body structures and locate abnormally dense structures (tumors, tuberculosis nodules) in the lungs and breasts

when is it used?

to diagnose fractures and dense tumors

Body Planes Image



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