
Blood

Fact & Fiction

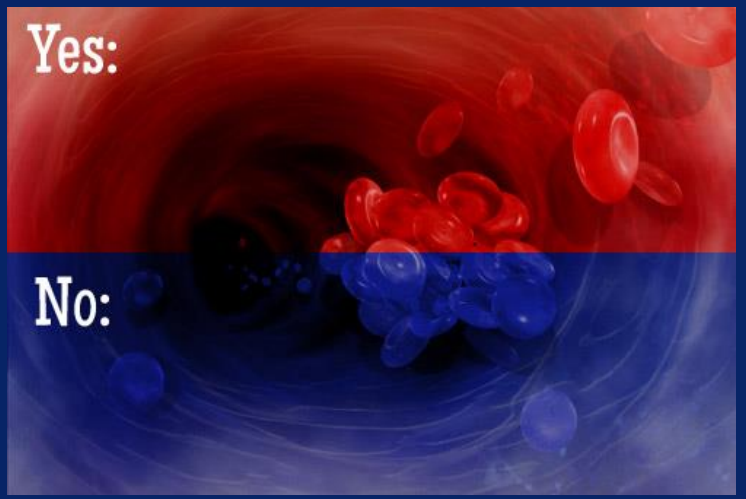
Fact

- There are about 5.6 litres of blood in an average human body.
- Human blood is red, ranging from bright red, when it contains oxygen, to dark red, when it does not.

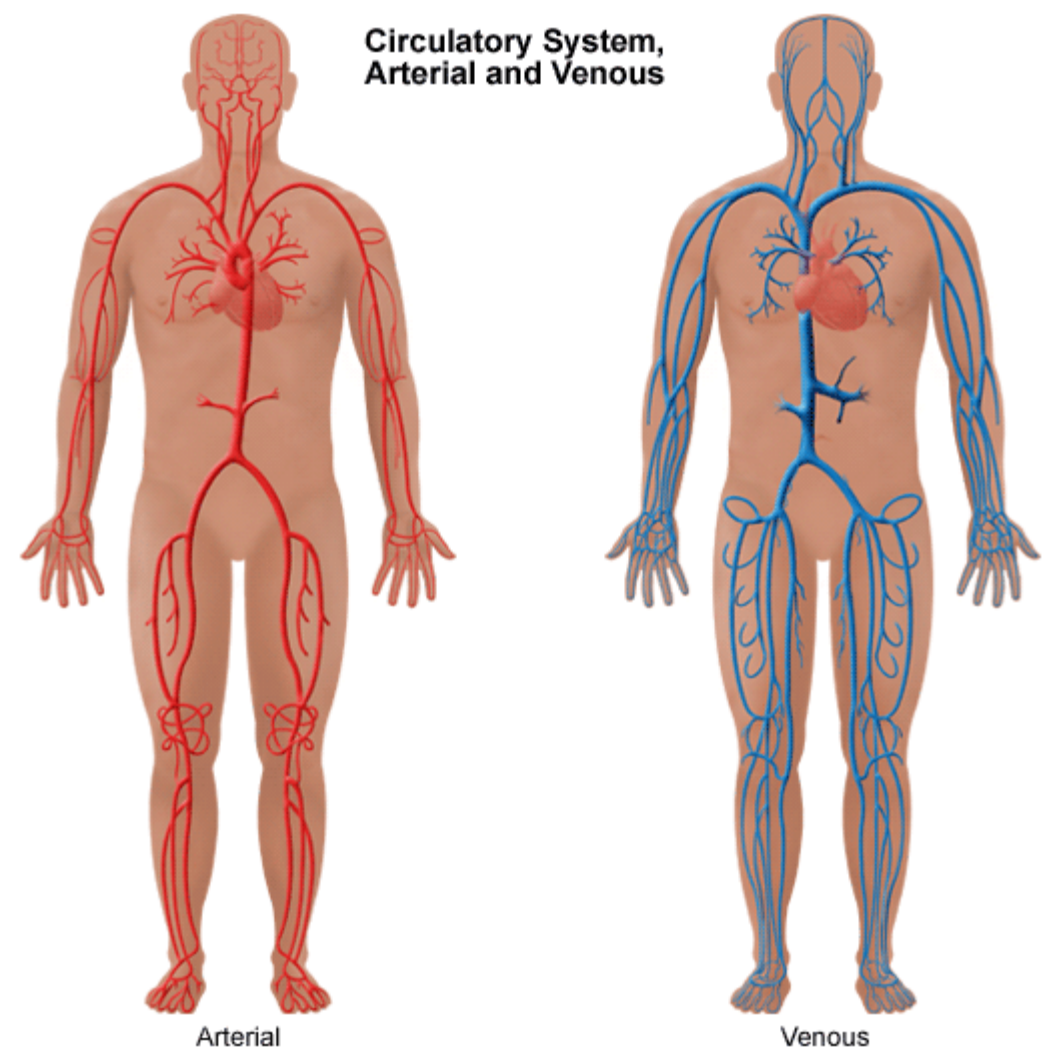
Fiction

- Blood is blue!!

This is wrong

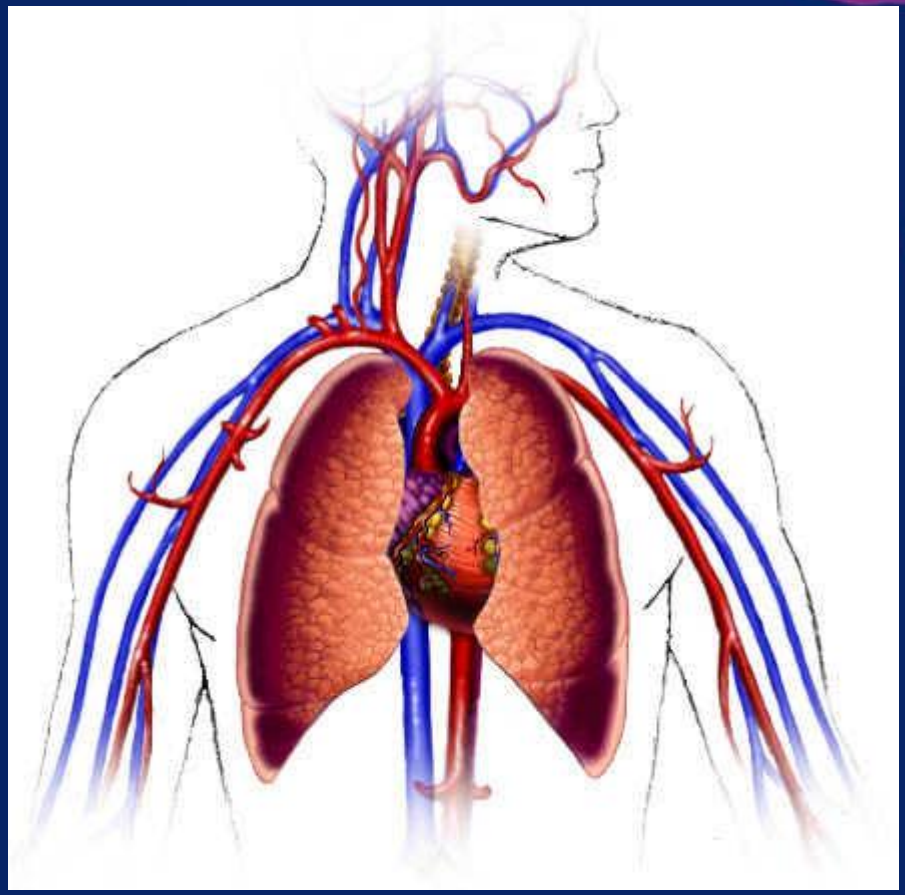


CARDIOVASCULAR SYSTEM

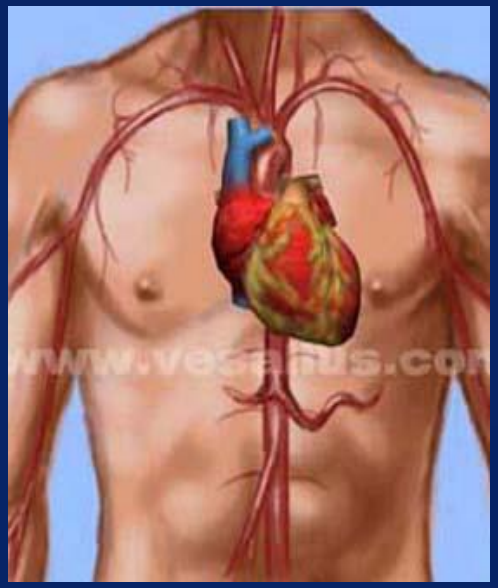


CARDIOVASCULAR SYSTEM

- **The heart and the blood vessels + blood form the cardiovascular system.**
- **The heart pumps the blood around the body in vessels called ARTERIES, VEINS AND CAPILLARIES.**



THE HEART

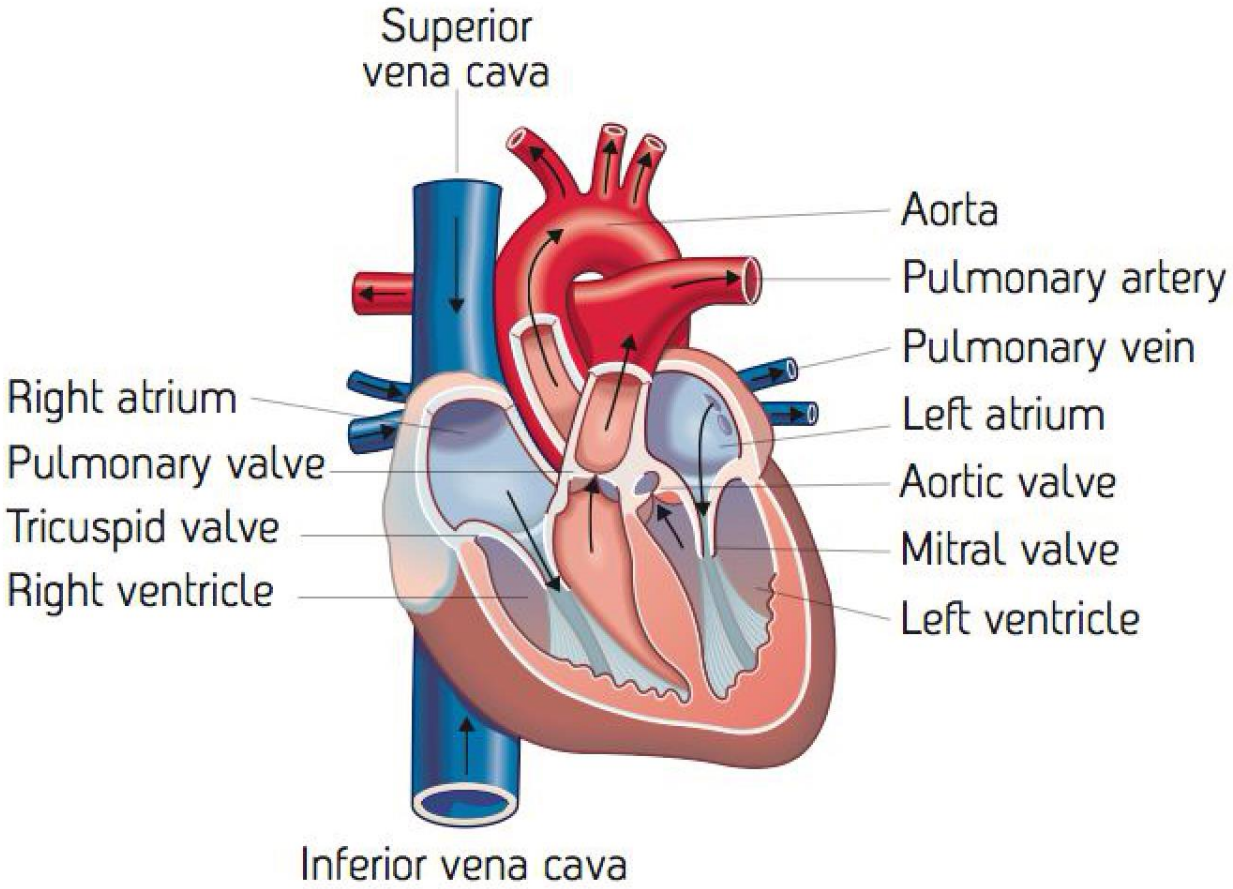


The heart is a hollow muscular organ. It is about 10cm long and is about the same size as the owner's fist.

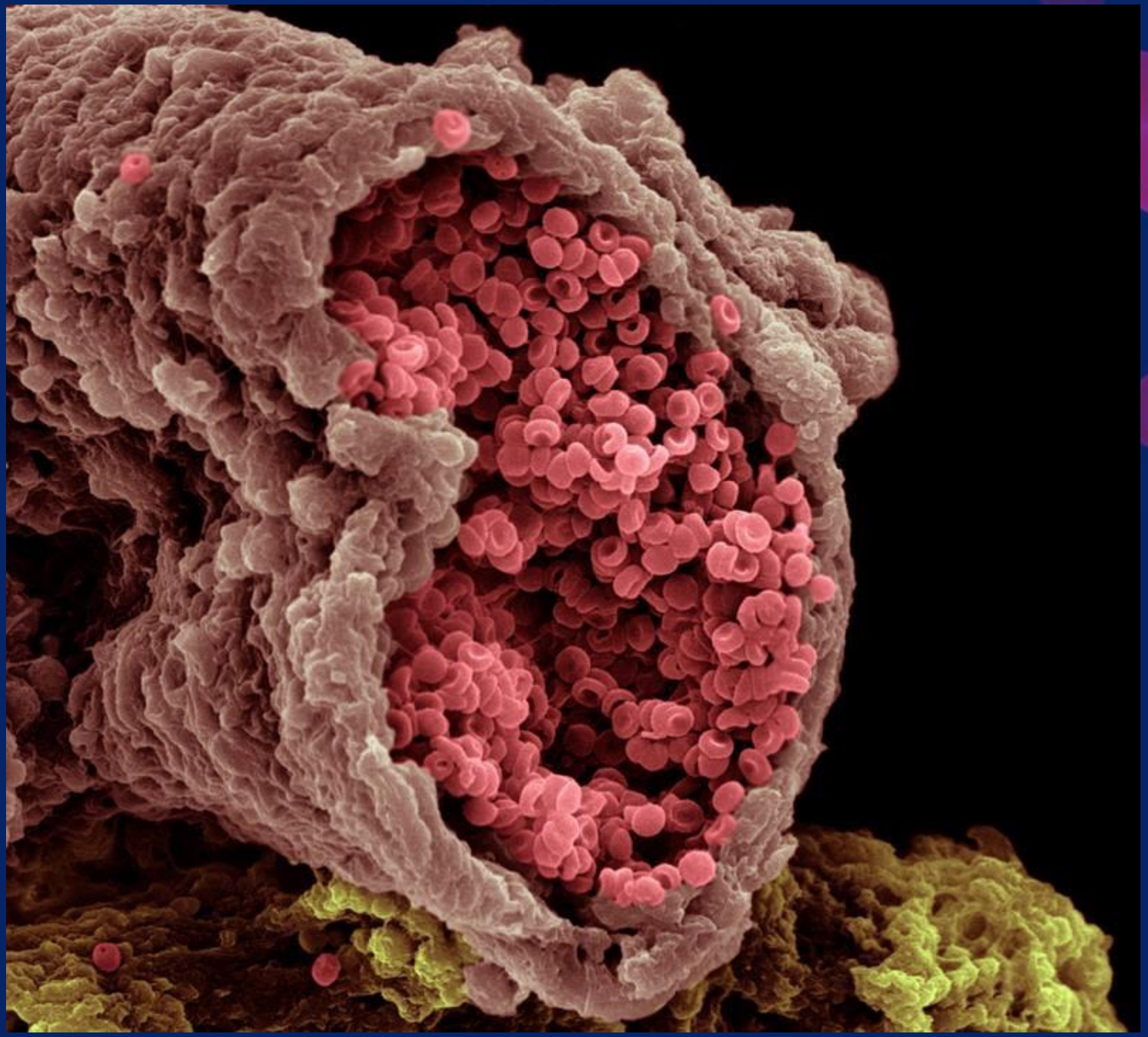
It lies in the centre of the thorax under the sternum.

What your heart does…

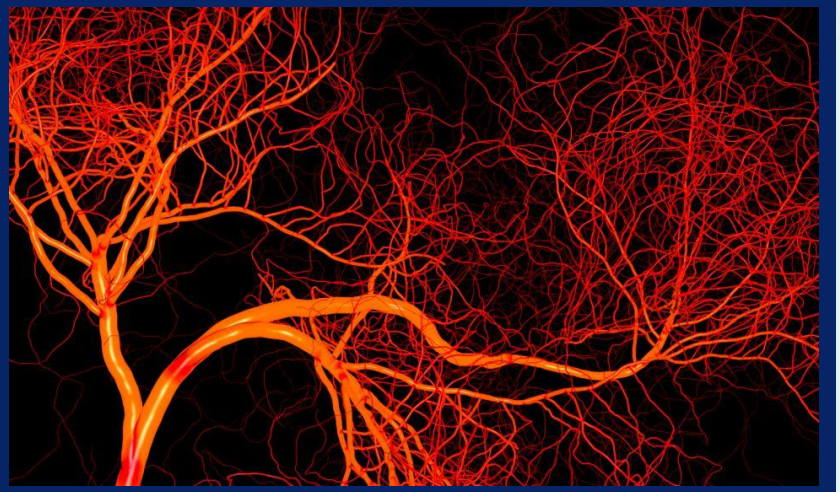
- **Your heart is a pump.**
- **The basic job of the heart is pump that blood through your body so that the blood can deliver the oxygen and nutrients right to the cells.**
- **The heart keeps your blood pumping at all times as it picks up oxygen from your lungs and nutrients from your digestive system and sends them to all cells of your body.**

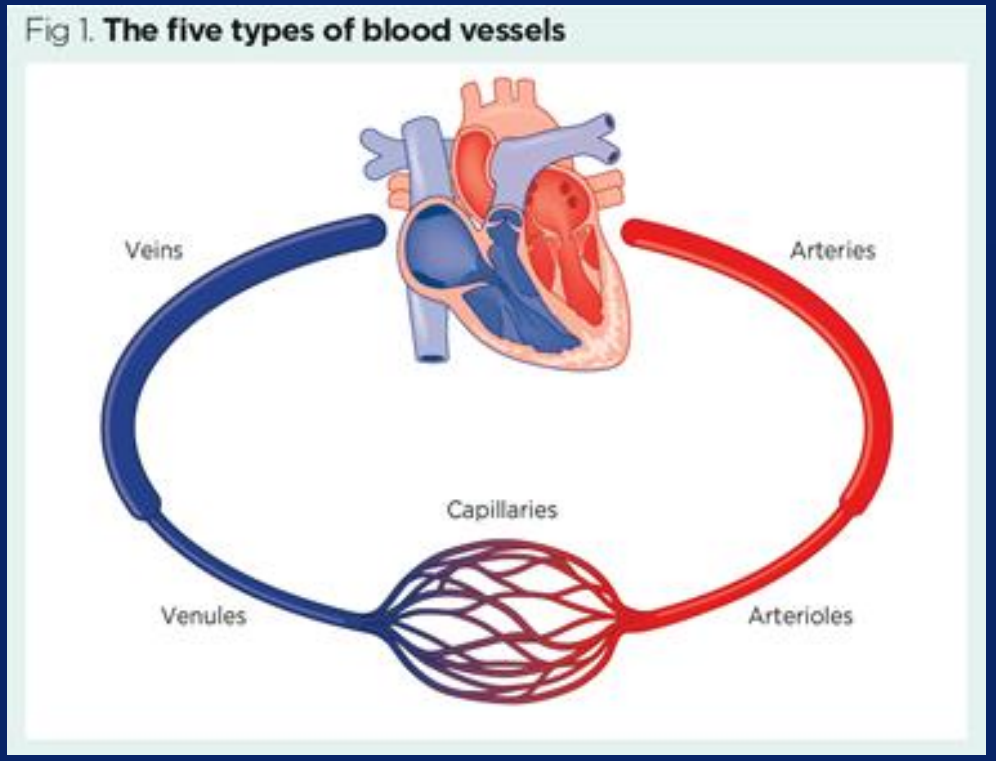


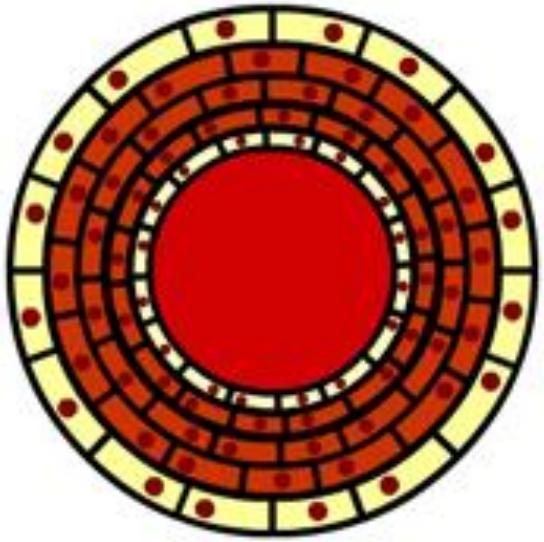
Chambers of the heart



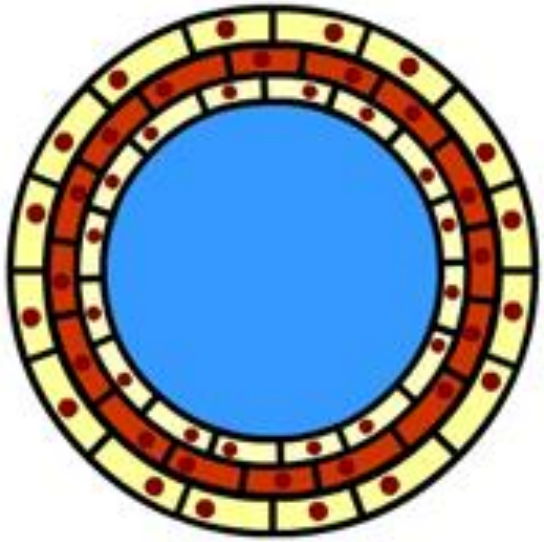
What are blood vessels?







artery



vein

capillary

Arteries:

- have thick elasticated walls
- carry blood under pressure
- contain oxygenated blood (except the pulmonary artery)
- tend to lie deep in the body.

Veins:

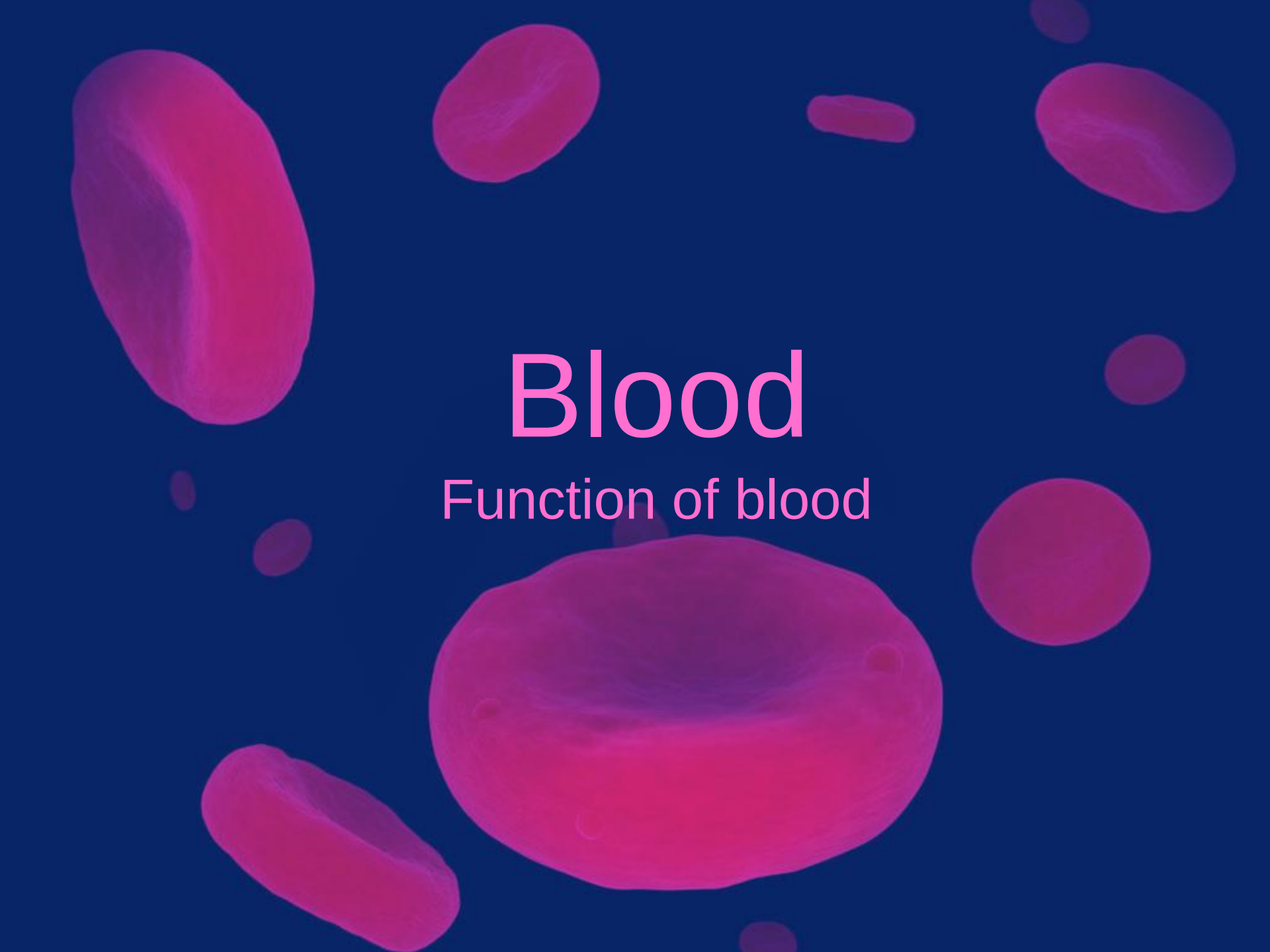
- have thinner walls
- contain valves to prevent a back flow of blood
- rely on muscular contractions to push the blood back towards the heart
- carry deoxygenated blood
- are more superficial than arteries.

Capillaries:

- are tiny vessels one cell thick
- carry both oxygenated and deoxygenated blood to and from the cells and tissues
- do not work under pressure
- can be both deep and superficial.

Structure and function of blood vessels

	Arteries	Veins	Capillaries
Blood pressure	High pressure	Low pressure	Low pressure
Direction of blood flow	Away from the heart	Towards the heart	To and from the tissues
Wall thickness	Thick and muscular	Thinner, less tissue	Minute, one cell thick
Functions	Carry oxygenated blood	Carry de-oxygenated blood	Carry both
Valves	No valves	Numerous valves	No



Blood

Function of blood

Functions of the blood

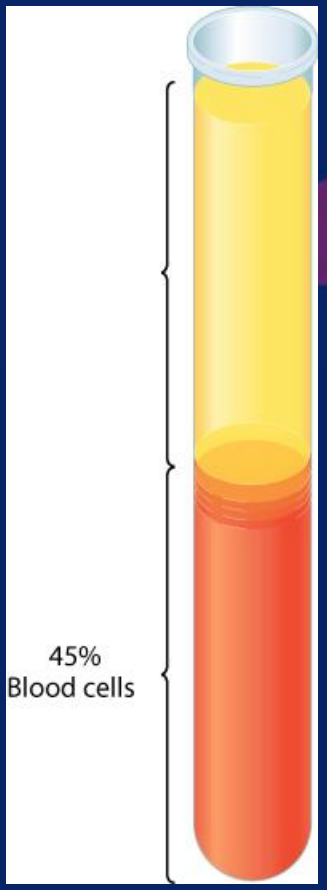
- Blood has three main functions:
  - **transport** of various gases, nutrients, hormones and waste
  - **regulation** of water in the body and body temperature
  - **protection** against infection and blood loss.

Functions of the blood: transport

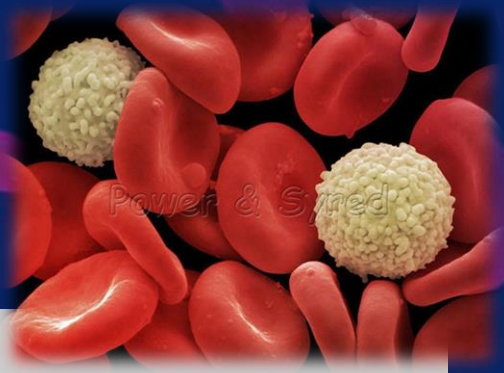
- The blood transports:
  - **oxygen** from the lungs to the body cells
  - **carbon dioxide** from the cells to the lungs
  - **nutrients** from digestive system to the cells
  - **waste products** from the cells, to be excreted
  - **hormones** from endocrine glands, to regulate cells
  - **medication** from the blood to the cells.

COMPOSITION (what is blood made up of?)

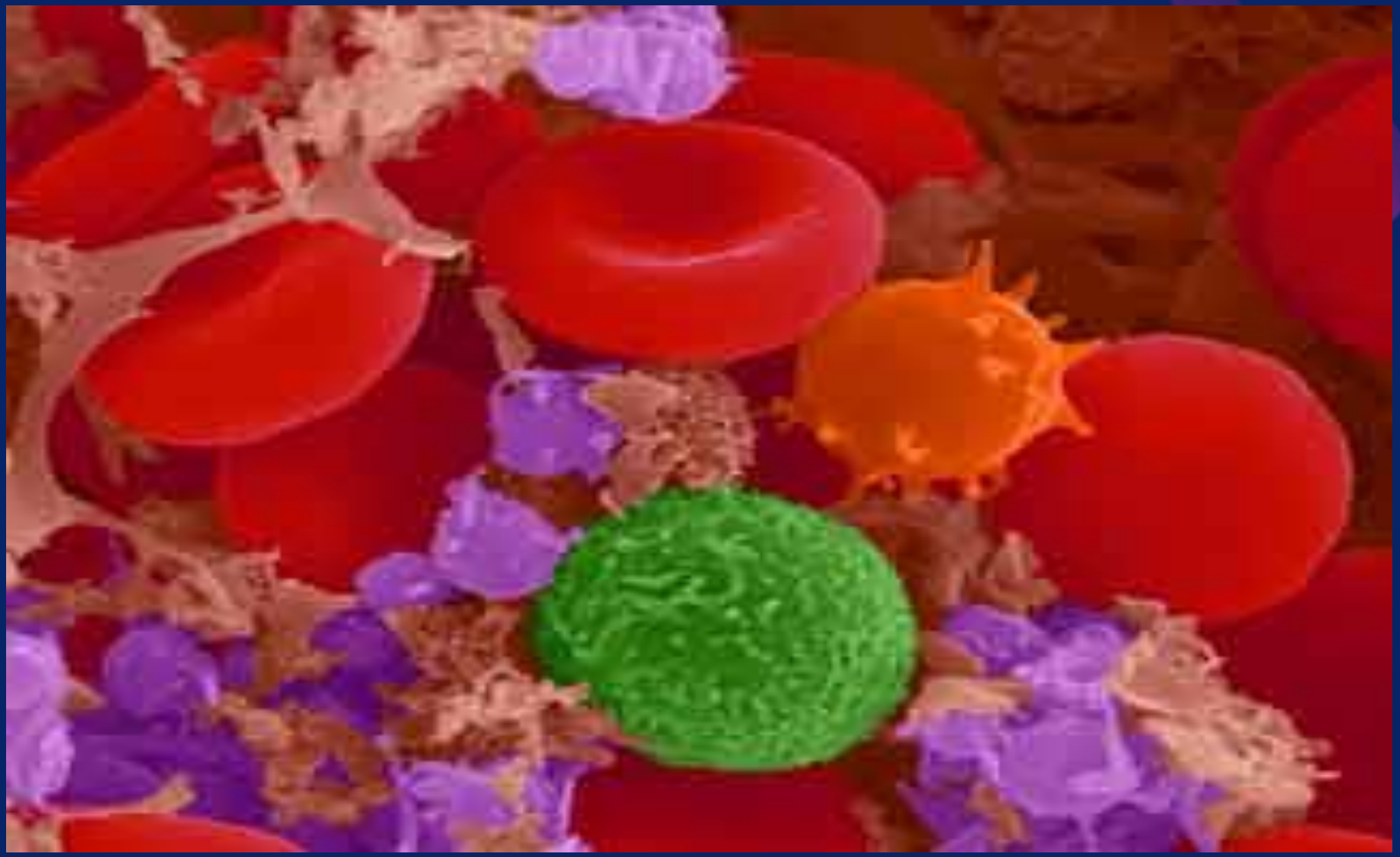
- Blood is composed of several kinds of cells – red blood cells and white blood cells.
- The red blood cells make up about 45% of whole blood.
- The other 55% is blood plasma, a yellowish fluid that is the liquid part of blood.



COMPOSITION



- Plasma: mainly water, foods, Co2
- White blood cells (Leucocytes): fighting & destroying foreign bodies, carrying away debris
- Red blood cells (erythrocytes): Haemoglobin, carry O2 from lungs to cells of body &
- De-oxygenated blood back to the lungs
- Platelets (thrombocytes): cells bond together to form clot, when injured & exposed to air
- Other chemicals: Hormones

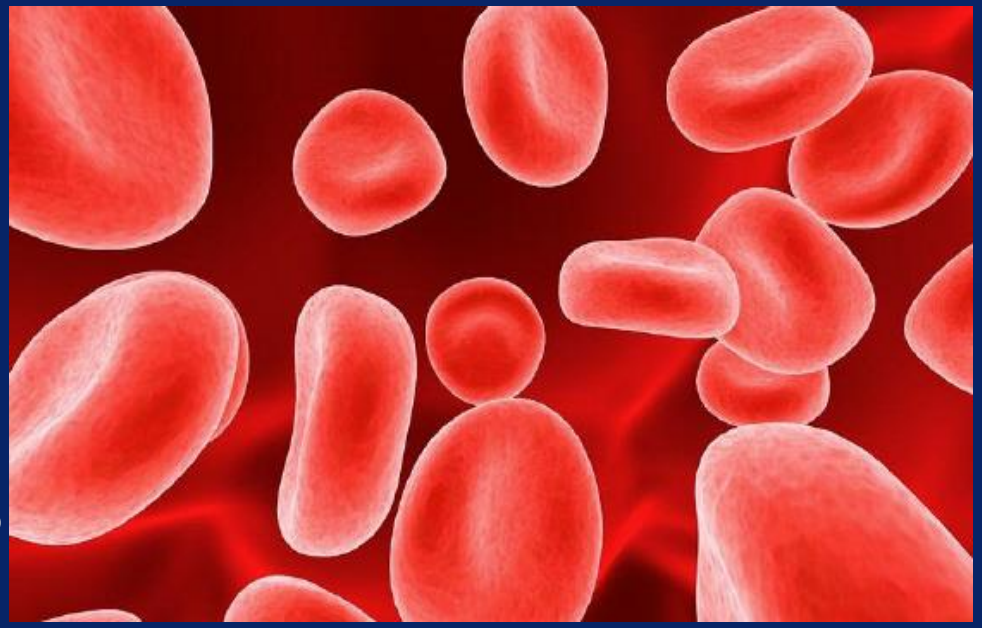


Red Blood Cells, Platelets (stained purple), a Lymphocyte white cell (stained green), and a white cell (stained gold)

as seen through a scanning electron microscope.

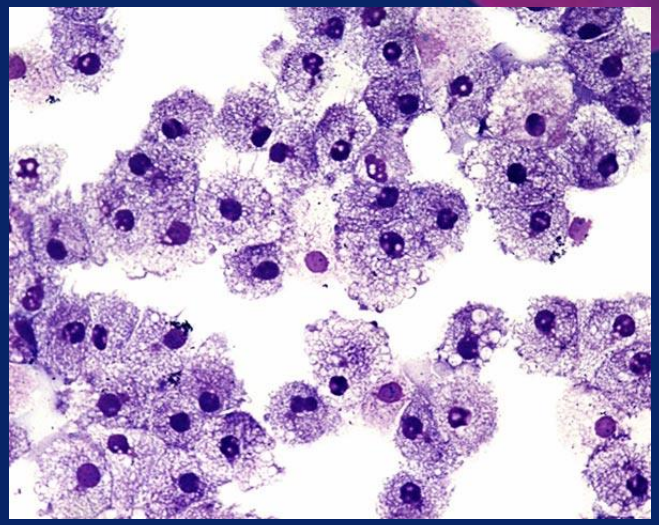
Red blood cells aka Erythrocytes

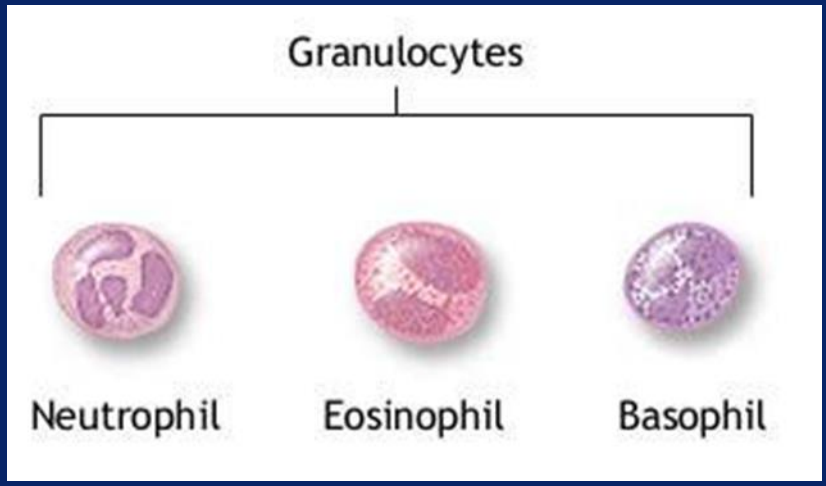
- These ‘corpuscles’ lack a nucleus, so are not cells, strictly speaking.
- They distribute oxygen to the cells of the body.
- They remove carbon dioxide from the cells.



White blood cells

- There are 3 different types of white blood cell:
  - granulocytes
  - lymphocytes
  - monocytes.
- They kill the invaders, such as bacteria.
- Formed in the bone marrow
- They then eat the remnants.
- White blood cells increase in number during infection/illness





Agranulocytes

Monocytes

- **Monocytes** act as a type of 'vacuum cleaner', cleaning the body of unwanted germs, infections and waste.
- They live longer than most other white blood cells, because they also have another job:
  - to recognise invading germs and produce antibodies to prevent the infection from thriving.
- This process operates after vaccinations, thus preventing us from getting various diseases.

Lymphocytes

- These are much more common in the lymphatic system than in the blood.
- The blood has two different types of lymphocytes-
  - T- lyphocytes combat and destroy cells containing antigens
  - B-lymphocytes are involved in producing antibodies
- They defend the body from viruses and other types of infections.

Platelets (or thrombocytes)

- These are cell-like structures that stick together to help form blood clots.
- They are activated when the blood vessel lining is damaged.
- Once activated they release a number of substances that bind together and form the clot.
- The clot prevents blood and fluid loss.

Plasma

- Plasma is a pale yellow coloured fluid, if you remove all the cells from blood this is what would be left.
- Plasma contains a variety of substances
- Page 77 includes a list of these

Functions of the blood: water regulation

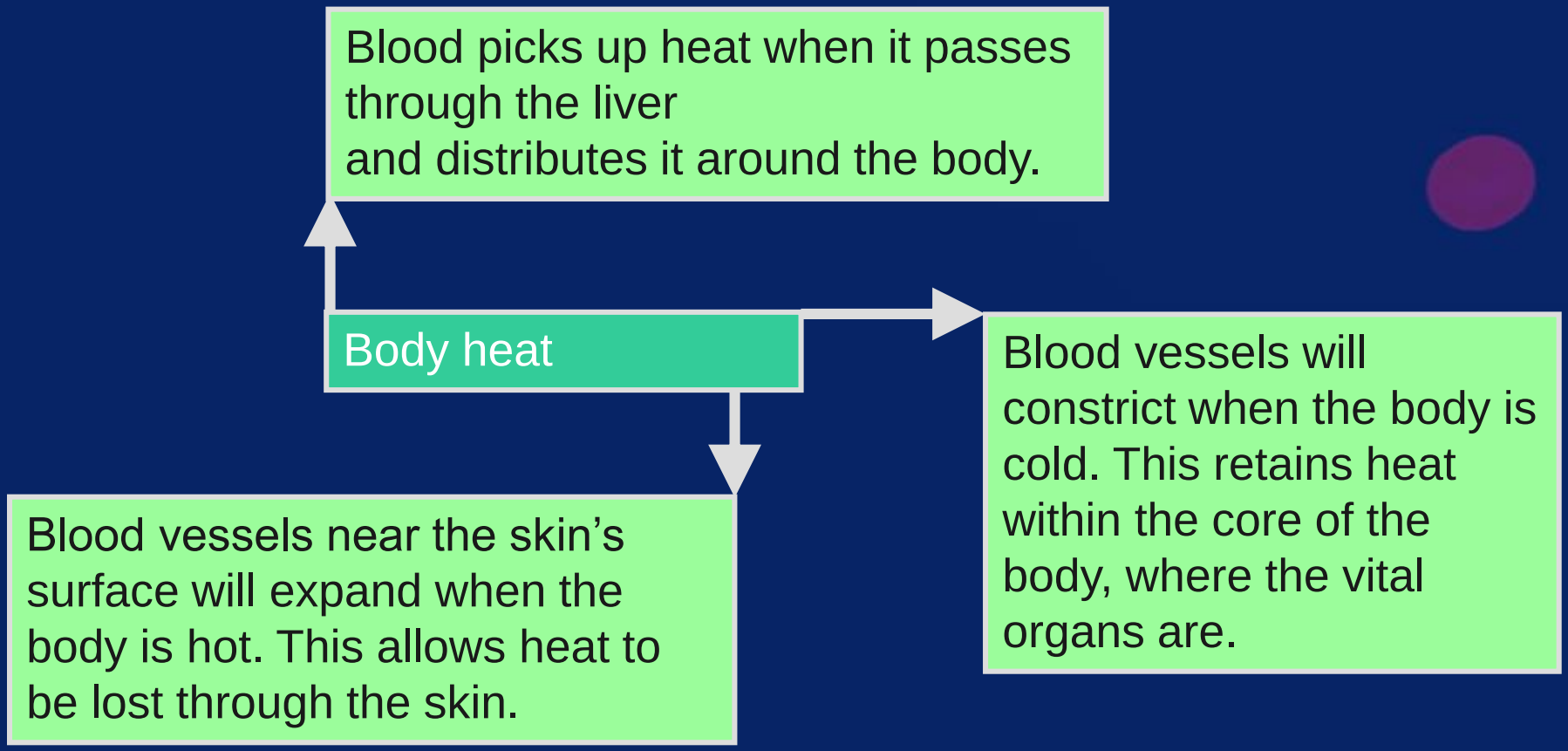
The blood will retain more or less water according to the current water content of the cells

Water content of cells

When the blood passes through the kidneys, if there is too much water content, the kidneys retain the water and it is excreted

If there is not enough water, the kidneys pass water back into the blood to be passed to the body's cells

Functions of the blood: heat regulation



VASODILATION

- Blood vessels expand when we get hot, bringing them closer to the surface. This is why we go red.
- This is so we can cool ourselves down just like sweating.

VASOCONSTRICTION

- Blood vessels shrink down close to internal organs to keep our body temperature warm. We do this when we are cold.
- Just like our arrector pili muscles contract to make our hairs stand on end to trap heat and shiver to warm our organs.

Effects of massage on blood circulation

- Massage increases the amount of blood flow into the area.
- How do you know that you have increased the blood flow to an area?
- **Reddening of the skin is seen.**
- What is the correct term for this?
- **Erythema**

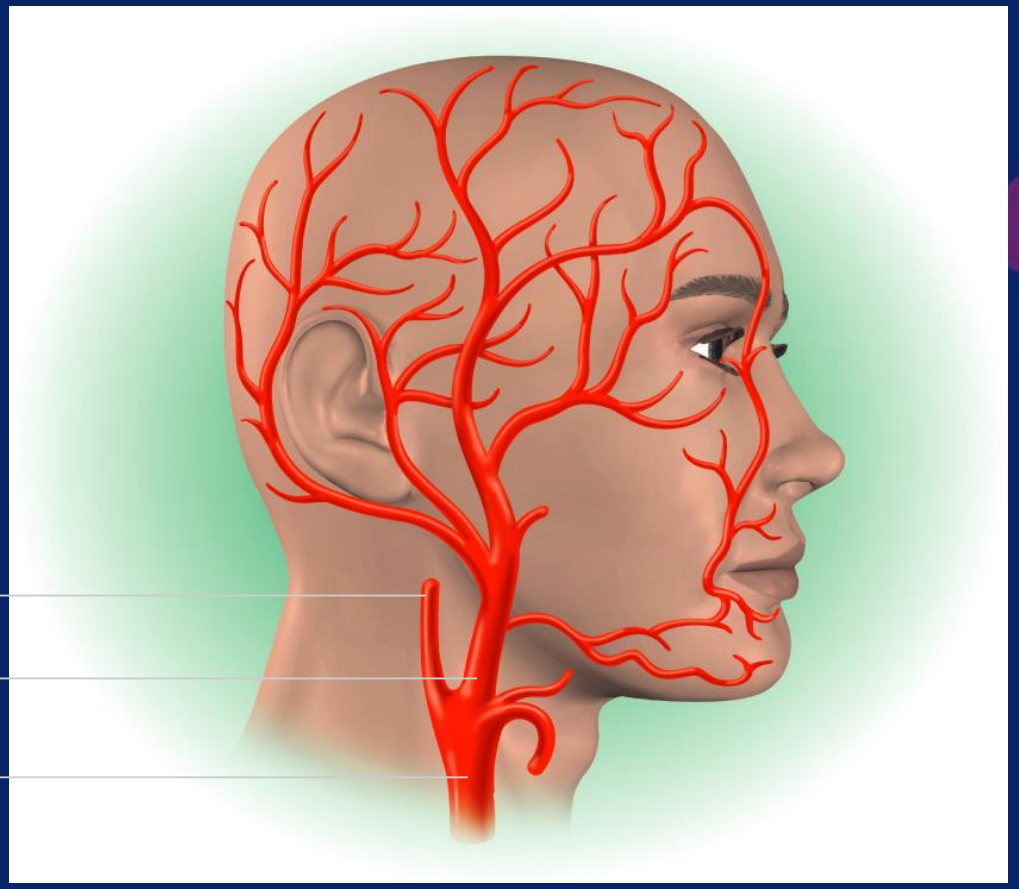
Effects of massage on blood circulation

- What benefits of increasing blood circulation can you think of?
- **Speeds blood flow through the veins and therefore helps with removal of waste products.**
- **Fresh blood to an area brings with it oxygen and nutrients, so helping with growth and repair.**
- **Extra oxygen and nutrients improve the skin texture and look.**

Effects of massage on blood circulation

- What other benefits of increasing blood circulation can you think of?
- **Warmth is produced, which helps to relax the client.**
- **Muscles get extra oxygen and nutrients, so improving their efficiency.**
- **Removing waste from muscles will help them to recover after exercise, help with tone and make them more relaxed.**

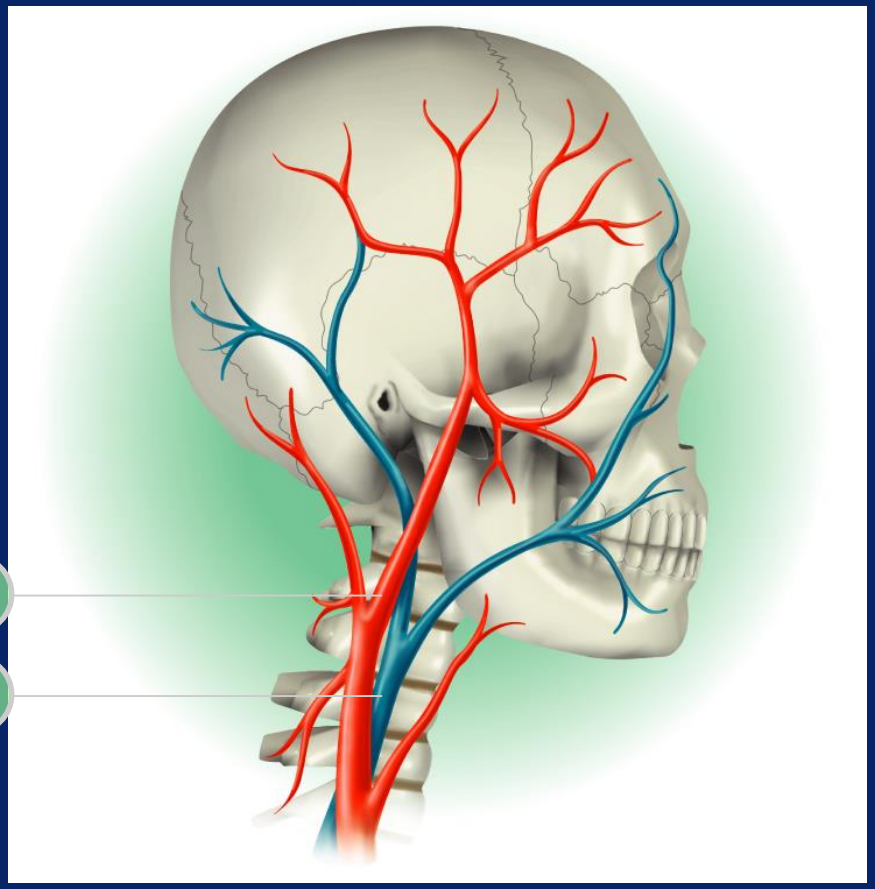
Blood flow to the face and head: Arteries

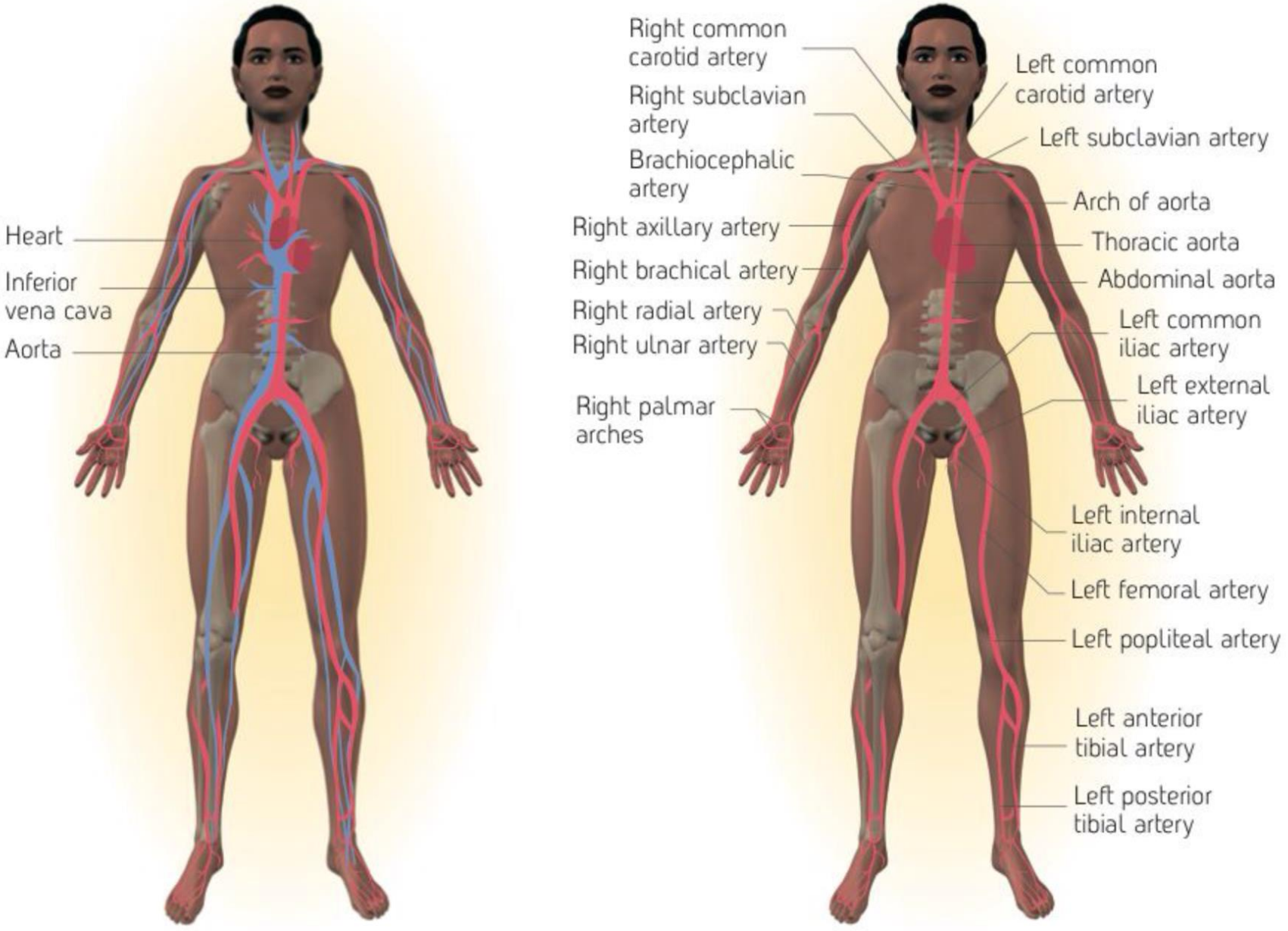


Blood flow to the face and head: Veins

External jugular vein 1

Internal jugular vein 2




Heart
Inferior vena cava
Aorta
Right common carotid artery
Right subclavian artery
Brachiocephalic artery
Right axillary artery
Right brachical artery
Right radial artery
Right ulnar artery
Right palmar arches
Left common carotid artery
Left subclavian artery
Arch of aorta
Thoracic aorta
Abdominal aorta
Left common iliac artery
Left external iliac artery
Left internal iliac artery
Left femoral artery
Left popliteal artery
Left anterior tibial artery
Left posterior tibial artery