MAJOR BLOOD VESSELS (SYSTEMIC CIRCUIT)

1. Aorta - receives blood from heart; sends to body.
2. Renal artery/vein - takes blood to/from kidneys.
3. Femoral artery/vein - brings blood to/from legs.
4. Subclavian artery/vein - supplies blood to/from arms.
5. Jugular vein - drains blood from head.
6. Carotid artery - supplies blood to head.

CIRCULATORY SYSTEM

Function: transports nutrients, oxygen, water to every cell and carries waste away.

Main Organs: heart, veins, arteries, capillaries.

BLOOD VESSELS TYPES

1. Arteries and Arterioles - carry blood away from heart.
   - thick walls, high blood pressure
   - 3 layers: inner epithelium, thick muscle layer, connective tissue.
2. Capillaries
   - walls: 1 cell thick, exchange of nutrients, O2, waste
   - sphincters at either end control blood flow.
3. Veins and Venules - carry blood to heart.
   - thin walls, low blood pressure
   - muscle contraction pumps blood, one-way valves.
BLOOD PRESSURE

* The force exerted on the inner wall of blood vessel, it's as you move further from heart.
  
  Highest in arteries
  Lowest in veins capillaries

Systolic = BP when heart contracts
Diastolic = BP when heart relaxes.

Normal BP = 120mmHg systolic
80mmHg diastolic

THE PATH OF FOOD

* Saliva contains Salivary Amylase (begins carbohydrate digestion)

  mouth → teeth → tongue → pharynx

  Acid Reflux

  → esophagus → cardiac sphincter → stomach
  (enzyme leaves)

  → pyloric sphincter → duodenum (first part of small intestine)

  → pancreatic duct

  → small intestine → large intestine

GASTRIC JUICE

Components &
1) H₂O (solvent)
2) HCl (kills bacteria, pH 2)
3) Pepsinogen (begins protein digestion)
4) Mucus (protects stomach)
LIVER FUNCTIONS

6 main functions:
1) detoxifies blood
2) produces bile (stored in gallbladder)
3) stores vitamins & minerals
4) stores glucose as glycogen
5) helps regulate blood sugar (receives signals from pancreas)
6) removes bilirubin

SMALL INTESTINE

Digestive Enzymes:
1) Maltase - breaks down maltose
2) Peptidase - breaks down proteins
3) Nucleosidase - breaks down nucleic acids

Villus, lining small intestine to increase surface area for absorption.

Blood capillary absorbs glucose, salts, amino acids, nucleotides, lacteals, absorbs fats

PANCREATIC JUICE

Pancreas regulates blood sugar:
A. ↓ blood sugar - insulin secreted, signals liver to store glucose
B. ↑ blood sugar - glucagon secreted, signals liver to convert glycogen into glucose

Components:
1) Sodium bicarbonate - raises pH of duodenum
2) Pancreatic Amylase - continues carbohydrate digestion
3) Lipase - lipid (fat) digestion
4) Trypsin - protein digestion
LARGE INTESTINE

Functions:
1) Absorb water
2) Vitamin production
3) Store fecal matter until defecation

Composed of:
1) 40% bacteria
2) 30% undigested
3) 20% fat
4) 10% water

ULCERS

→ breakdown in protective mucous lining of the stomach.

CAUSES:
1) Overuse of anti-inflammatory
2) Helicobacter pylori infection

TREATMENT: antibiotics or acid reducing medications.

DIGESTIVE SYSTEM ACCESSORY ORGANS

Accessory Organs:
1) Liver
2) Pancreas
3) Gall Bladder

Digestive System Functions:
1) Breakdown nutrients
2) Absorb nutrients
3) Excrete indigestibles as waste
BLOOD

Functions: delivers O₂ and nutrients, removes wastes

Composition: 1) 55% plasma
   - water, salts, large proteins, gases, hormones
  2) 45% blood cells
     - red and white blood cells, platelets
     - produced in red bone marrow (long bones)

BLOOD CELLS

3 Types:
1) Erythrocytes
   - Anemia - lack of iron slows production
   - hemoglobin binds to O₂ for transport
   - after 120 days, RBC's broken down by liver
2) Leukocytes
   1) Phagocytize - engulf
      - fight infection
   2) Release histamines - flush out and disease
   3) Produce antibodies - Tag
3) Thrombocytes (platelets)
   - cell fragments involved in blood clotting

INTERNAL STRUCTURE OF THE HEART

Components:
1) 4 chambers - 2 atria & 2 ventricles
2) Septum - separate heart into right & left sides
3) AV valves - separate atria from ventricles
4) Cordae Tendineae - ligament attached to ventricles and to AV valve preventing backflow
5) Semi-lunar valves - separate ventricles from arteries

Notes: left ventricle wall thicker & pumps blood to entire body.
PATH OF BLOOD THROUGH THE HEART

1. Superior vena cava (drains upper body) → right atrium → AV valve → right ventricle → pulmonary trunk
   → O₂-rich blood → left atrium → AV valve → left ventricle → semi-lunar valve → aorta.
   → Systemic circulation

RESPIRATORY SYSTEM FUNCTIONS

Function:

1. External
   - exchange of O₂ and CO₂ between air and blood.
   - occurs in lungs.
2. Internal
   - exchange of O₂ and CO₂ between blood and tissue fluid.
   - occurs in capillaries.

THE PATH OF AIR

Diaphragm contracts

air rushes in

mouth & nasal cavity → pharynx → larynx → trachea → bronchi → bronchioles → alveoli (cilia & mucus)
ALVEOLI STRUCTURE

1) Clustering shape - increases SA for gas exchange.
2) Thin walls - fast diffusion of O₂ and CO₂.
3) Covered in Capillaries - greater blood volume exposed to O₂.
4) Surfactant - prevents walls from sticking together.
5) Moist inner walls - diffusion of O₂ and CO₂ faster.
6) Stretch receptors - prevents walls from bursting.

TIDAL VOLUME

→ normal amount of air inhaled and exhaled while a person is resting.
→ minimum amount of O₂ the body requires.
* When O₂ requirements ↑, tidal volume ↑.

VITAL CAPACITY

→ maximum volume of air a person can inhale and exhale.
   Average 3-5L

Depends on:
1) body mass
2) gender (10-20% lower in females)
3) fitness (20-30% greater in athletes)
Amount of air remaining in lungs after exhalation.

Average 1 L