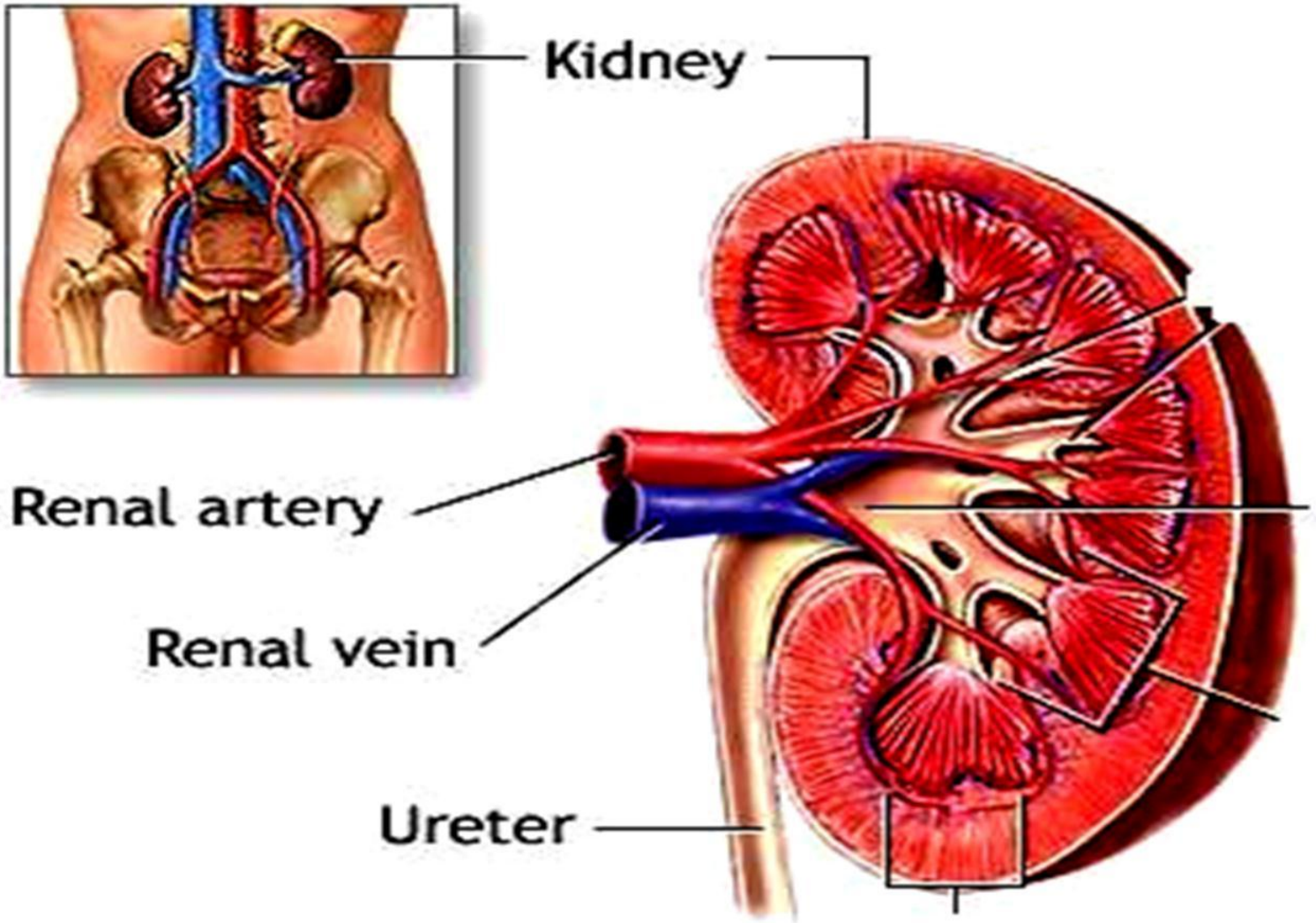
Chapter 39
Section 3

The Excretory System

Excretion



Excretion

→Composition of blood in renal artey	→Composition of blood in renal vein
→Carries oxygenated blood from heart to kidneys →to supply kidney cells with O2 to release energy from respiration	→Carries deoxygenated blood from kidneys back to heart/ carries CO2 which is produced from respiration
→Carries unfiltered blood /rich in nitrogenous wastes and urea	→Carries filtered blood /free of nitrogenous wastes and urea

Excretion

→Urea is formed in the liver →it's a toxic nitrogenous wastes

→**How urea is formed?**

→1-Hepatic vein carries amino acids from the small intestine to the liver

→In the liver , amino acids will be broken by liver's enzymes.

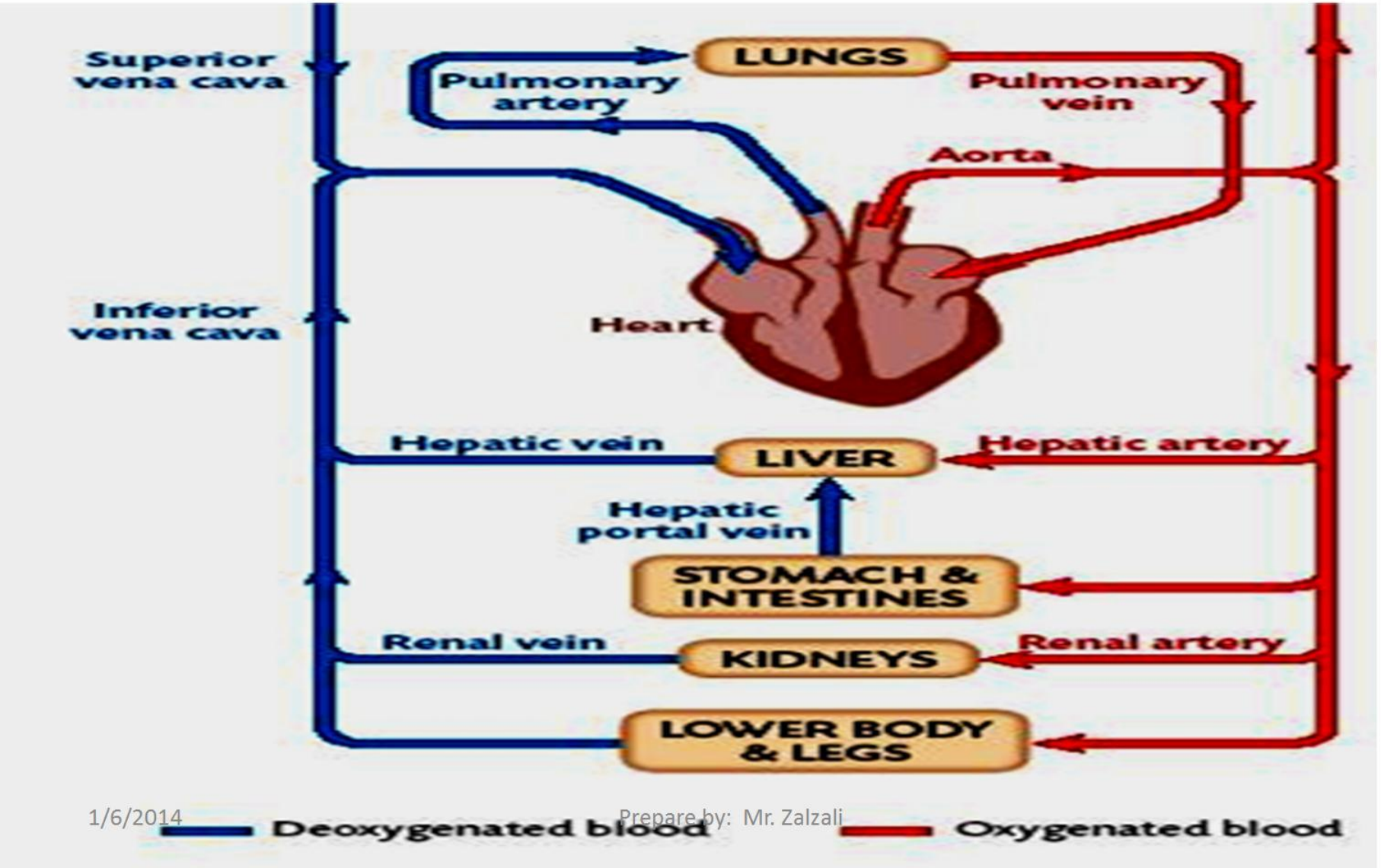
→2-When a.a are broken , the toxic nitrogenous part is removed from amino acids and converted into highly toxic chemical called **ammonia**

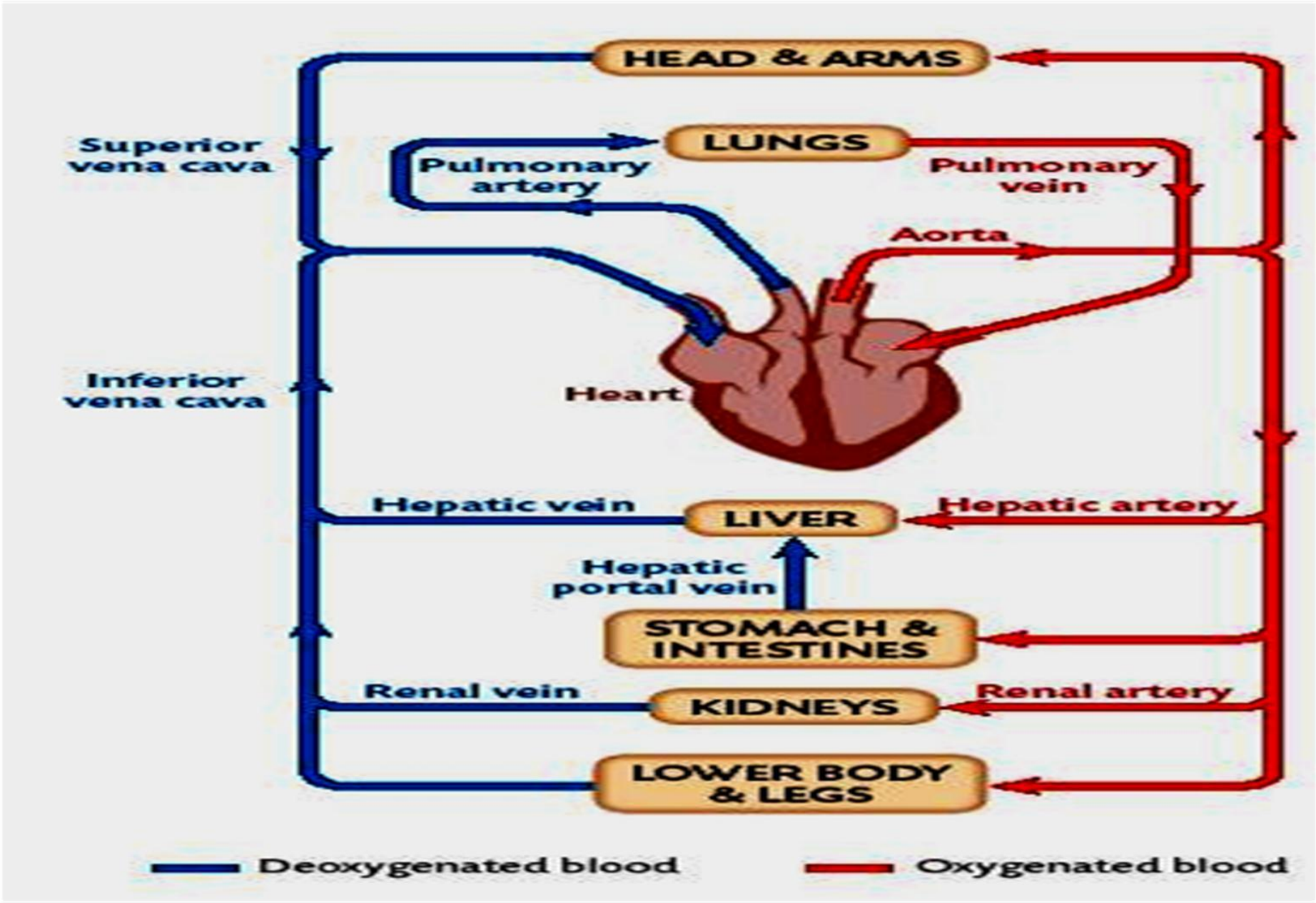
Excretion

→**3- amonia converts later into less toxic substance called urea**

→**Urea should be carried by the blood from liver o kidneys through the blood.**

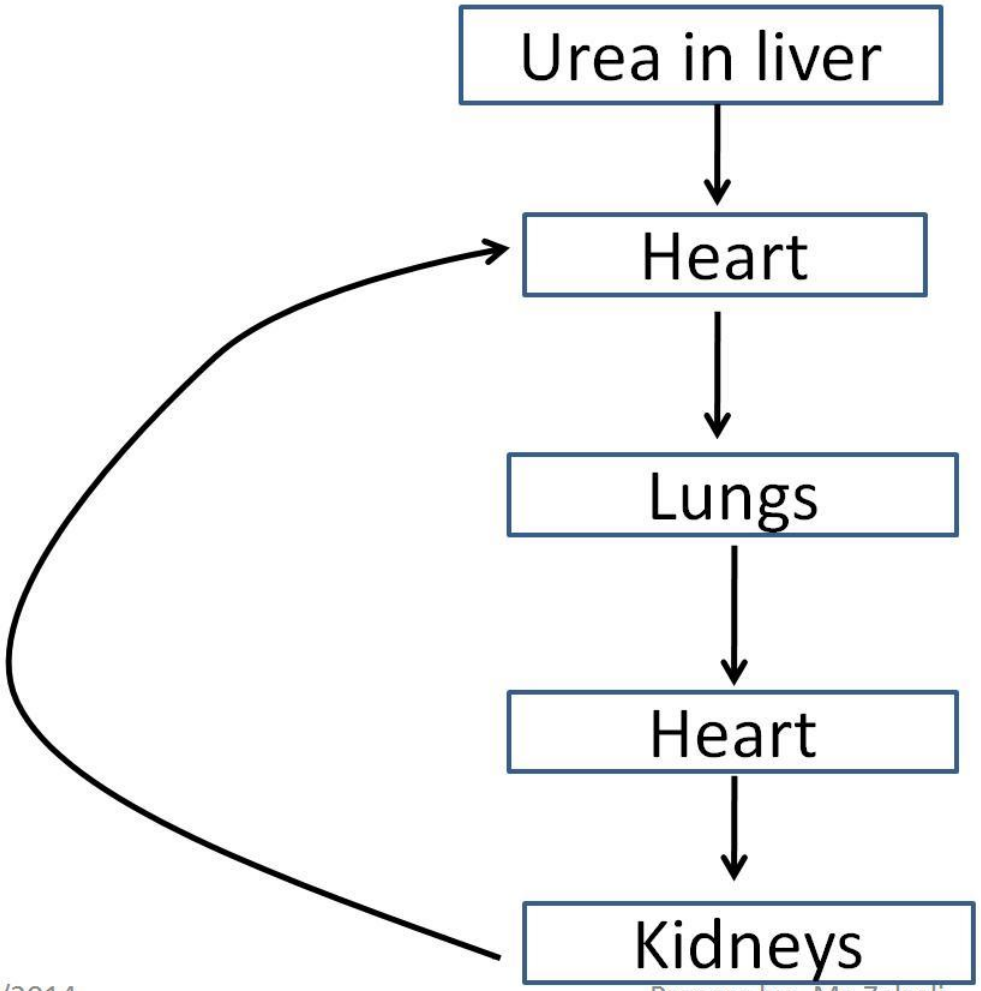
How is urea carried through blood stream from the liver to kidneys?




HEAD & ARMS
Superior vena cava
LUNGS
Pulmonary artery
Pulmonary vein
Aorta
Inferior vena cava
Heart
Hepatic vein
LIVER
Hepatic artery
Hepatic portal vein
STOMACH & INTESTINES
Renal vein
KIDNEYS
Renal artery
LOWER BODY & LEGS
Deoxygenated blood
Oxygenated blood

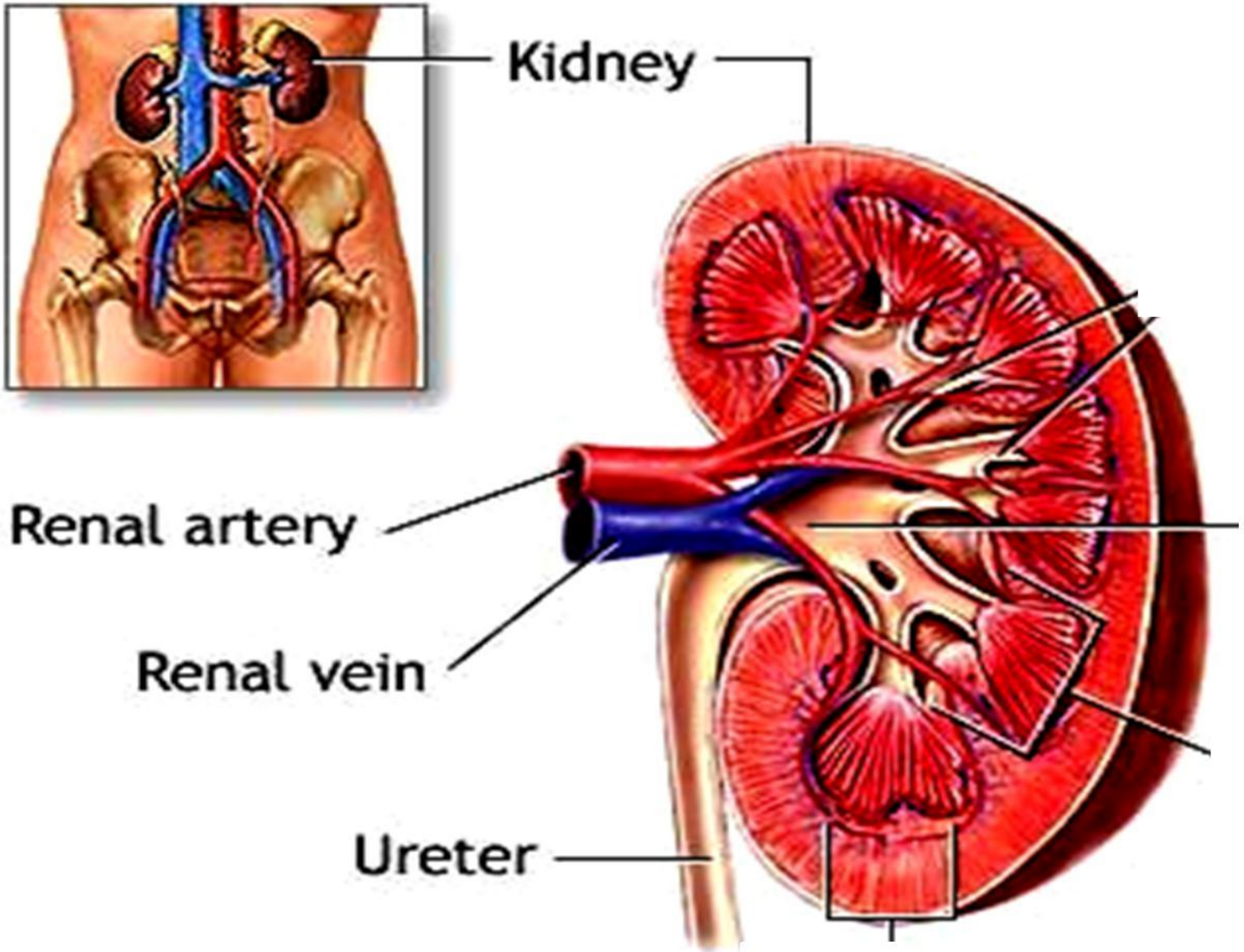
Excretion

→**How urea is carried through blood stream from liver to kidneys to be excreted?**

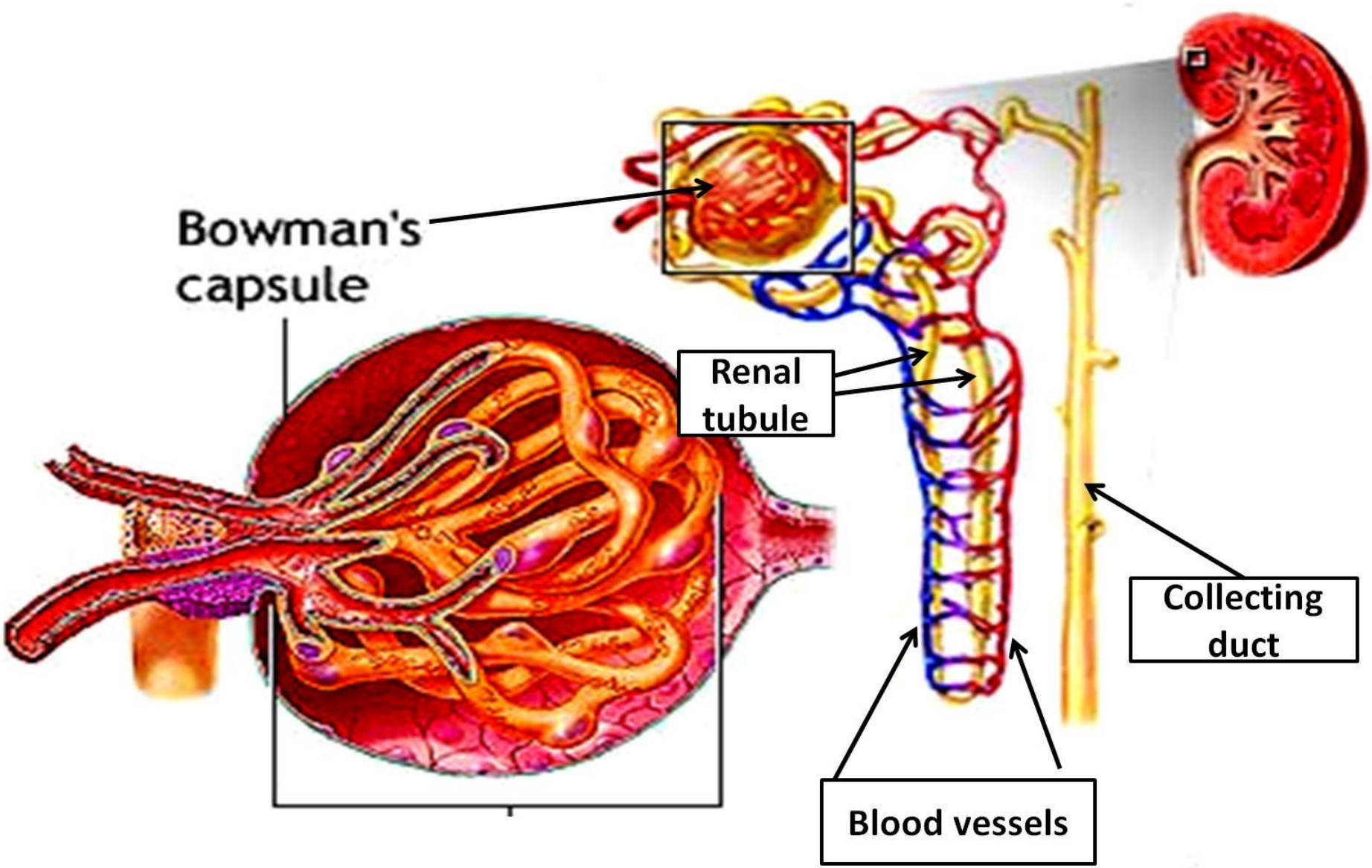


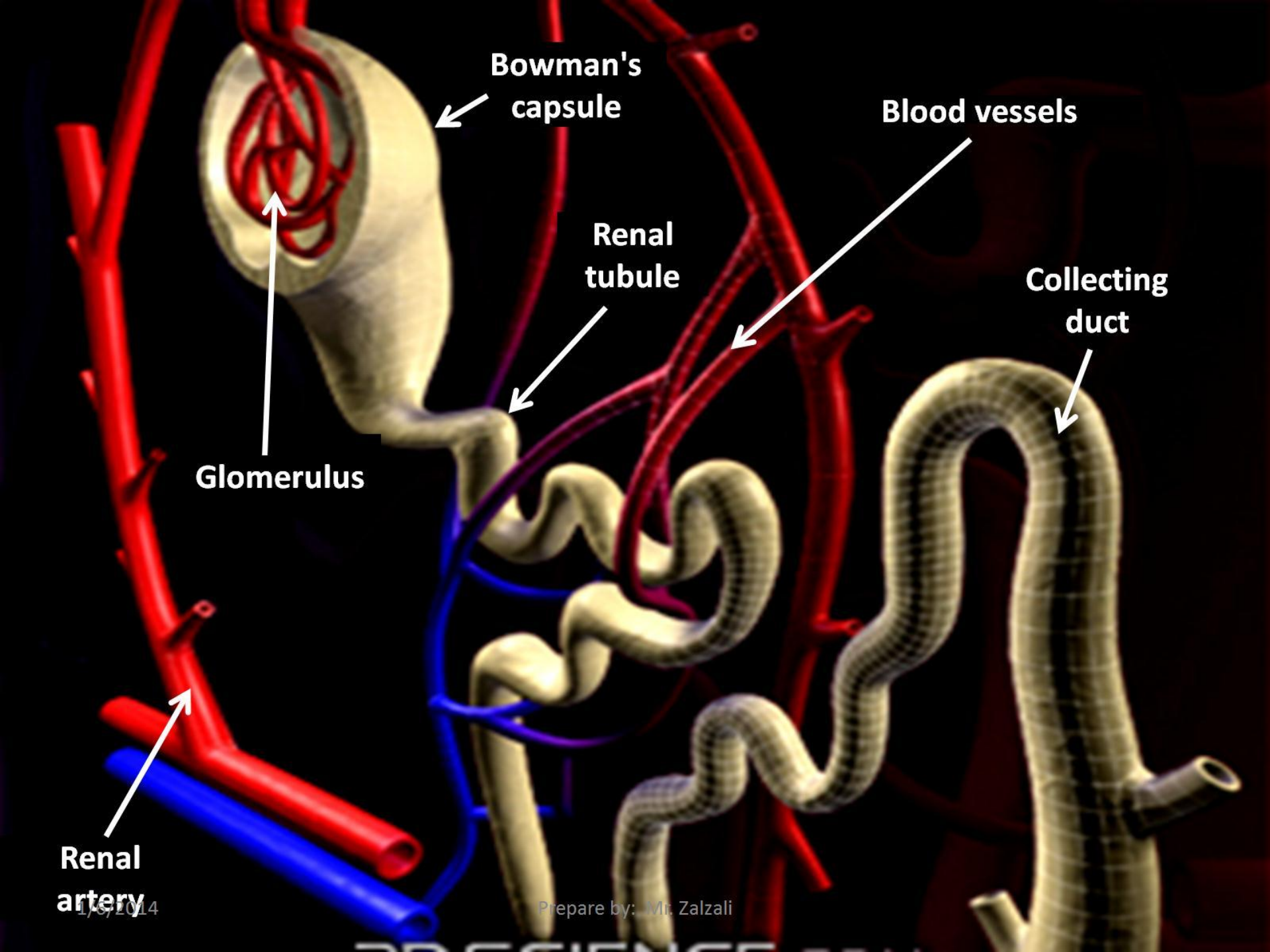
Excretion

Cross – section through the kidneys:



Kidneys and nephron




Bowman's capsule
Blood vessels
Renal tubule
Collecting duct
Glomerulus
Renal artery

Kidneys and nephron

→ **Nephron :**

→ Microscopic filtering units in kidneys

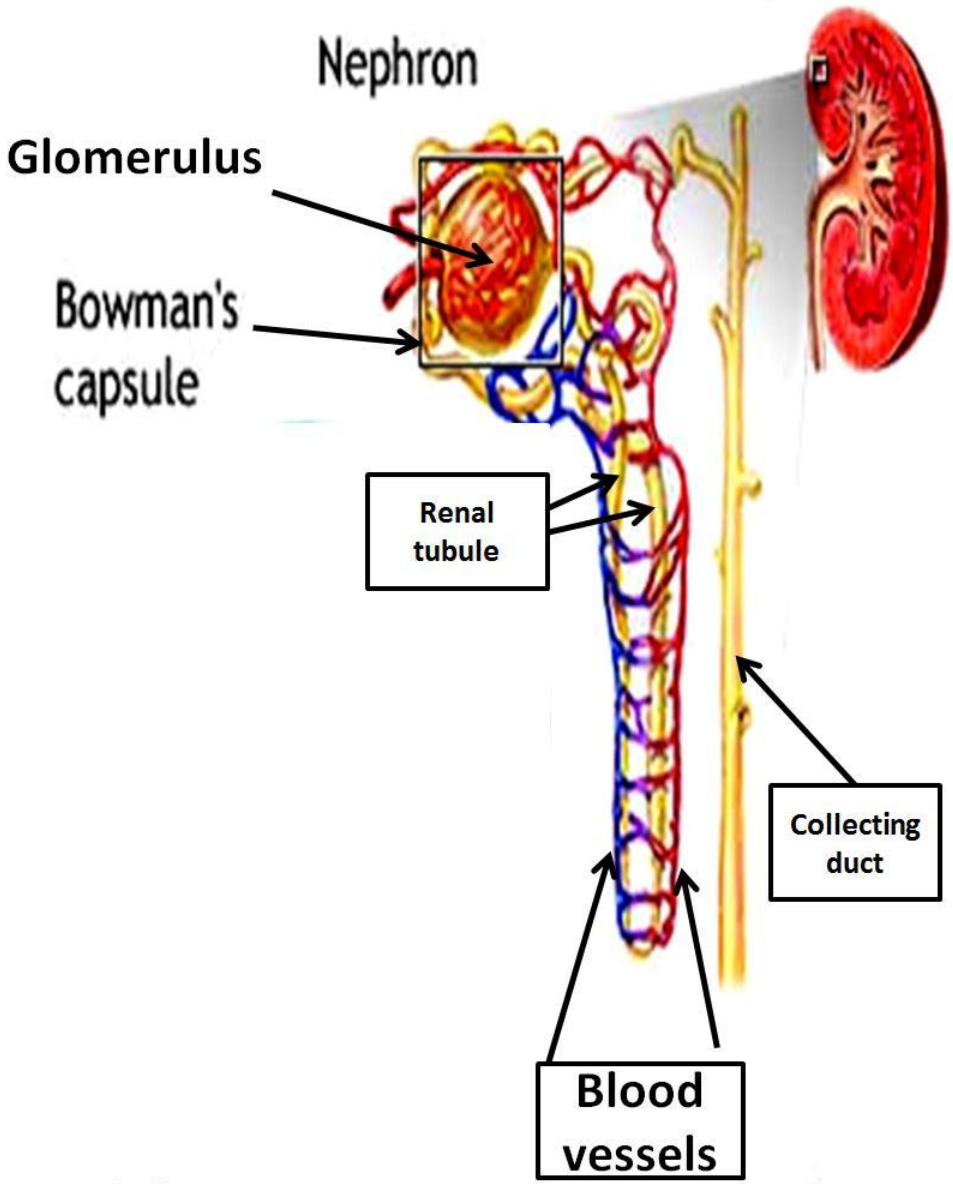
→ **Nephron consists of 4 parts:**

→ 1-glomerulus

→ 2-Bowman's capsule

→ 3-Renal tubule

→ 4-collecting duct



Kidneys and nephron

→1-Bowman's capsule:

→A cup – shaped structure in which Glomerulus filters blood

→2-Glomerulus:

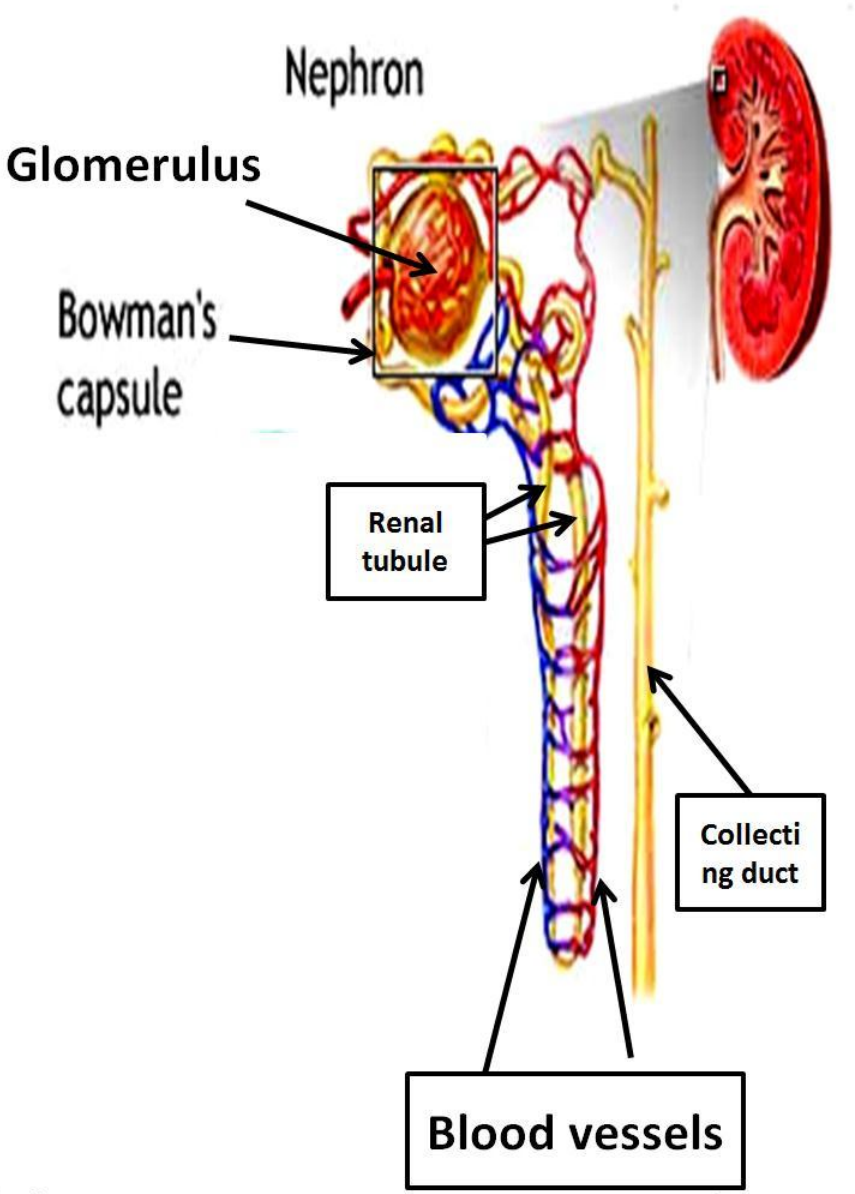
→Bed of extensive network of capillaries embedded into Bowmans capsule to allow diffusion of small molecules into the capsule.

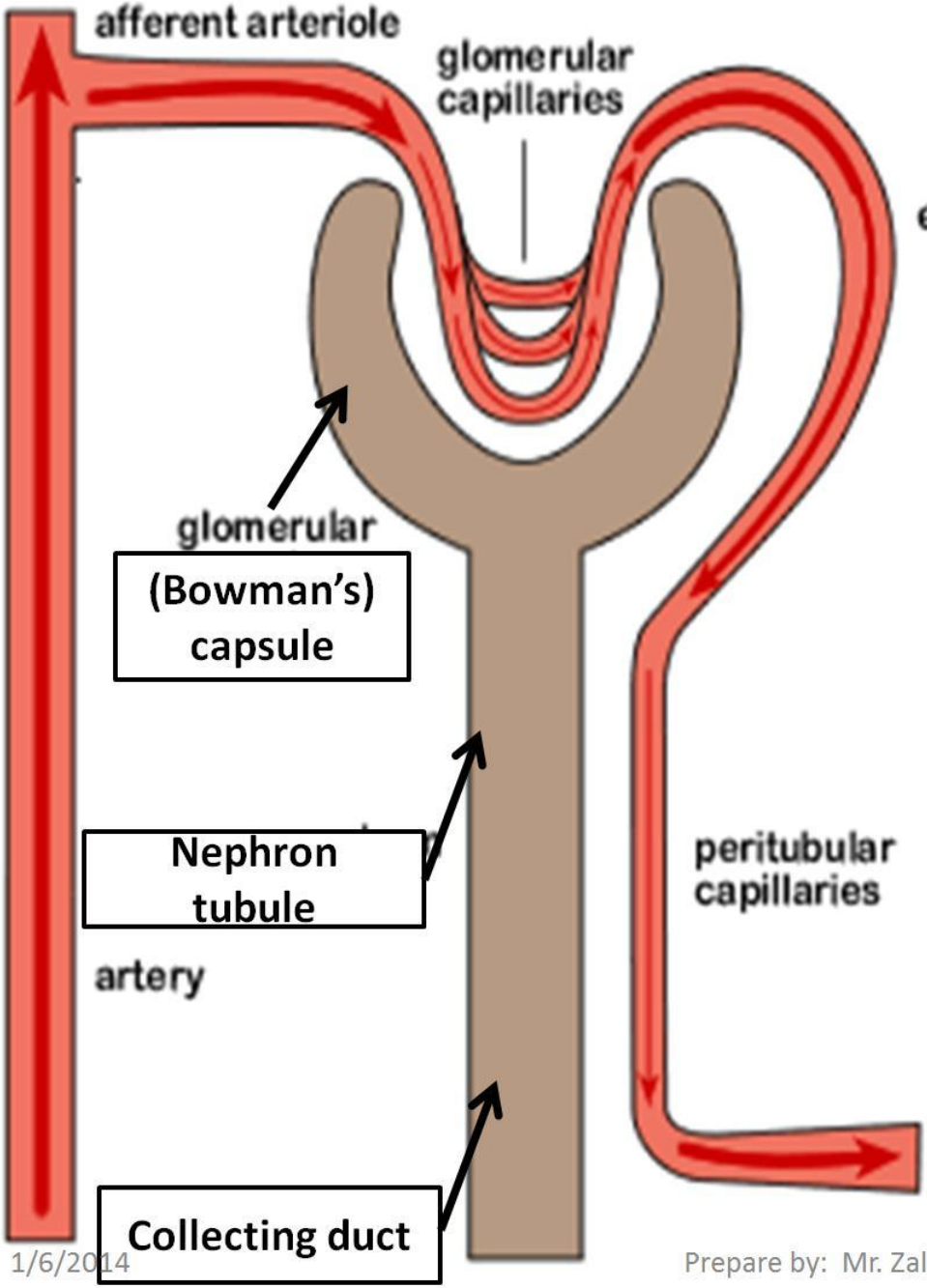
→3- Renal tubule:

→Tiny folded tube surrounded by many capillaries to allow reabsorption to take place

→4-Collecting duct:

→Carries urine to the pelvis then to ureter





3 Major Processes in Nephrons

- filtration
- reabsorption
- secretion

→Three main processes take place in a nephron:

→1-filtration

→2-reabsorption

→3-secretion

→What substances are allowed to diffuse from blood in Glomerulus into the Bowmans capsule?

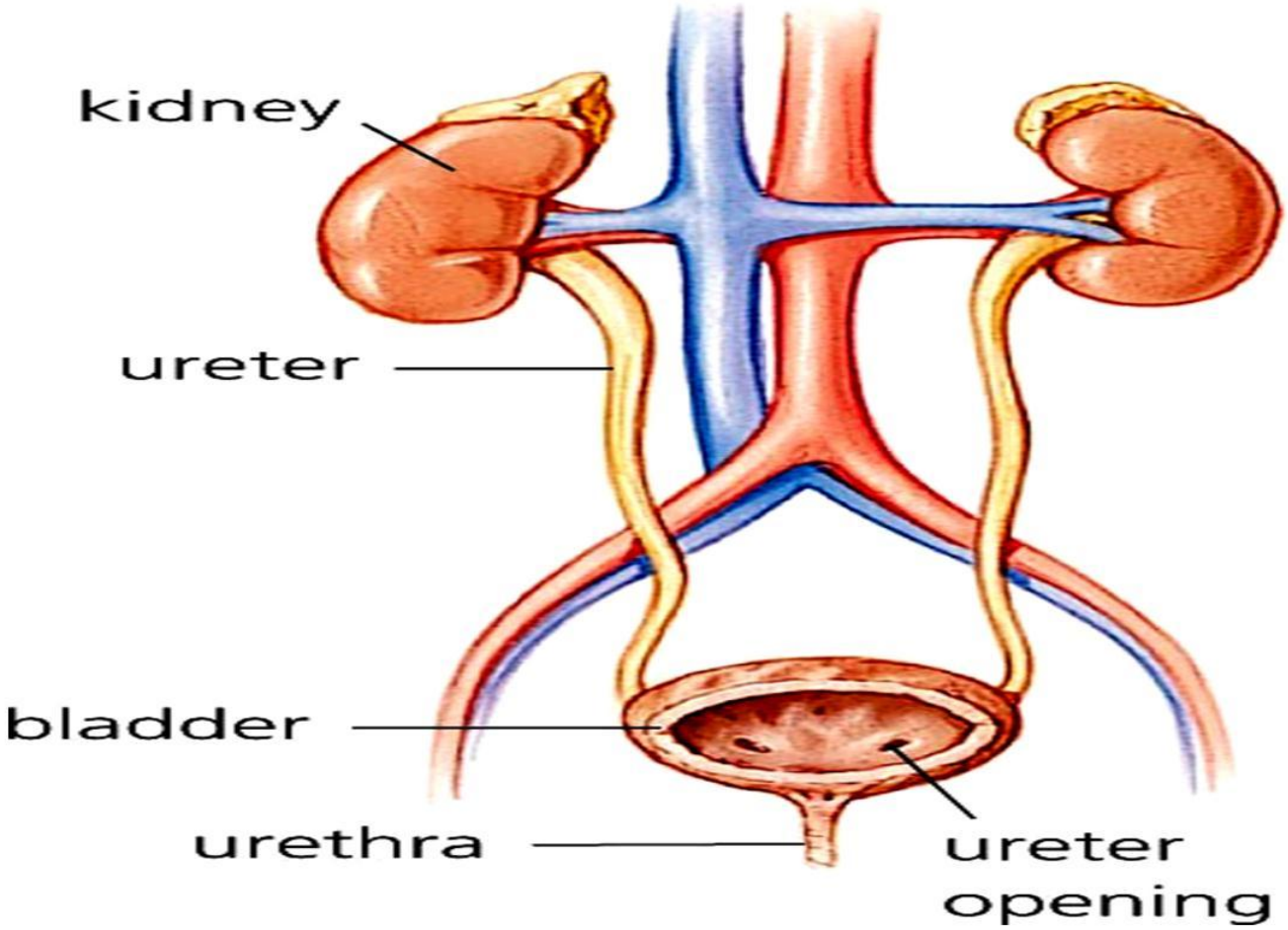
→Only small, tiny molecules can diffuse into Bowmans capsule to form the filtrate, these molecules include : water, glucose , amino acids , fatty acids,, mineral salts and toxic urea

→But large molecules remain in blood stream and cannot diffuse into the capsule as large proteins, white blood cells and RBC's

→All collecting ducts in the kidneys collect the urine (urea – water – salts) and empty in the ureter.

→Ureter carries the urine to urinary bladder where it will be stored

→Urine is excreted outside the body though urethra



Kidney disorders:

→ Kidney failure:

→ If one kidney fails to function and to filter blood from toxic and nitrogenous metabolic wastes, the other kidney will do the work of both.

→ Main causes :

→ 1- Bacterial or viral infection

→ 2- Diabetes over long period of time

→ 3- High blood pressure

→ 4- Sudden drop in blood pressure for more than 2 weeks

→ 5- Accidents

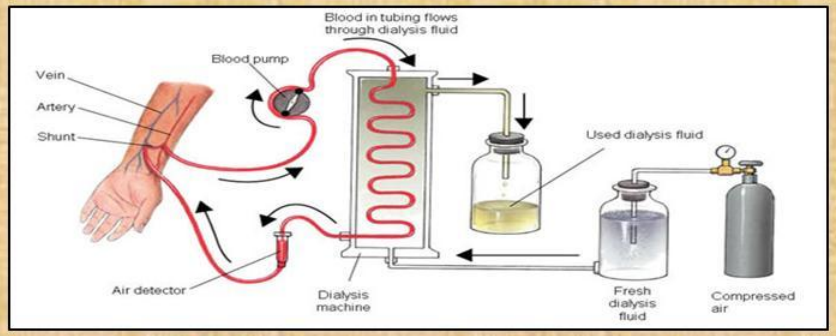
→ 6- Drugs (as alcohol, some medicines)

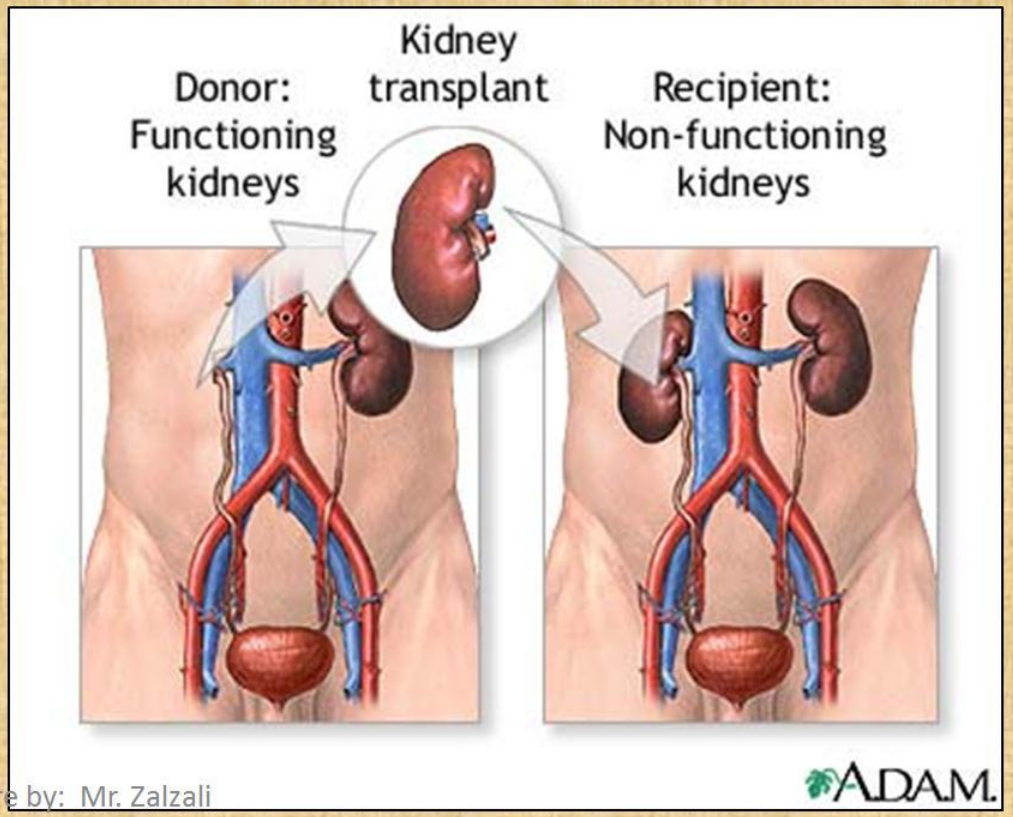
Kidney disorders:

→ Possible treatments:

→ 1-Kidney dialysis

→ 2-kidney transplant





Kidney disorders:

→ 1-Kidney dialysis

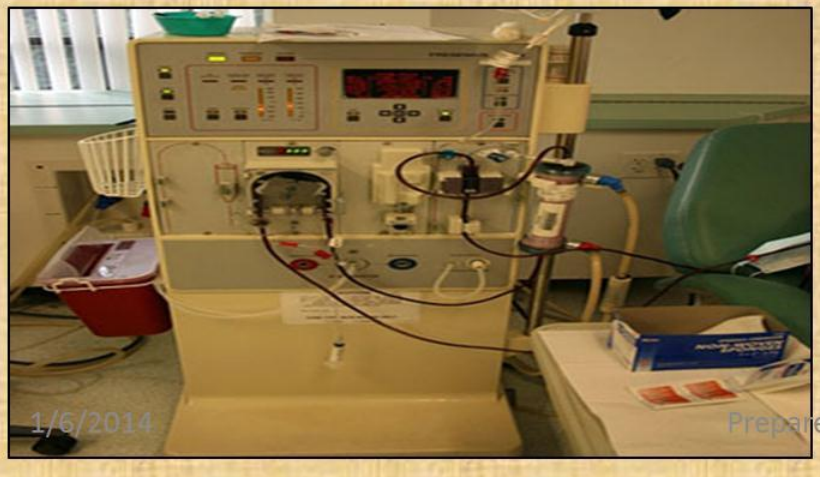
→ Main advantage:

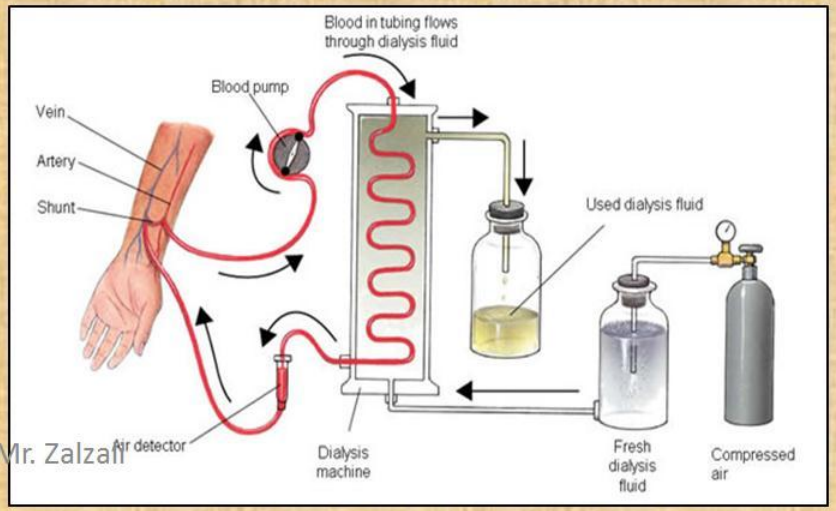
→ Affordable treatment for every patient, as all hospitals can offer this machine

→ Main disadvantage:

→ Temporary solution until finding a donor with matching tissues, blood and immune system.

→ Patient should be connected to dialysis machine at least 2-3 hours twice a weak.





Kidney disorders:

→ 1-Kidney transplant

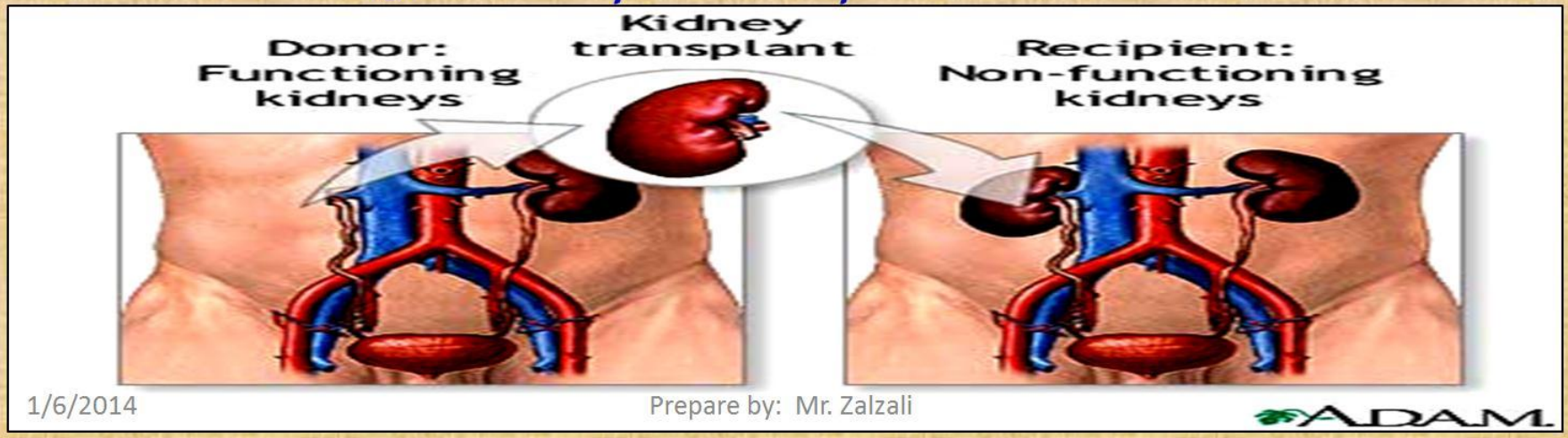
→ Main advantage:

→ A permanent solution for kidney failure and if the new transplanted kidney is not rejected in patient's body → they will live healthy life later on.

→ Main disadvantage:

→ Rejection of the new transplanted kidney by the patient immune system.

→ Costly and expensive procedure

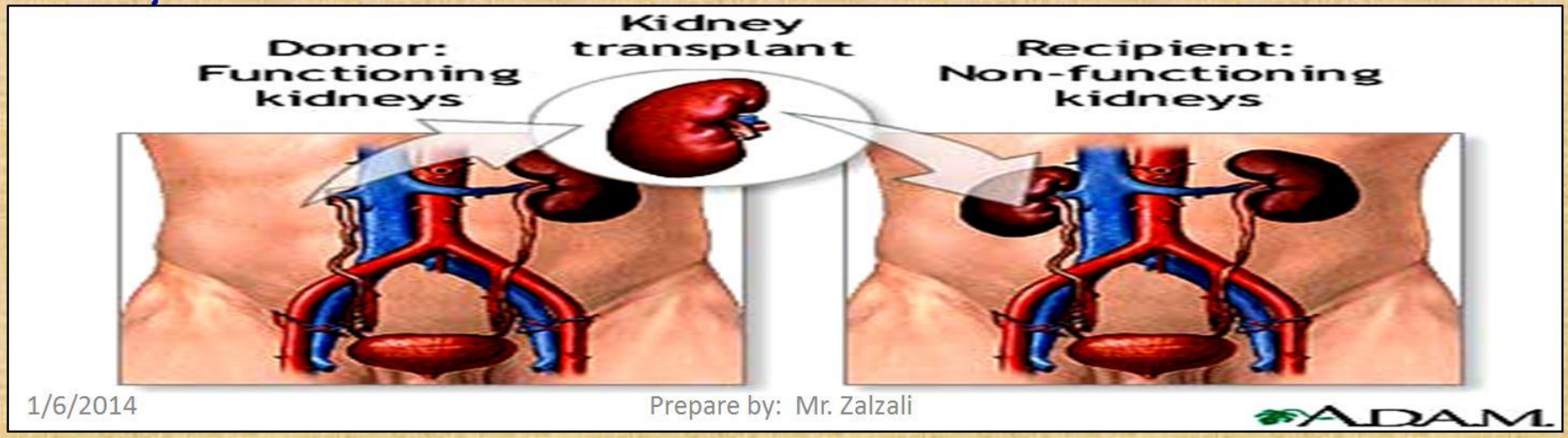


Kidney disorders:

→ How to overcome rejection problem?

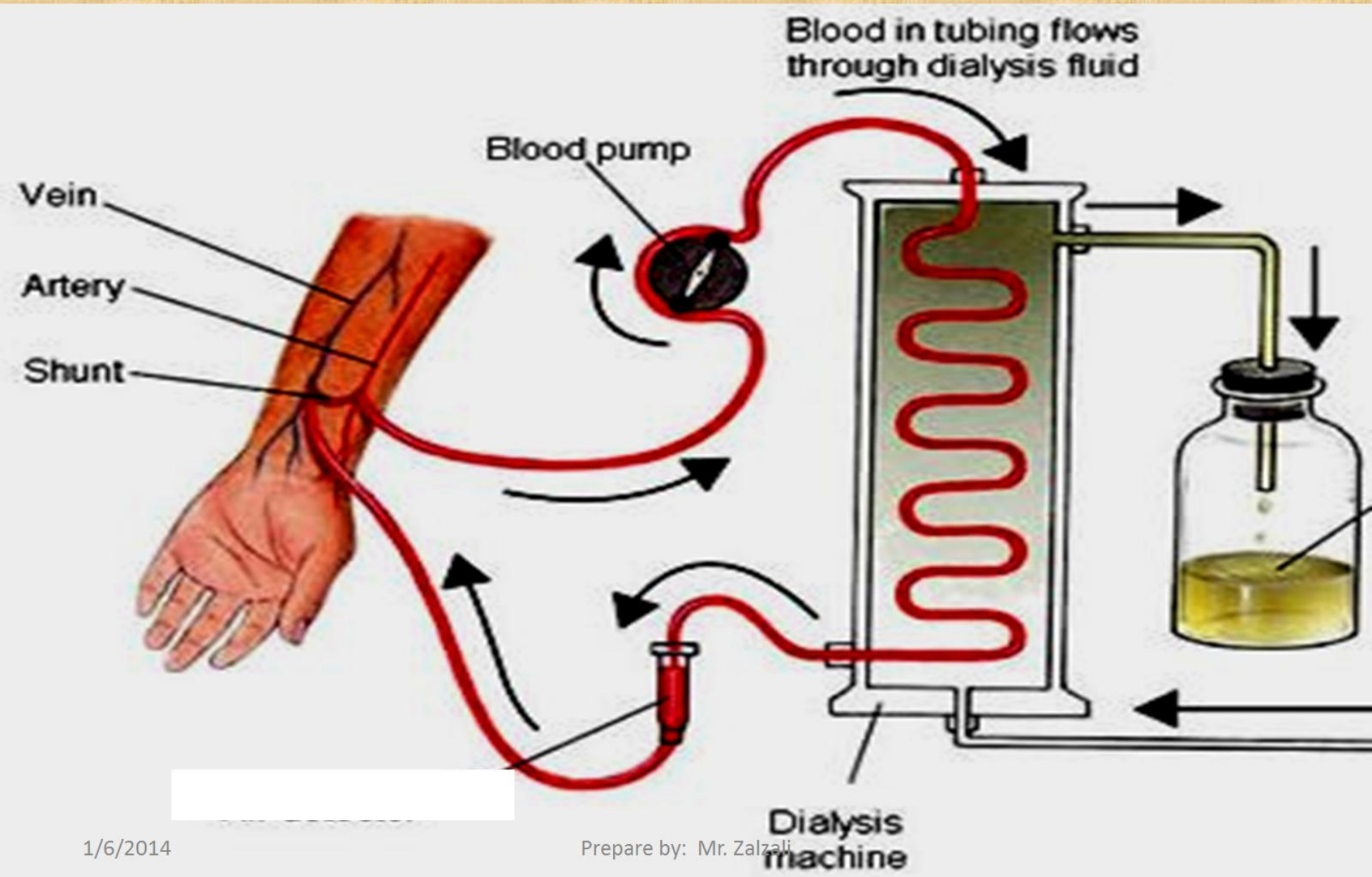
→ 1- patient will be given drugs called immunosuppressive to minimize the action of WBCs so they don't attack the new organ.

→ 2-the donor should be a close relative to the patient so the antigens on cells match and reduce the risk of rejection.



Excretion

→Kidney dialysis machine:



Excretion

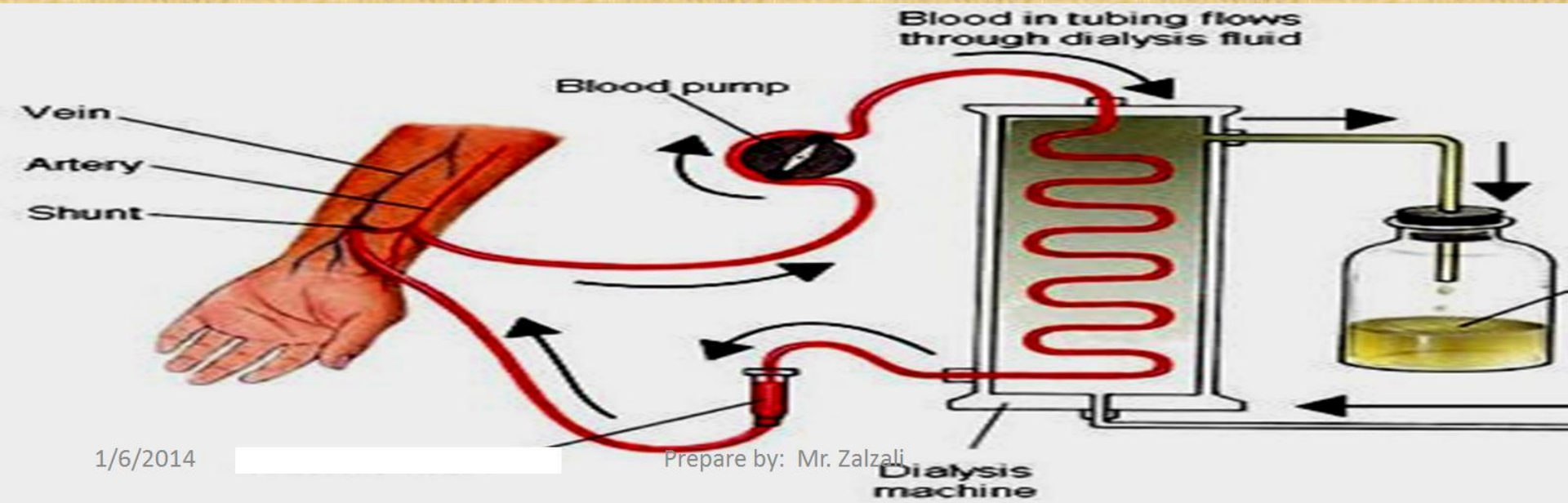
→ Kidney dialysis machine:

→ Made up of :

→ 1-long folded dialysis tube

→ Long to increase surface area for faster diffusion of toxic and unwanted wastes.

→ Semipermeable to allow small molecule to diffuse out of the blood



Excretion

→Kidney dialysis machine:

→2- a solution contains:

→Warm water →same as body temperature and same concentration as in blood stream

→Salts →same as in blood stream

→Glucose sugar : same concentration as blood stream