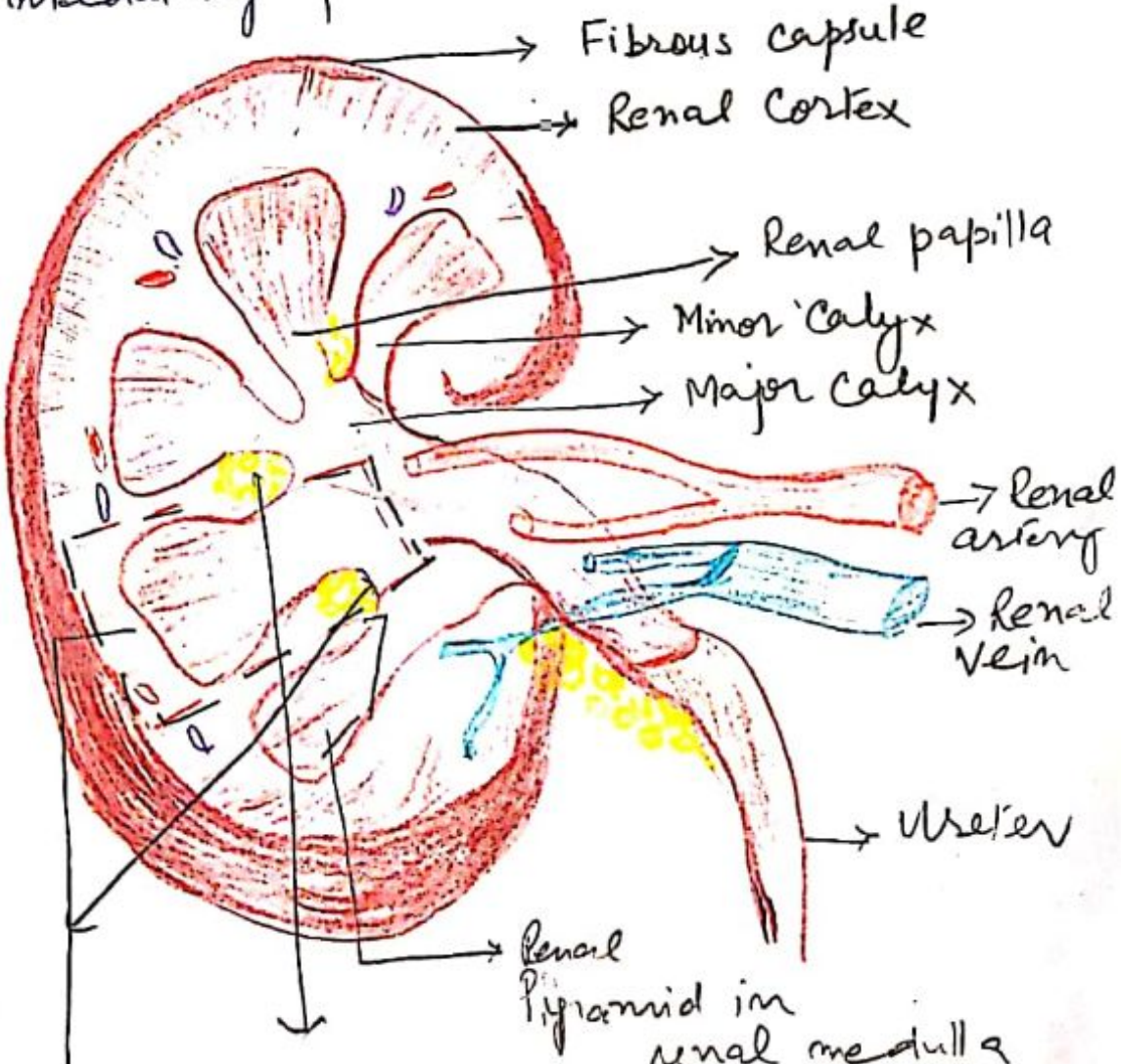
Urinary System

The Main Organs of Urinary system are
- two kidneys : one on the left side another on the right side

Shape: Kidney is bean shaped. On the top or head of kidney is a gland called Supra-renal gland (adrenal gha gland)

Anatomy: Kidney consists of outer cortex and inner medullary portion as shown in diagram:



Internal anatomy of kidneys

Renal Circulation

Kidney is rich in blood supply through renal artery and renal veins.

Supply through Renal artery
& return through renal veins.

Each divisions of artery further branches (arterioles) passes between pyramids as interlobar arteries.

These arteries give off afferent vessels (as shown in diagram of nephron)

→ Just entering the glomerulus the afferent vessels contains juxta glomerular cells.

→ These cells secretes Renin which controls renal blood flow and through angiotensin (renin-angiotensin system) regulates the blood flow.

Efferent arterioles: The vessels coming out of glomerulus is efferent arterioles.

The efferent arteri arterioles breaks up into a capillary network around the tubules.

a Tuft (small bunch of Blood Vessels)

Renal circulation has following characteristics.

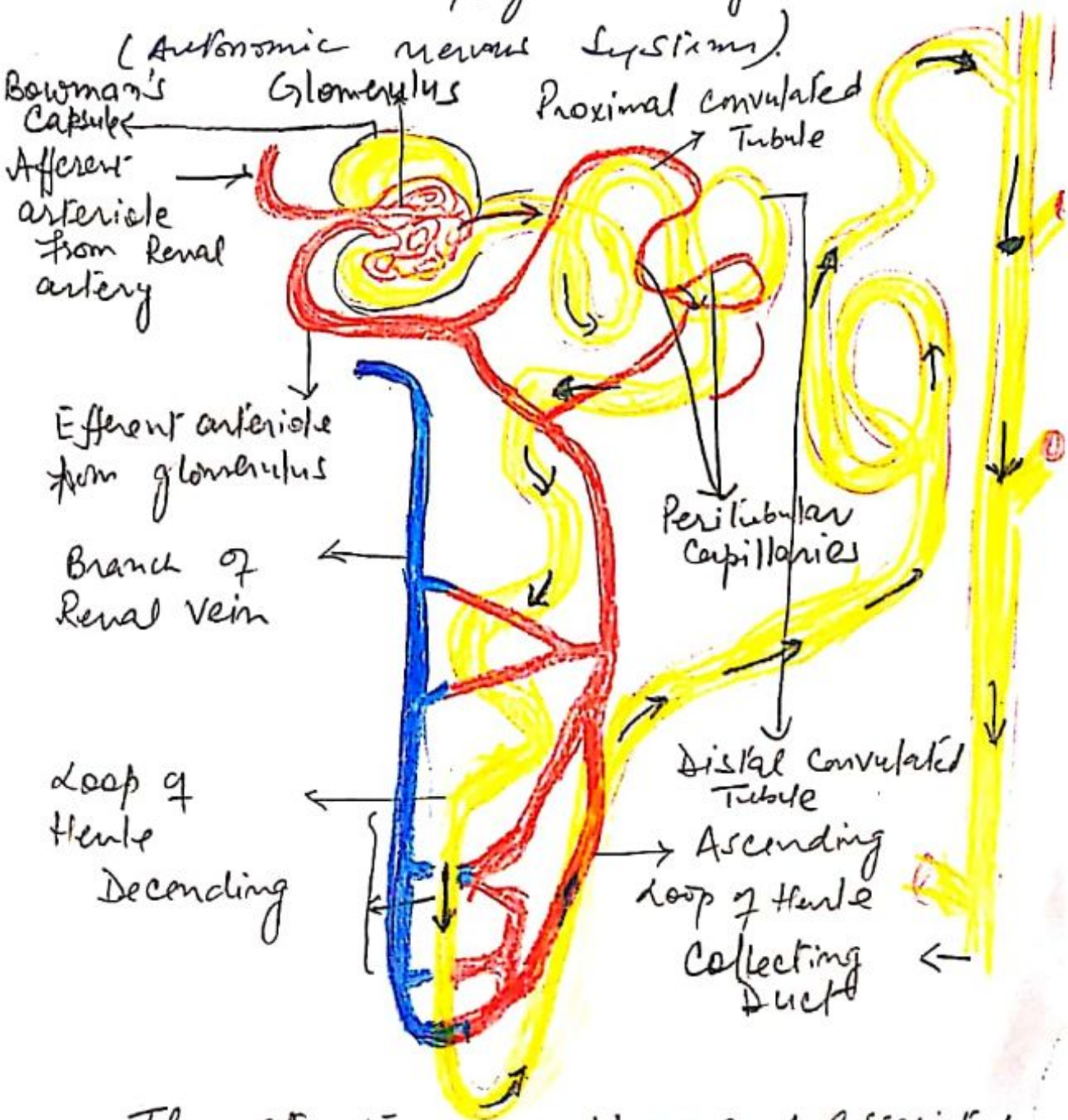
Renal portal system: Blood has to circulate through the glomeruli and also through the peritubular capillaries (surrounding tubules) capillaries reabsorb.

2. Through the glomeruli filtration and the circulating blood under pass.

3 Pressure in renal vessels runs higher than in systemic peritubular capillaries.

4. The rate and volume of blood flow is very ~~high~~ high.

The nerve supply is through A.N.S. (Autonomic nervous system)



The structure of nephron and associated Blood vessels.

4. The rate and volume of blood flow is also very high.

Nephron :

(i) Nephron is structural and functional unit of kidney – Ufar means, each kidney is made of 1 million nephrons.

- Normally all are not working / functioning.

Parts of Nephron : Ref. diagram

(i) Bowman's capsule,

(ii) Glomerulus

(iii) Proximal convulated tubule (Tube)
पहला / first मुड़ी हुई
see diagram

So the पहली (first) मुड़ी (Twisted) tube is Proximal convulated tubule

(iv) Loop of Henle (Slightly thinner than Proximal and distal convulated tubule)

(v) Distal convulated tubule

(vi) Collecting duct.

Physiology of Urine formation:

1. Glomerular filteration 2. Tubular reabsorption and Tubular secretion.

1. Glomerular filteration: It is the filteration of body fluids & Solutes from blood out of / through glomerular capillaries into the Bowman's capsule.

- All substances from the blood are filtered out except Proteins, cells and colloids.

Glomerular filteration depends on three main pressures. One pressure promotes filteration and Two pressures oppose filteration:

1. Glomerular blood hydrostatic pressure (GBHP). is the BP in glomerular capillaries,
= 55 mm·Hg IT PROMOTES FILTERATION

2. Capillary Hydrostatic Pressure: CHP is hydrostatic pressure exerted against the filteration membrane = 15 mm·Hg It opposes filteration — Back Pressure

3. Blood Colloidal osmotic pressure (BCOP) is due to presence of Protein = 30 mmHg.

Net filteration pressure:
NFP = GBHP − CHP − BCOP
= 55 mmHg − 15 mm Hg − 30 mmHg = 10 mmHg