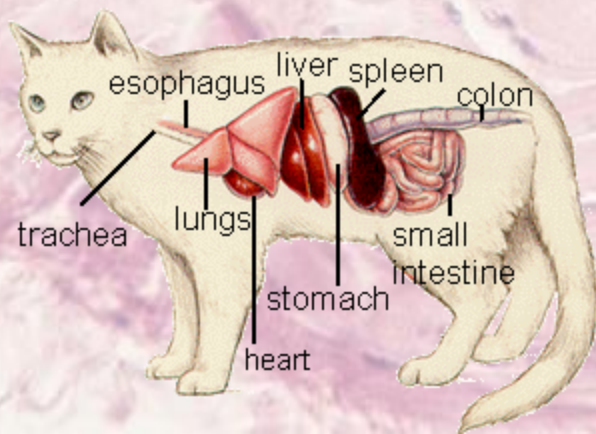


BASIC CANINE & FELINE ANATOMY



Objectives

1. To examine canine and feline body systems and understand their functions in relation to the animal.
2. To classify different organs and body systems and explain their importance in allowing the body to work.
3. To compare the role of the skeletal system in humans to felines and canines.

Main Menu



Cardiovascular



Muscular



Digestive



Nervous



Endocrine



Reproductive



Excretory



Respiratory



Immune



Skeletal

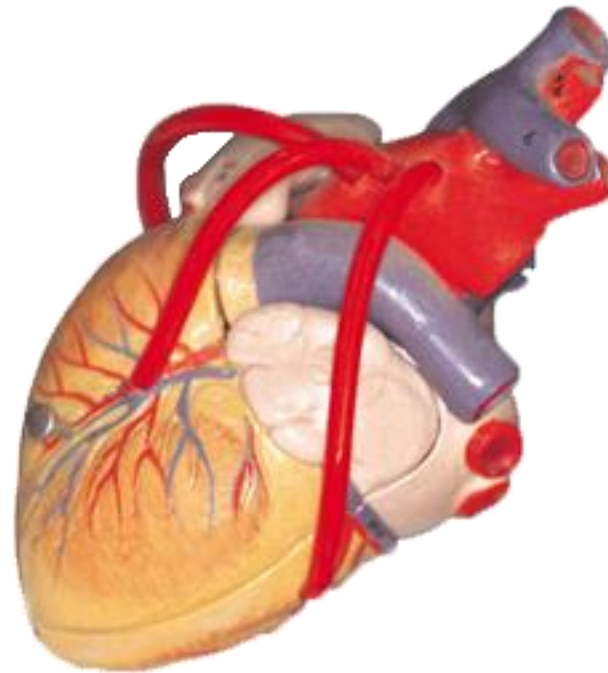


Integumentary

CARDIOVASCULAR SYSTEM

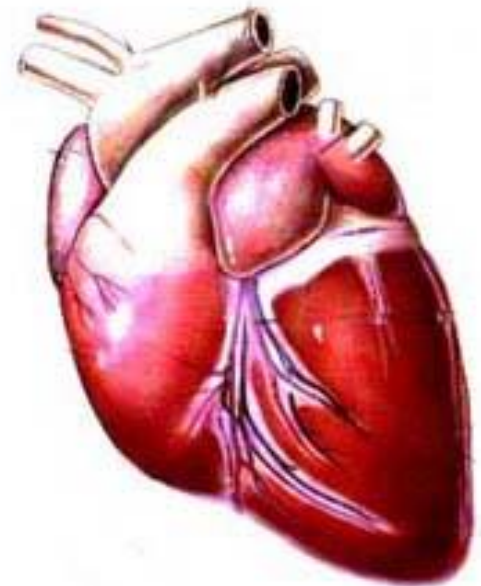
Cardiovascular

- Consists of the following:
 - heart
 - blood
 - blood vessels



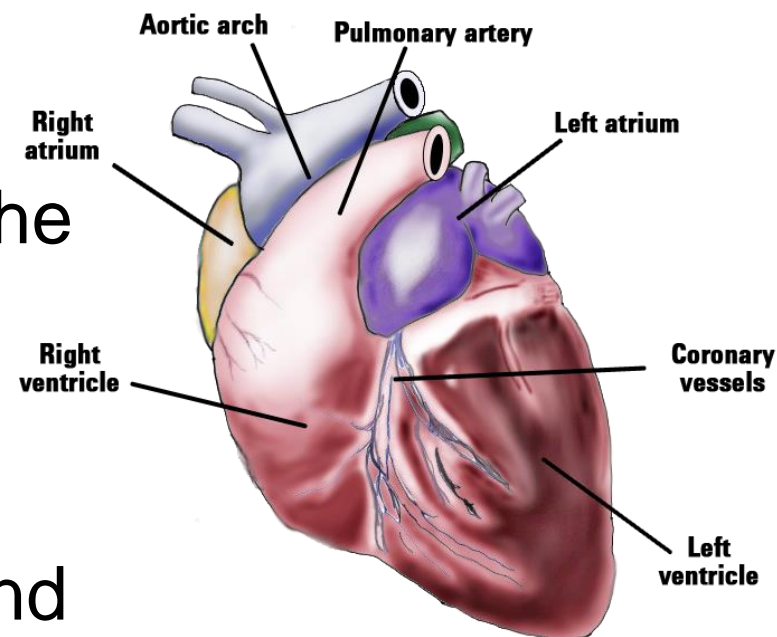
The Heart

- Is composed of an involuntary cardiac muscle
- Pumps blood throughout the body using blood vessels
- Consists of four chambers
 - atria: top two chambers
 - ventricles: bottom two chambers



Blood Vessels

- Are a closed vascular structure in mammals
 - transport blood from the heart throughout the body and back to the heart
- Include arteries, veins and capillaries

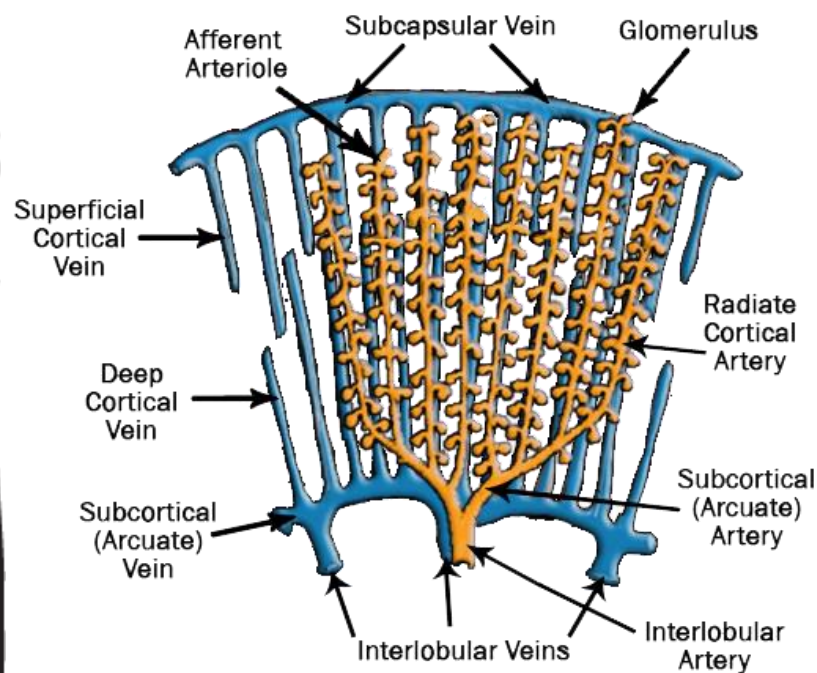


Interesting Fact: Chocolate is poisonous to dogs and affects their hearts when consumed, often resulting in death.

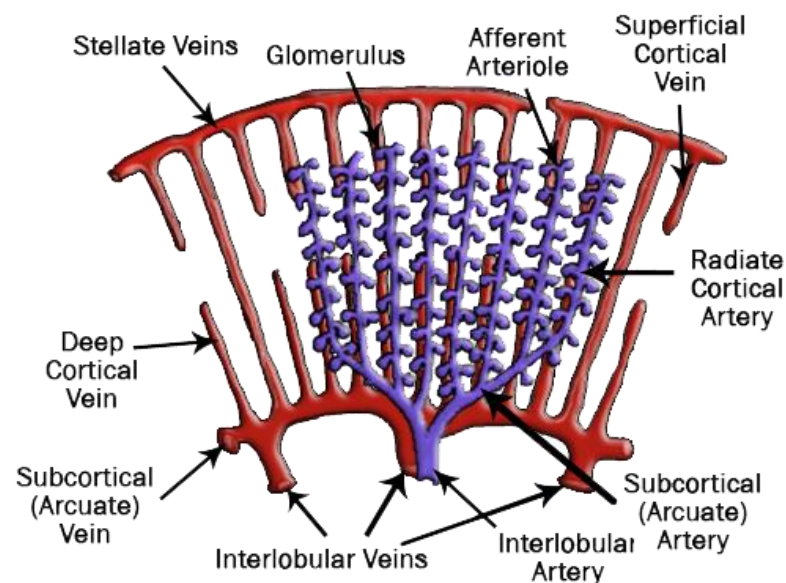
Arteries

- Carry blood away from the heart
- Obtain blood under high pressure from the ventricles of the heart
- Contain three layers which allow them to stretch each time the heart beats therefore more blood is pumped out

Arteries & Veins



CAT



DOG

Schematic diagrams of the cortical arteries and veins of the feline and canine kidneys

Veins

- Carry blood to the heart
- Receive blood from organs and tissues
- Transport waste products away from organs and tissues

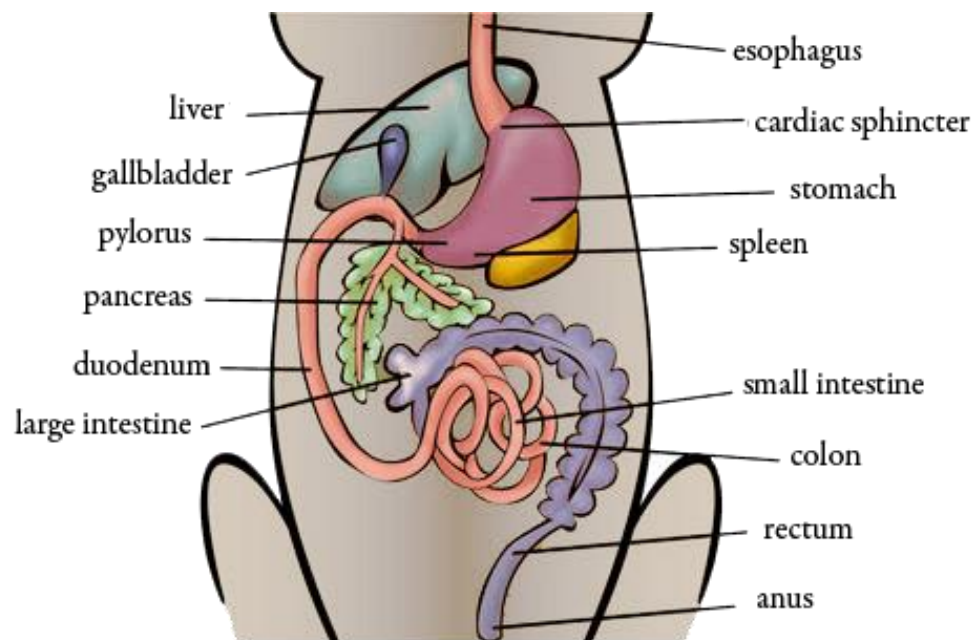
Capillaries

- Connect arteries and veins
- Exchange oxygen, water, salts and carbon dioxide between blood and surrounding body tissues
- Remove wastes from the surrounding cells

DIGESTIVE SYSTEM

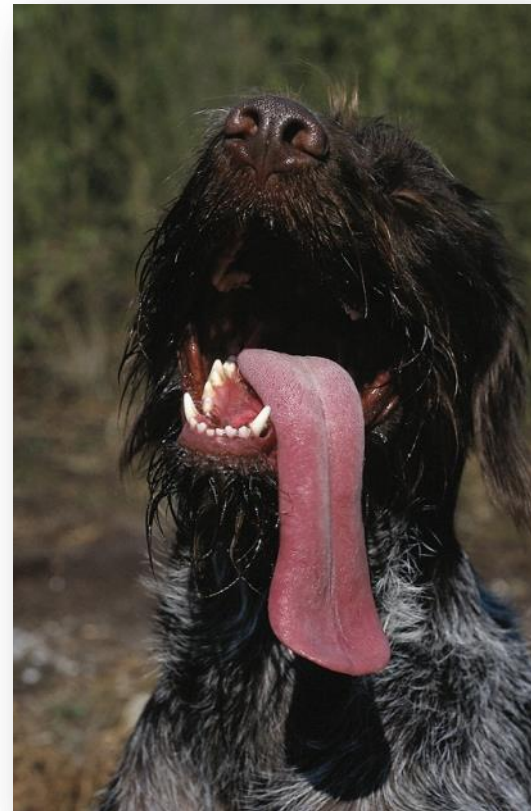
The Digestive System

- Takes in and digests food
- Eliminates solid wastes from the body
- Is also known as the gastrointestinal tract (GI tract) which can be broken into the upper and lower GI tract



The Upper GI Tract

- Includes the following:
 - mouth
 - pharynx
 - esophagus
 - stomach



The Mouth

- Houses teeth which are used to tear, scrape and chew food
- Includes the salivary glands which produce saliva, breakdown carbohydrates and lubricate the passage of food
- Contains the tongue which manipulates food for chewing and swallowing

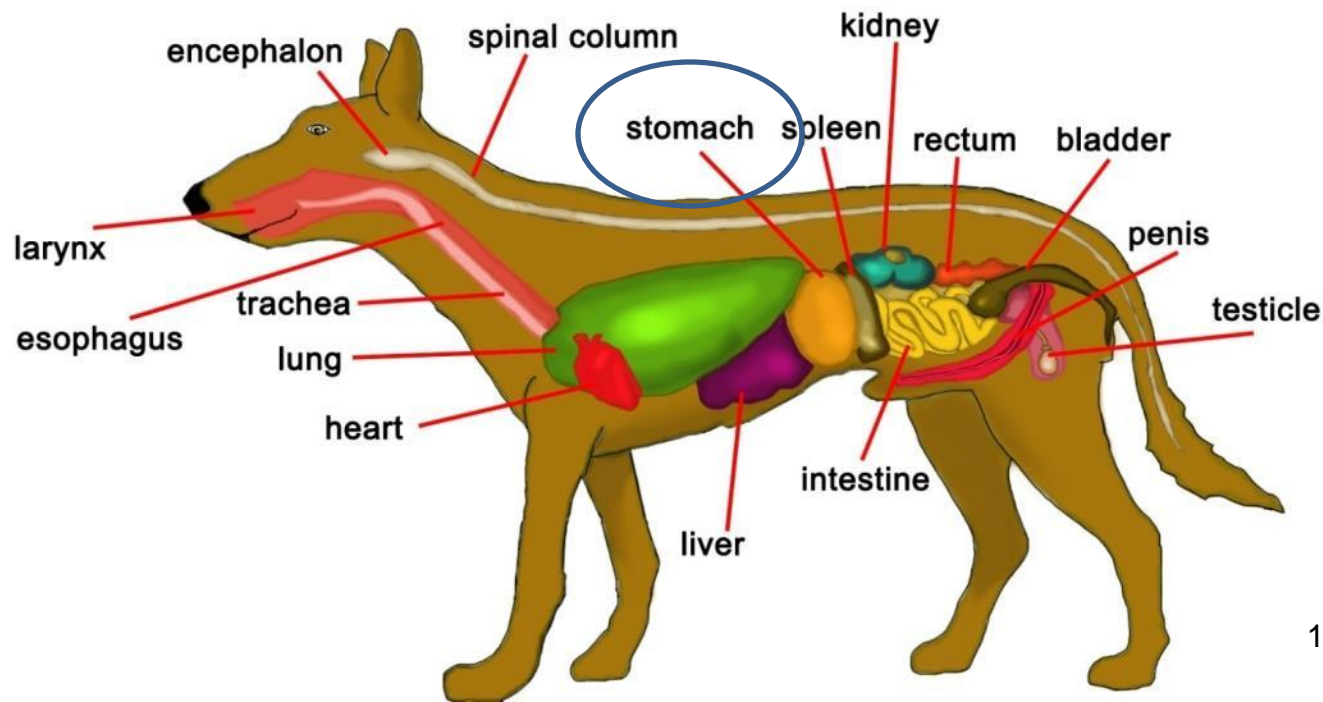


The Pharynx and Esophagus

- The pharynx:
 - is located in the throat
 - allows the passage of air and food
 - directs food to the esophagus
- The esophagus:
 - lies between the pharynx and the stomach
 - allows for the passage of food
 - directs food to the stomach

The Stomach

- Connects the esophagus and the small intestine
- Acts as a storage spot for food during a meal
- Secretes many acids which are used to break down foods



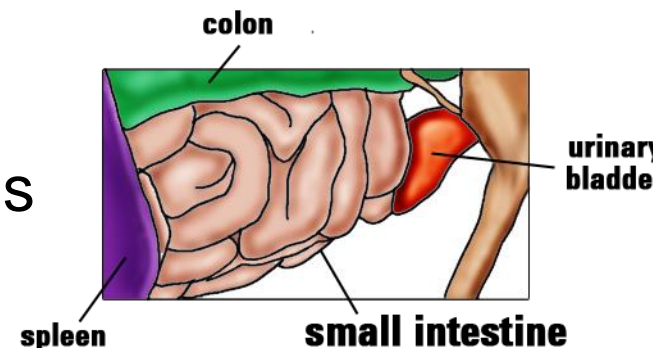
The Lower GI Tract

- Includes the following:
 - small intestine
 - large intestine
 - anus



The Small Intestine

- Is composed of the following:
 - duodenum: connects the stomach to the jejunum and is where the most chemical digestion takes place
 - jejunum: connects the duodenum to the ileum and absorbs carbohydrates and proteins
 - ileum: absorbs vitamin B12, *bile salts*, water and other products not absorbed by the jejunum



Bile Salts – chemicals which aid in digestion by making vitamins easier to absorb from the small intestine



The Large Intestine

- Is also known as the colon
- Is composed of the following:
 - cecum: aids *enzymes* in breaking down molecules into nutrients the body can use
 - colon: extracts water from feces
 - rectum: temporarily stores feces



Enzymes – proteins produced by living organisms causing or speed up a chemical reaction without being effected

The Anus

- Excretes feces
- Consists of specialized linings which allow it to detect whether the contents are liquid, solid or gas
- Is surrounded by sphincter muscles which allow for the control of stool



Sphincter Muscle – a ring of muscle which contracts to close an opening

Other Organs of the Digestive System

- Include the following:
 - pancreas: secretes digestive enzymes
 - liver: produces *bile* to aid in digestion of fats
 - gallbladder: stores bile until needed



Main Menu

Bile – a bitter liquid which aids in absorption and digestion

ENDOCRINE SYSTEM

The Endocrine System

- Consists of organs which excrete hormones to control the body's responses to *stimuli* and functions
- Regulates growth, development and reproduction
- Produces, uses and stores energy
- Works with the nervous system to maintain the body's nutrition, metabolism and balance of salt and water

Stimulus - an agent, action or condition which causes a response



The Endocrine System

- Consists of the following glands:
 - pituitary
 - thyroid
 - parathyroid
 - adrenal
 - pancreas

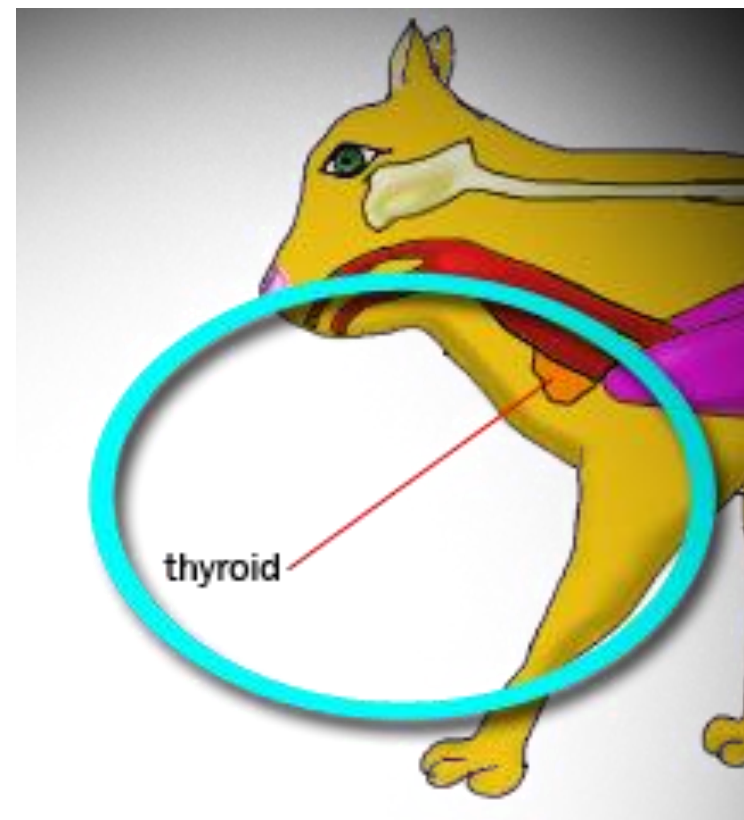


The Pituitary Gland

- Is located on the underside of the brain
- Produces specific hormones to respond to the needs of the body, including the following:
 - growth hormones to stimulate the growth of cells and tissues
 - prolactin which stimulates milk production after birth

The Thyroid Gland

- Is located in the neck next to the trachea
- Controls how fast the body burns energy, makes proteins and the sensitivity of the body to other hormones
- Regulates the rate of metabolism



Parathyroid Glands

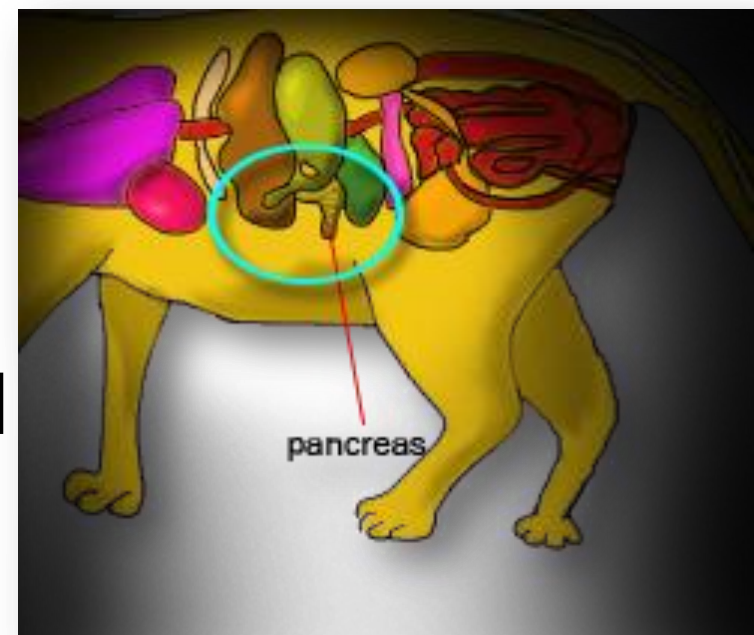
- Are located behind the thyroid gland in the neck
- Are responsible for maintaining calcium levels
- Release a hormone to boost calcium levels when they sense the calcium level in blood is too low

Adrenal Glands

- Are located on top of each kidney
- Release hormones in response to stress or excitement
- Produce the following hormones:
 - aldosterone: regulates salt and water balance in the body
 - cortisol: controls carbohydrate, protein and fat metabolism

The Pancreas

- Is located in the upper abdomen
- Secretes insulin which metabolizes sugar
- Releases glucagon and somastatin which regulate energy and metabolism in the body



EXCRETORY

The Excretory System

- Is responsible for the elimination of wastes from the body
- Regulates the amount of water and *ions* present in bodily fluids



Ions – an atom or group of atoms which have a positive or negative electrical charge

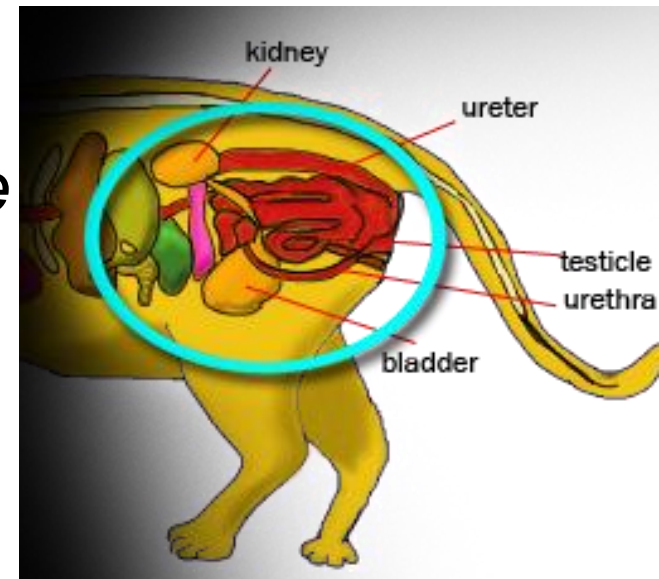
The Excretory System

- Includes the following:
 - urinary system
 - liver
 - spleen
 - lymph nodes



The Urinary System

- Is comprised of the following:
 - kidneys: filter blood to form and excrete urine as well as regulate fluid and *electrolyte* balance
 - bladder: hollow muscular organ which stores urine
 - urethra: excretes urine from the body

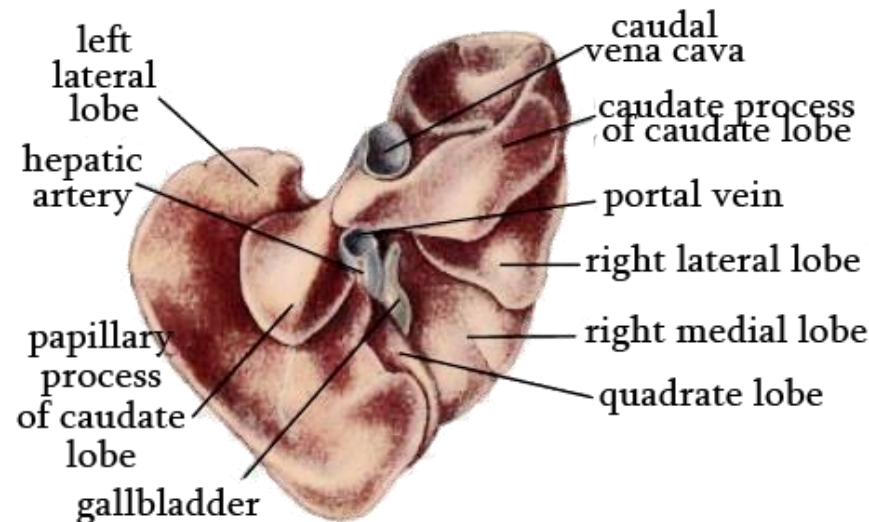


Electrolyte – a chemical substance which separates into ions and gives cells the energy needed to function



The Liver

- Clears blood of drugs and toxic substances
- *Metabolizes* and alters the chemical structure of foreign material in blood
- Excretes these waste products in the form of bile



Main Menu

Metabolize – the processing of a specific substance within the living body

IMMUNE SYSTEM

The Immune System

- Identifies and kills *pathogens*
- Divides into two categories depending on how specific their functions are, the innate and adaptive immune systems



Pathogen – any disease causing agent, such as a virus or bacteria

The Innate Immune System

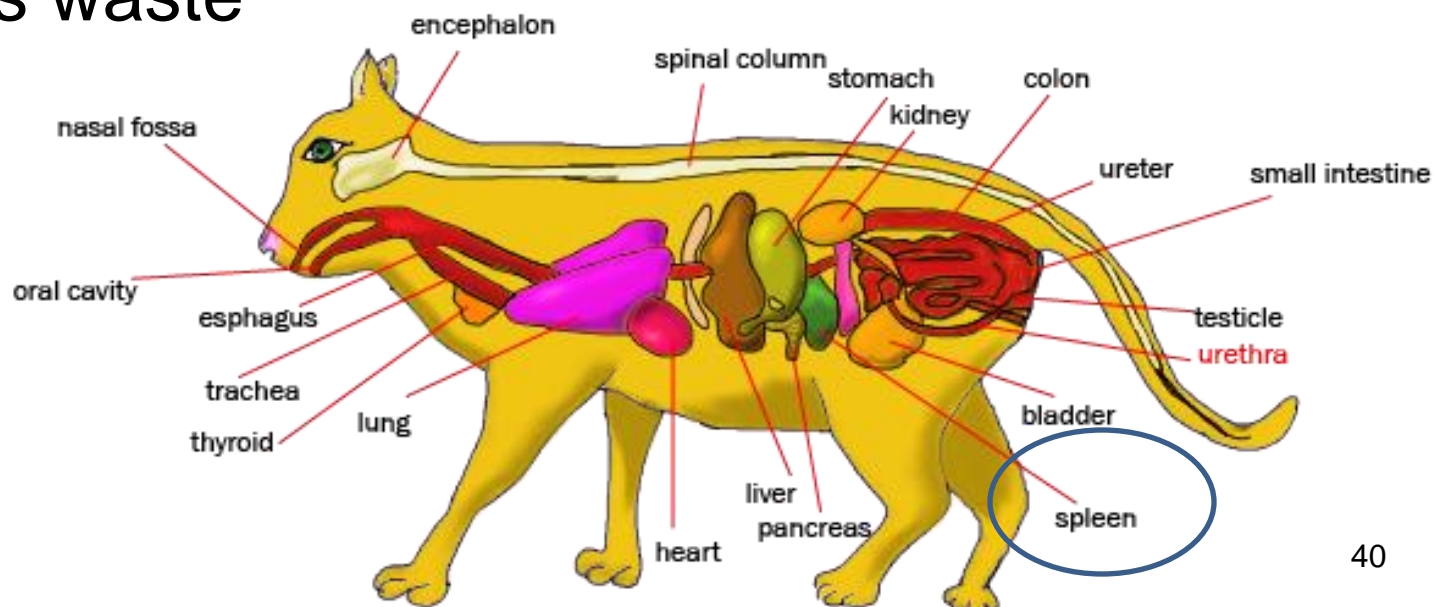
- Acts as the first line of defense
- Is nonspecific, meaning it tries to prevent everything from coming in
- Is nonadaptive
 - does not have a memory
 - will not learn to keep substances out even after repeated exposure
- Includes skin, fur, saliva, stomach acid and mucous

The Adaptive Immune System

- Attacks specific threats to the body
- Designs different methods of attack for different invaders
- Is adaptive
 - has a memory
 - remembers how to defeat an infection and will be able to overcome it faster if exposed again
- Works with the innate immune system to prevent disease and remember how to treat previous attacks
- Includes the spleen and lymph nodes

The Spleen

- Is located in the abdomen
- Destroys worn out red and white blood cells
 - breaks them down and returns needed iron to the blood while excreting the excess material as waste



Lymph Nodes

- Are scattered throughout the body
- Filter the *lymph* of particular matter and microorganisms
- Transport waste to veins to be evacuated

INTEGUMENTARY SYSTEM

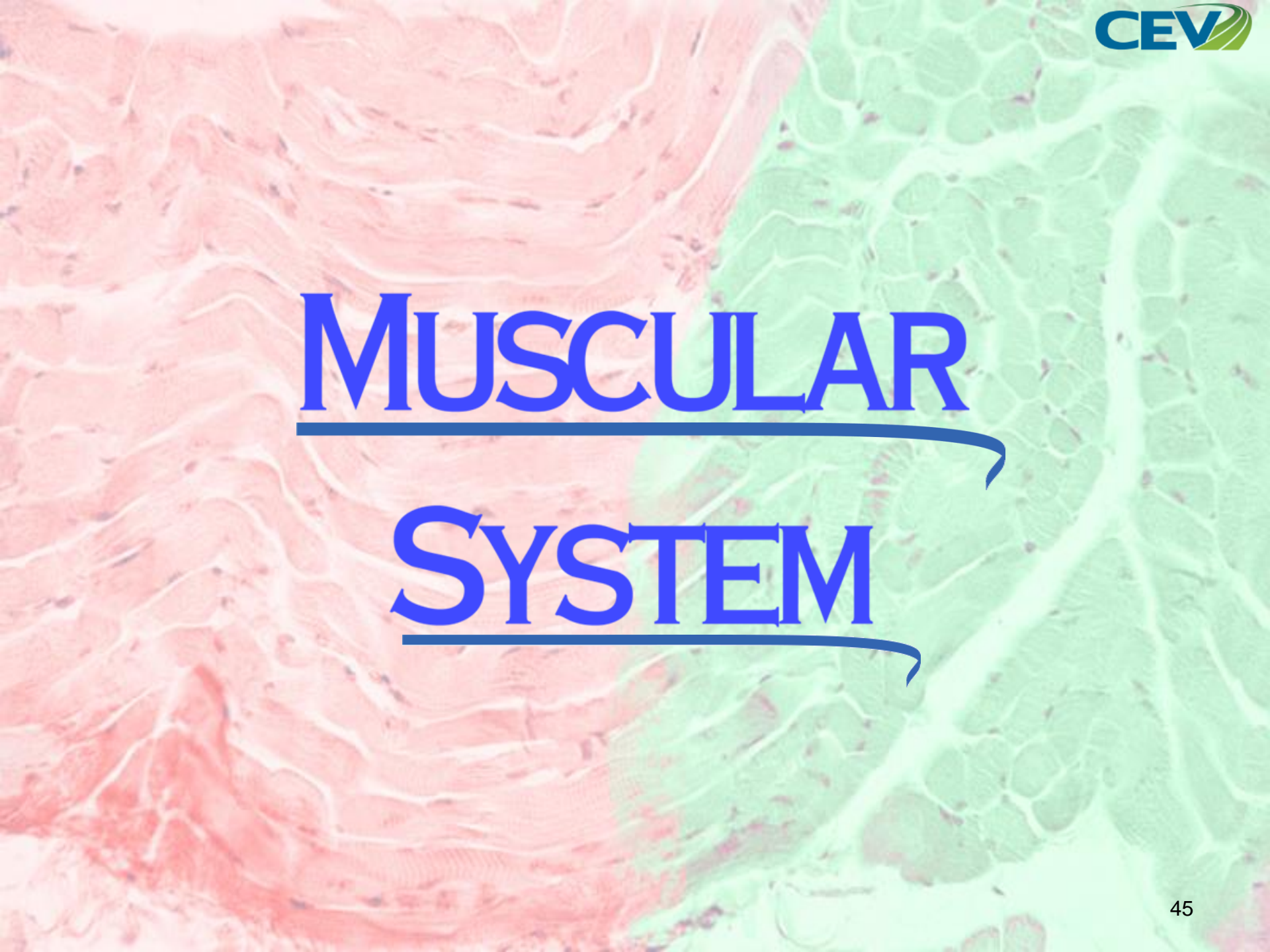
The Integumentary System

- Includes the skin, fur, nails and sweat glands of an animal
- Distinguishes, protects and separates an animal from its surroundings
- Communicates to the animal by acting as a receptor for touch, pain, pressure and temperature
- Acts as an innate immune system

Skin

- Is composed of the following three layers:
 - epidermis: outermost layer of skin
 - dermis: connective tissue which provides the body with cushioning from stress and strain as well as housing sweat glands, hair follicles and nerve endings
 - subcutaneous tissue: provides insulation and nutrient storage





MUSCULAR SYSTEM

The Muscular System

- Allows an organism to move
- Represent endurance in dogs and allows them to jump, run and play
- Is highly evolved in cats and allows swift, agile movements used for catching prey and escaping predators



Fun Fact: Cats have 32 muscles in each ear

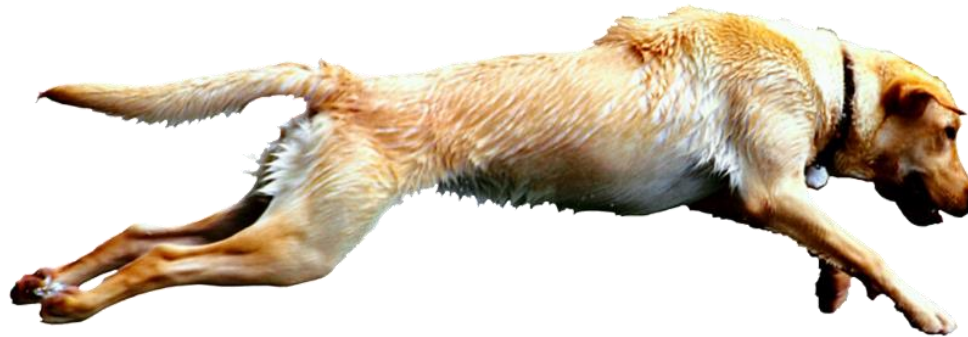
Muscles

- Can be divided into the following:
 - voluntary
 - involuntary
 - smooth
 - skeletal
 - cardiac



Voluntary Muscles

- Can be controlled by thought
- Consist mainly of skeletal muscle
- Include muscle found in the arms and legs



Involuntary Muscles

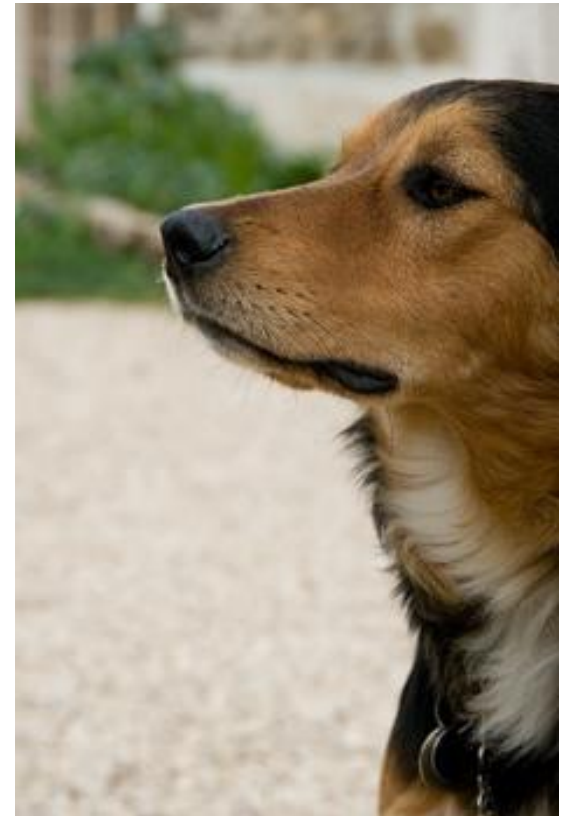
- Contract without conscious control
- Consist primarily of muscle lining organs
- Include muscle found in the stomach, intestine and bladder

Smooth Muscle

- Is involuntary muscle tissue
- Forms thin layers or sheets of flat muscle
- Cells have one nucleus

Skeletal Muscle

- Is usually voluntary muscle tissue
- Is connected to a bone
- Is elongated and striped
- Cells have many nuclei



Cardiac Muscle

- Is an involuntary muscle tissue
- Is found specifically in the heart
- Has adapted to the continuous rhythmic contractions of the heart

NERVOUS SYSTEM

The Nervous System

- Is constructed of specialized tissue which controls the actions and reactions of organisms to their environment
- Coordinates the activity of muscles
- Involves sensory stimulation to evoke *motor response*
- Is divided into the central and peripheral nervous systems



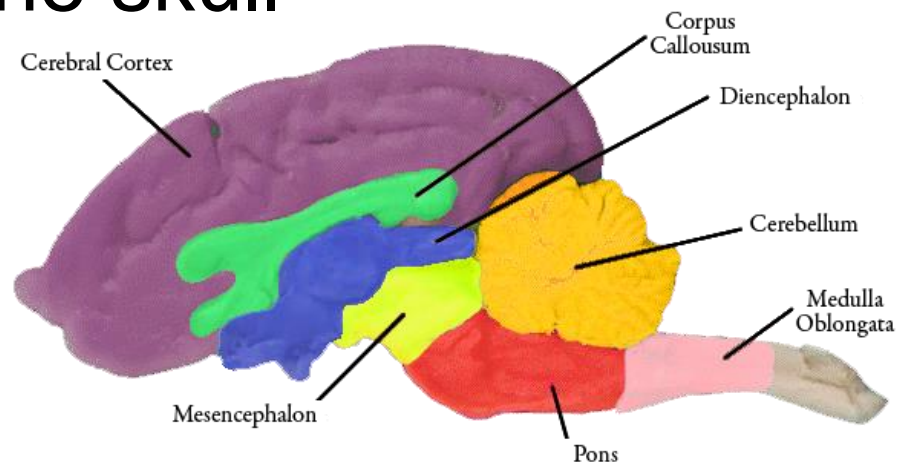
Motor Response – activities which result in muscular reaction

The Central Nervous System

- Includes the following:
 - brain
 - spinal cord

The Brain

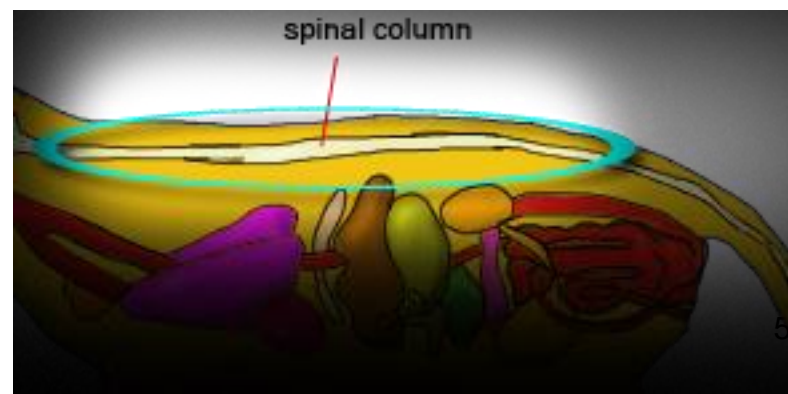
- Receives messages from all over the body and tells it how to react
- Houses billions of *neurons*
- Is protected by the skull



Neurons – impulse conducting cells which carry and transmit electrical signals throughout the nervous system

The Spinal Cord

- Consists of a long bundle of nerve tissue
- Starts at the bottom of the brain and continues down the spine
- Allows nerves to branch out, forming the peripheral nervous system
- Is protected by vertebrae



The Peripheral Nervous System

- Consists of the following
 - cranial nerves: are located on the brain and carry impulses to the head and neck
 - spinal nerves: extend from the spine and provide information to areas of the body below the neck
 - autonomic nerves: responsible for involuntary body functions such as breathing and digestion

REPRODUCTIVE SYSTEM

The Female Reproductive System

- Includes the following:
 - ovaries
 - uterus
 - vagina
 - vulva
 - mammary glands

The Ovaries

- Are located right behind the kidneys
- Contain eggs which are waiting to be fertilized
- Produce hormones such as estrogen and progesterone

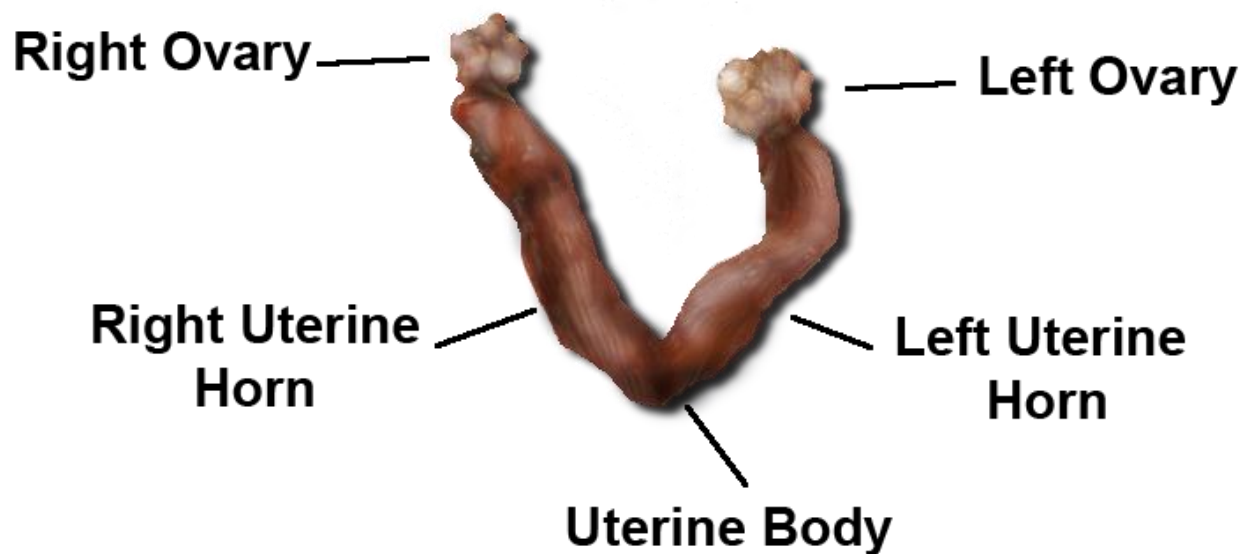


The Uterus

- Hollow muscular organ
- Two long, nearly straight horns
- Serves as the site of *implantation* of fertilized eggs and fetus development
- The top two sections are called uterine horns and extend from each ovary to join with the uterus
 - when pregnant, the fetuses are arranged in a row in both horns

Implantation – the attachment of the early embryo to the lining of the uterus

The Uterus



The Vagina

- Is the site where males deposit semen during reproduction
- Provides a passageway from the outside to the inside of the uterus
- Provides a protected passage for fetuses to move from the uterus to the outside during birth



Mammary Glands

- Run from the groin to the chest
- Are composed of connective tissue to provide support and structure
- Provide milk for any offspring



The Male Reproductive System

- Includes the following:
 - scrotum
 - testicles
 - epididymides
 - deferent ducts
 - prostate gland
 - penis



The Scrotum

- Houses the testicles
- Functions as a temperature regulator for the testicles and epididymides
- Lies toward the back of the abdomen between the hind legs in dogs
- Lies just below the anus in cats



Testicles

- Reside in the scrotum
- Contain seminiferous tubules which manufacture sperm
- Produce *testosterone*



Testosterone – sex hormone responsible for developing male secondary sex characteristics

The Epididymides

- Are enlarged tubes which lie along the edge of a testicle
- Start at the top of a testicle and end on the bottom
- Store sperm before ejaculation
- Transport sperm to the deferent ducts



The Deferent Ducts

- Are muscular tubes which begin at the tail of the epididymides and empty into the urethra
- Transport sperm from the epididymides to the urethra using strong contractions along the muscle wall



The Penis

- Is housed within a *prepuce* when not erect
- Acts as the male sexual organ
- Contains specialized connective tissues and blood vessels which allow it to become erect



Main Menu

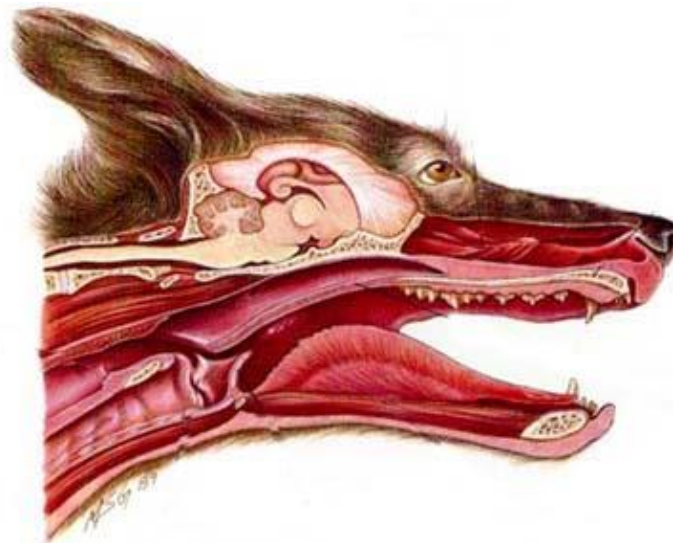
Prepuce – protective tubular sheath of skin

RESPIRATORY

SYSTEM

The Respiratory System

- Takes in oxygen
- Eliminates waste gases such as carbon dioxide
- Regulates temperature



The Respiratory System

- Includes the following:
 - mouth: oral cavity where air is admitted and released
 - nose: admits and releases air in conjunction with the mouth
 - trachea: tube which transports air gained from the mouth or nose into the body and out
 - lungs: transport oxygen into the body and carbon dioxide out of the body

Temperature Regulation

- Must be completed because dogs and cats do not sweat like humans to help cool their body
- Occurs when animals pant, which replaces the warm air in the body for the cooler outside air



SKELETAL SYSTEM

The Skeletal System

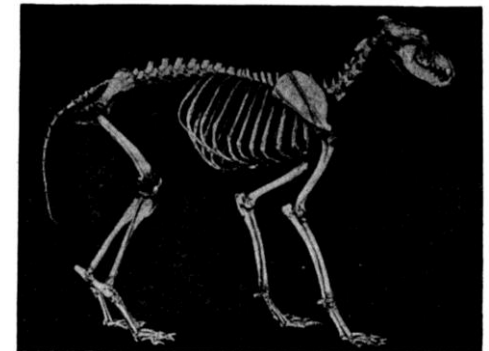
- Serves many different functions throughout the body
- Is composed of five different types of bone
- Divides into three parts including the axial, appendicular and visceral skeletons



Fun Fact: Almost 10 percent of a cat's bones are in its tail

The Skeletal System

- Supports the body
- Provides a system of levers which are used in movement
- Protects the soft organs inside the body
- Produces red blood cells



The Skeletal System

- Is composed of the following five types of bone:
 - long bones: found in the limbs
 - short bones: only in the wrist and ankle regions
 - flat bones: found in the pelvis and head
 - irregular bones: found in the vertebral column and parts of the skull
 - sesamoid bones: found in locations where tendons pass over joints, such as the knee



Tendon – tissue which serves to connect muscle with a bone⁷⁹

The Skeletal Systems

- Include the following:
 - axial skeleton: the bones of the head and trunk, such as the skull and vertebral column
 - appendicular skeleton: bones which comprise limbs, such as the femur and tibia
 - visceral skeleton: bones which form part of an organ, such as the ossicles in the middle of the ear

The Canine Skeleton

- Differs from the human body in that it is designed to allow the dog to run fast, hunt and chase
- Is not tightly attached to the shoulder blades, allowing for a higher potential of greater motion and flexibility
- Consists of an average of 319 bones, while the human skeleton consists of 206

The Feline Skeleton

- Differs from the human body in two major ways:
 - their backbone contains more bones than ours, mainly due to the tail, and their vertebrae are not as tightly connected, allowing for higher flexibility
 - they do not have a collarbone

Resources

- *College of Veterinary Medicine*. (n.d.). Retrieved March 31, 2009, from Washington State University: www.vetmed.wsu.edu
- *Foster & Smith Inc.* (2009). Retrieved March 31, 2009, from Pet Education: www.peteducation.com
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