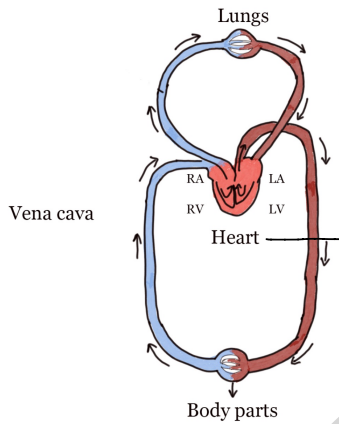
CIRCULATION AND EXCRETION

CIRCULATORY SYSTEM

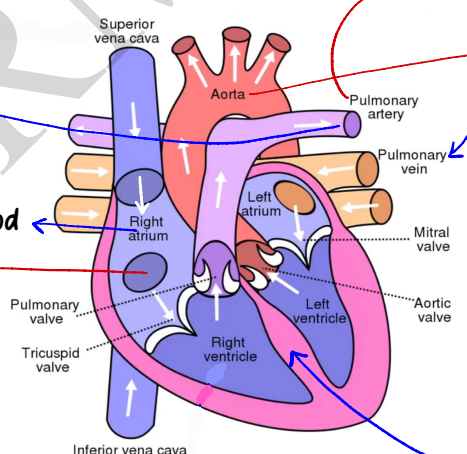


Pumping organ: pumps blood to cells

Blood Circulation in Human

- O_2 rich blood: bright red
- CO_2 rich blood: dark red

- Pacemaker: Artificial Heart
- To measure arterial blood pressure : Sphygmomanometer is used



Lungs

Largest artery

Pulmonary artery (right) — longer

Collects blood

Sinoatrial node

initiates heartbeat

Because of aorta

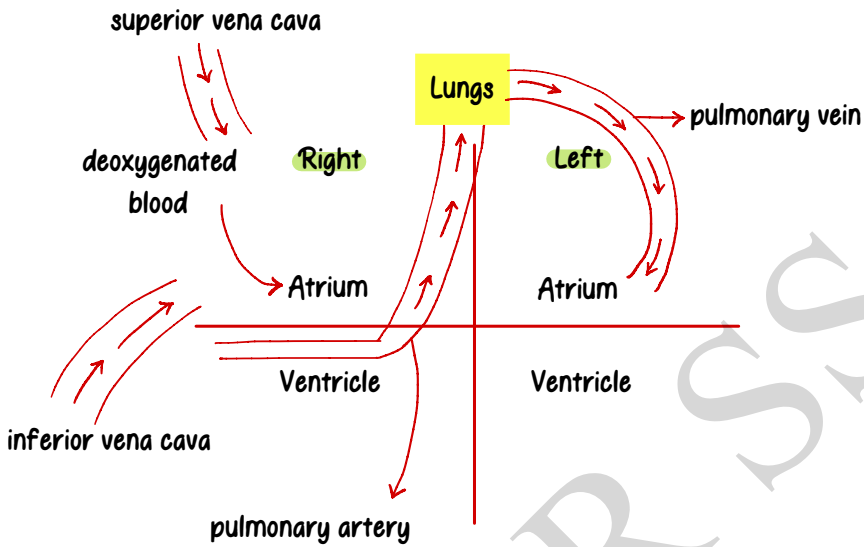
Largest artery

Carries blood from heart to different parts of the body

Largest vein

- The human heart pumps blood

Septum (dividing wall between left and right part of heart)



Heart to different body parts (pure blood)

Narrow, thicker (due to pressure)

Arteries: carries oxygenated blood

Veins: carries deoxygenated blood — different body parts to heart (impure blood)

Pulmonary artery: carries deoxygenated blood (right ventricle to lungs)

Pulmonary vein: carries oxygenated blood (lungs to left atrium)

Exception

- When heart contracts: systole → 120 mm of Hg (if more than this, then high BP)
- When heart relaxes: diastole → 80 mm of Hg (if less than this, then low BP)
- Sound oh heart: lubb-dubb (when heart contracts)

Blood Group

Discovery: Karl Landsteiner
Universal donor: O−
Universal acceptor: AB+

valves of heart:
- Mitral (Bicuspid valve)
- Aortic
- Tricuspid

Bombay blood (1952, Bombay) by YM Bhende: Lacks H antigen on RBCs, have anti-H in the serum i.e. **cannot take blood from anyone**

Systole: Contractions

Diastole: Relaxation

Given B+ blood

A+ B+

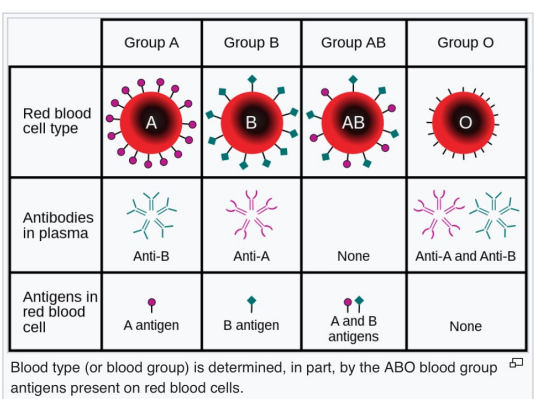
can die due to blood coagulation

Rh is derived from the use of blood of rhesus monkeys in the basic test for determining the presence of Rh antigen in human blood

- Rh factor is a protein on the surface of RBCs
- Rh+ – Protein present
- Rh− – Protein not present

Blood Type Compatibility

Blood Type	Gives	Receives
A+	A+, AB+	A+, A-, O+, O-
O+	O+, A+, B+, AB+	O+, O-
B+	B+, AB+	B+, B-, O+, O-
AB+	AB+	Everyone
A-	A+, A-, AB+, AB-	A-, O-
O-	Everyone	O-
B-	B+, B-, AB+, AB-	B-, O-
AB-	AB+, AB-	AB-, A-, B-, O-



Blood type (or blood group) is determined, in part, by the ABO blood group antigens present on red blood cells.

EXCRETORY SYSTEM

Waste removal → Solid eg: by kidneys

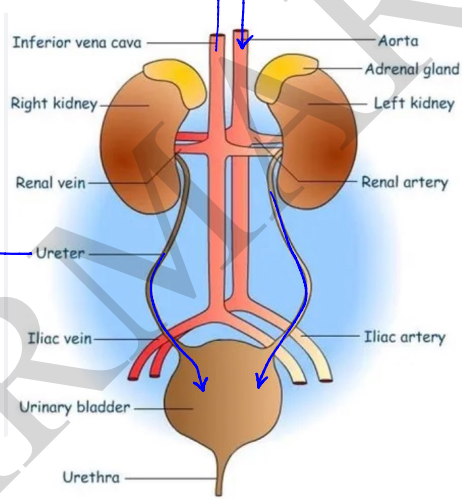
Gaseous eg: by lungs

Liquid eg: by skin (sweating)

- Basic unit of kidney: Nephron (specialised cells)
- Millions of nephron present in one kidney

Deoxygenated blood

Kidney to heart — Renal vein — Heart



2 ureters, sends wastes to urinary blood

* Right kidney is slightly down than left kidney

C M P

Cortex Medulla Pelvis

- Yellow solid waste from anus due to bilirubin

Waste product: Ammonia

Kidney converts ammonia to urea

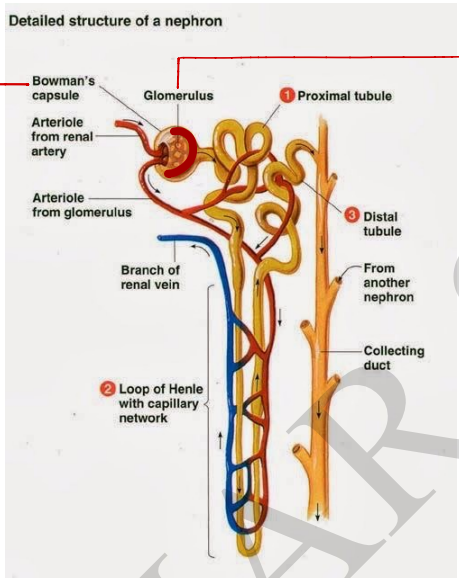
- Urea is major excretory product

Urine → Ureter → Urinary bladder

Colour: yellow due to Urobilin/Urochrome

Reabsorption and removal of nutrients/urea

Nephron: removes



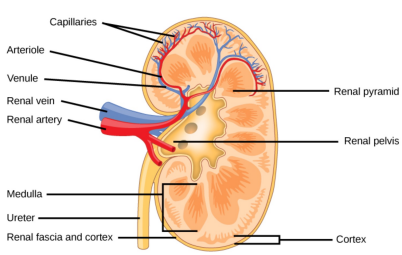
Ultrafiltration (filters everything)

Urine component:

- Water: 95%
- Urea: 2%
- pH: 4.5–5

Colour: Yellow
This colour comes from urochrome/urobilin, a waste product that comes from breakdown of haemoglobin

- liver cells are made of kupffer cells



- Kidney stone made of: Calcium oxalate

- When both kidney malfunctions: Dialysis is done

Artificial process to remove the waste from blood

- Large bean-shaped lymphoid organ in human body: Spleen (lymphoid organ)
- Swollen bluish veins resulting from valves that do not close properly: Varicose veins
- A healthy individual has 12-16 gm of haemoglobin in in every 100 mL of blood
- Heart weight: 285 gm
- RBCs develop in bone marrow
- Brain weight: 1300-1400 gm, male brain weighs more than females
- Blood clot (coagulation) is formed because of presence of platelets
- Carbon Monoxide reduces oxygen carrying capacity of blood
- Sweating/perspiration is a nature's way of releasing excess water from the body
- Flame cells: kidney, found in aquatic vertebrates