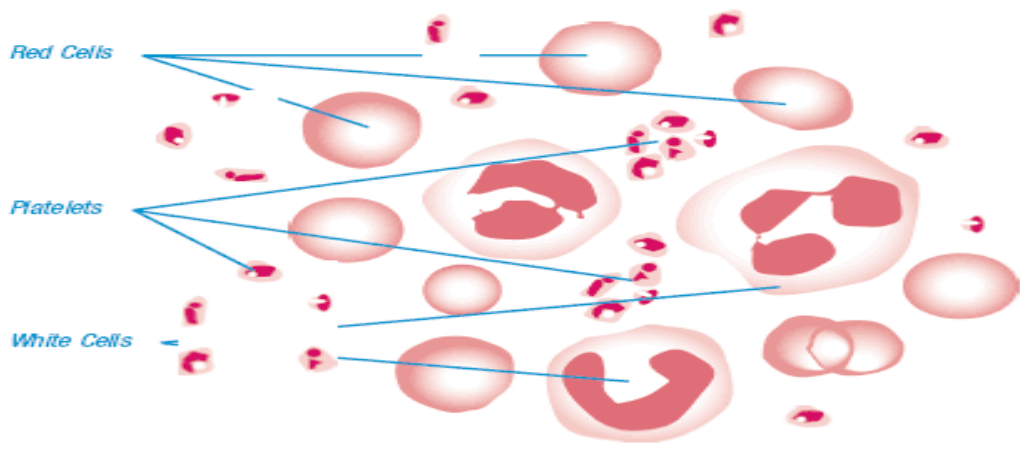


## Blood

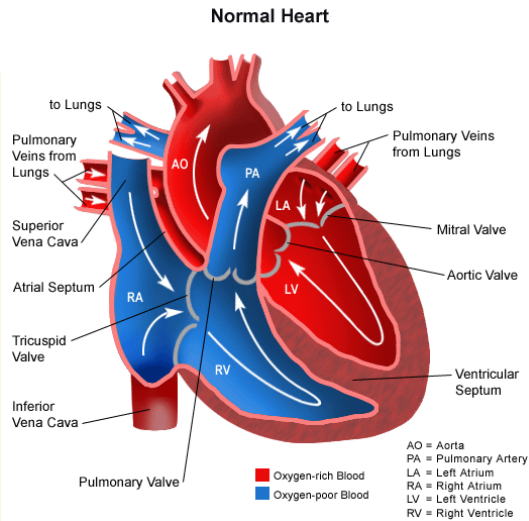
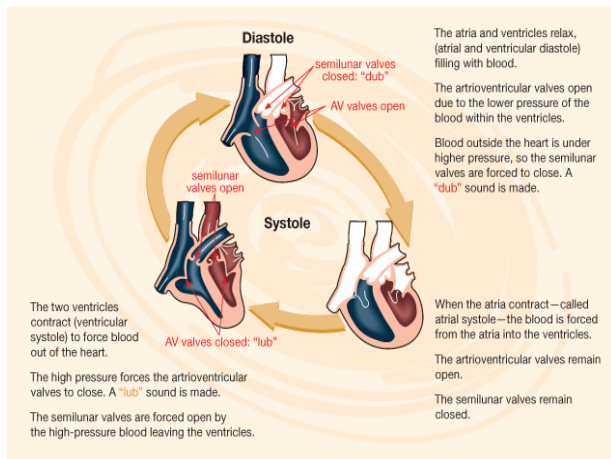
- ❖ The main functions of blood are to **transport oxygen, carbon dioxide, water, nutrients, hormones and waste** around the body. Blood also fights infection and regulates temperature.
- ❖ Composition of blood:
  1. **Plasma** constitutes for about 54% of our blood. 92% of it is water.
  2. **White blood cells and platelets** constitute for about 1% of our blood.
  3. **Red blood cells** constitute for about 45% of our blood.
- ❖ **Red blood cells** have a **biconcave shape** and are involved in the **transportation of oxygen by haemoglobin** (haem=iron-containing), they are made in the **bone marrow**, they have no nucleus, they last for approximately 120 days and are then broken down into pigments called **bilirubin** and **biliverdin** in the liver.(N.B. **oxyhaemoglobin** =oxygen rich haemoglobin, **deoxyhaemoglobin**=low oxygen haemoglobin)
- ❖ **White blood cells** are divided into 2 types: **monocytes** are involved in recognising anything that is foreign and ingesting the foreign particle by **phagocytosis** whereas **lymphocytes** are involved in the **production of antibodies which inactivate and immobilise pathogens**. (White blood cells have nuclei and are also made in the bone marrow.
- ❖ **Platelets** are small fragments without nuclei and last just 7 days. They are essential in **clotting blood**.
- ❖ **Blood groups** consist of A, B, AB and O groups. **People in the AB blood group are known as universal recipients** because they can receive blood from any group. **People in the O group are known as universal donors** because they can give blood to anybody, although the most common blood group they can only receive blood from their own group.
- ❖ **Deep vein thrombosis(DVT)** are swollen areas caused by unwanted clotting in veins due to a lack of movement on long journeys'.(flight socks may prevent DVT)



# Circulatory System

**Open circulatory systems** allow the blood flow out of the vessels before returning to the heart via **ostia**. (no veins involved)E.g. insects.

- **Closed circulatory** systems don't allow the blood to leave the blood vessels E.g. humans advantages include **faster and controlled delivery of oxygen and nutrients** which allow for longer periods of activity.
- **Arteries** are blood vessels that carry blood away from the heart in powerful pulses. They have thick walls small lumens and no valves.
- **Endothelium** is the innermost layer of blood vessels that consists of just a single layer of cells.
- **Veins** are blood vessels that carry blood to the heart in an even flow. They have thin walls large lumens and valves.
- **Capillaries** are tiny blood vessels with walls just one cell thick, they carry blood from arterioles to venules through tissues releasing nutrients and removing wastes.
- The human circulatory system consists of two circuits **systemic and pulmonary**.
- The **coronary artery** carries blood to the heart muscle from the aorta. (coronary vein )
- The **hepatic artery** carries blood to the liver. (*hepatic vein*)
- The **renal arteries** carry blood to the kidneys. (*renal veins*)
- The **mesenteric arteries** carry blood to the small and large intestines.
- The **carotid arteries** supply blood to the head. (*jugular veins*)
- The **subclavian arteries** supply blood to the arms. (*subclavian veins*)
- The **iliac arteries** carry blood to the legs. (*iliac veins*)
- A **portal system** is a network of capillaries in one organ or tissue joined to another network of capillaries in another organ or tissue via a vein or veins.
- A **pulse** is the alternate contraction and relaxation of an artery as blood passes through it.
- **Blood pressure** is the force blood exerts on the walls of blood vessels.
- A **sphygmomanometer** is used for measuring blood pressure(normally 120/80 mmHg)
- **Atherosclerosis** is the hardening of artery walls due to a build-up of fatty deposits.
- **Smoking** causes heart rate and blood pressure to increase. **Diet** high in saturated fats increase blood pressure and atherosclerosis. **Exercise** helps lower blood pressure.



# Lymphatic System

- The lymphatic system returns **extracellular fluid** (*ECF*) or **interstitial fluid** caused by plasma leaking from capillaries to the bloodstream.
- **Lymph** is a clear liquid that is collected around cells and is transported by the lymphatic system back to the bloodstream.
- **Lymph vessels** are narrow, **dead ending tubes that transport lymph** and are present in every tissue and organ throughout the body.
- **Lymph nodes** are small spherical-shaped organs of the lymphatic system that contain many white blood cells.
- **Functions of the lymphatic system:**
  1. **Filters lymph** white blood cells in lymph nodes remove bacteria and viruses.
  2. **Absorb fat from small intestine** lymph vessels throughout the wall of the digestive system absorb lipids.
  3. **Maturation of certain white blood cells** lymphocytes mature and become fully active in the thymus.
  4. **Fighting infection** white blood cells produce antibodies to kill bacteria and viruses.

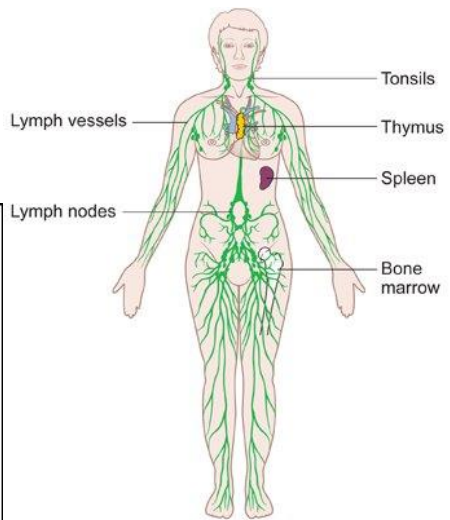
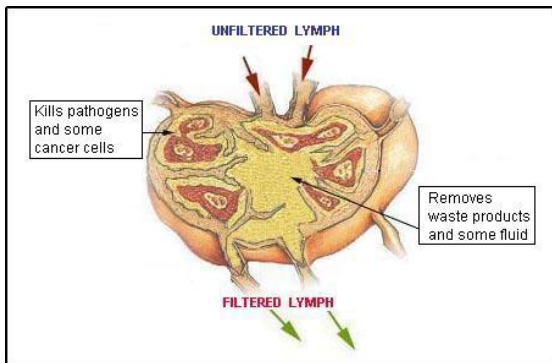


Diagram of the lymphatic system  
Copyright © CancerHelp UK