Anatomy

URINARY SYSTEM

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Urinary system

- *Introduction :*
- *The U. S. Subdivision of urogenital system , which functions in the formation, transport , storage , and excretion of urine.*
- *An animals body is fine-turned machine that relies on numerous metabolic reactions to keep it a live and well. These chemical reactions are of great benefit to the body but also result in many by- products. Some of these by- products are useful to the body and are recycled . Other by-products are of no further use and may actually be harmful substances are called waste products and must be eliminated from the body . Some example of metabolic waste products are :*
- *Carbone dioxide and water from carbohydrate and fat metabolic.*
- *Nitrogenous wastes, urea from protein metabolism.*
- *Bile salts and pigments from red blood cell breack down .*
- *The body has several routes by which wastes products can be eliminated from the body , one of these route is the urinary system which removes the urea, salts, water and other soluble waste products:*

Development of the kidney

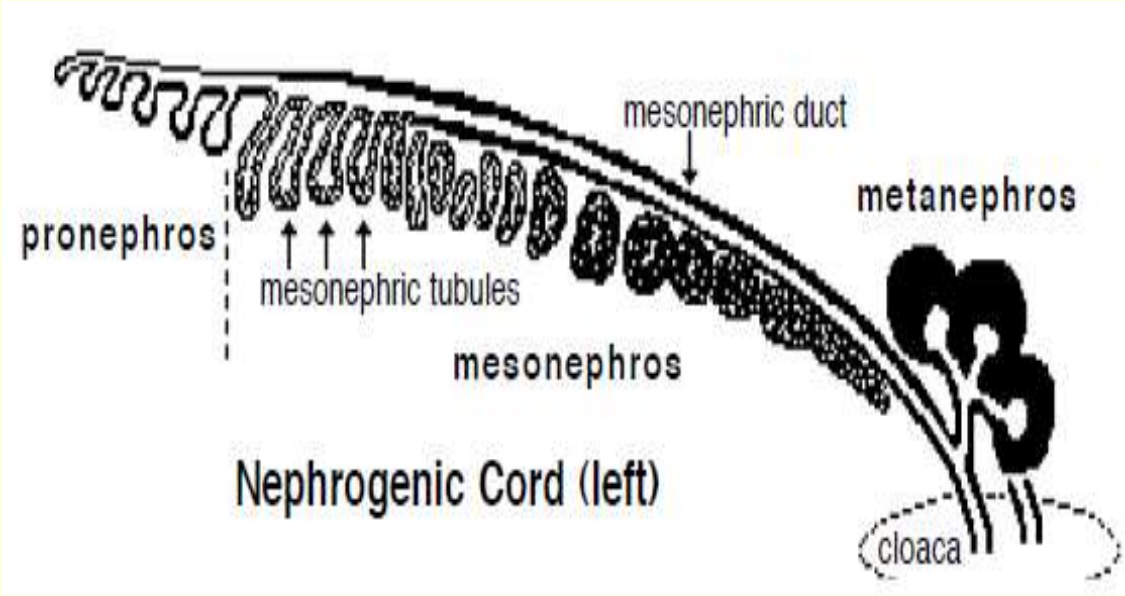
*Both urinary and genital systems are developed from the same origin i**ntermediate** mesoderm*

Bilateraly, three kidneys develop from the nephrogenic cord. They develop in cranial caudal sequence, and are designated .

Pronephros: rudimentary and is not functional,

mesonephros: degenerate most of it tubules (temporary).

metanephros: developed to kidney



Parts of the urinary system:

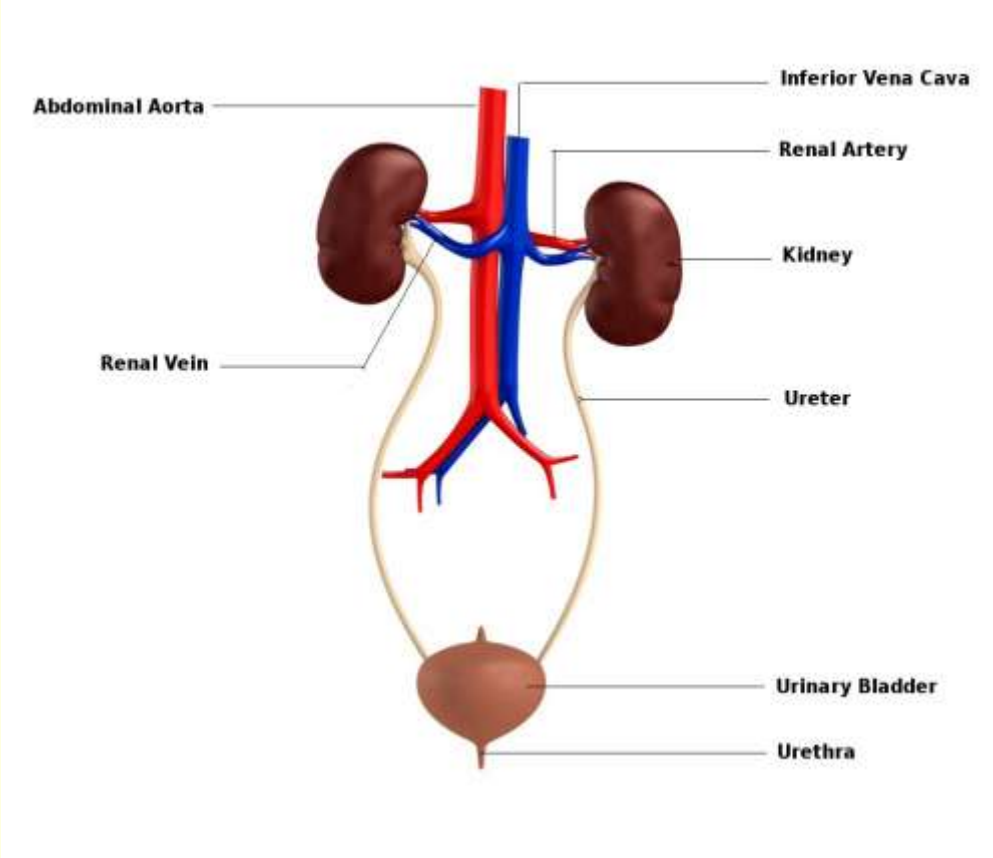
The urinary system includes:

1- kidneys

2- ureters

3- urinary bladder

4- urethra



Kidney:

- Functional organs of the urinary system that filter blood and produce urine. Both kidneys (left and right) are located high in the abdomens lumber region at the level of the thoracolumbar junction. They are retroperitoneal (behind the peritoneum) and against the crura of the diaphragm.
- They are red brown in color.
- Their shape are varies from bean shape to the heart shape only in the bovine is the kidney lobulated .

- Right kidney:
- The more cranial kidney by a half- kidney length. Its cranial end embedded in the renal impression(recess) of the livers caudate lobe, except in the pig.
- Left kidney:
- The more caudal kidney, except in the pig where both kidneys are at the same level.

Kidney:

- The kidney composed of many lobes, each lobe consists of a medullary pyramid capped by cortical tissue. The apex of the pyramid is the renal papilla. Fusion of kidney tissue accounts for the different types of kidneys.

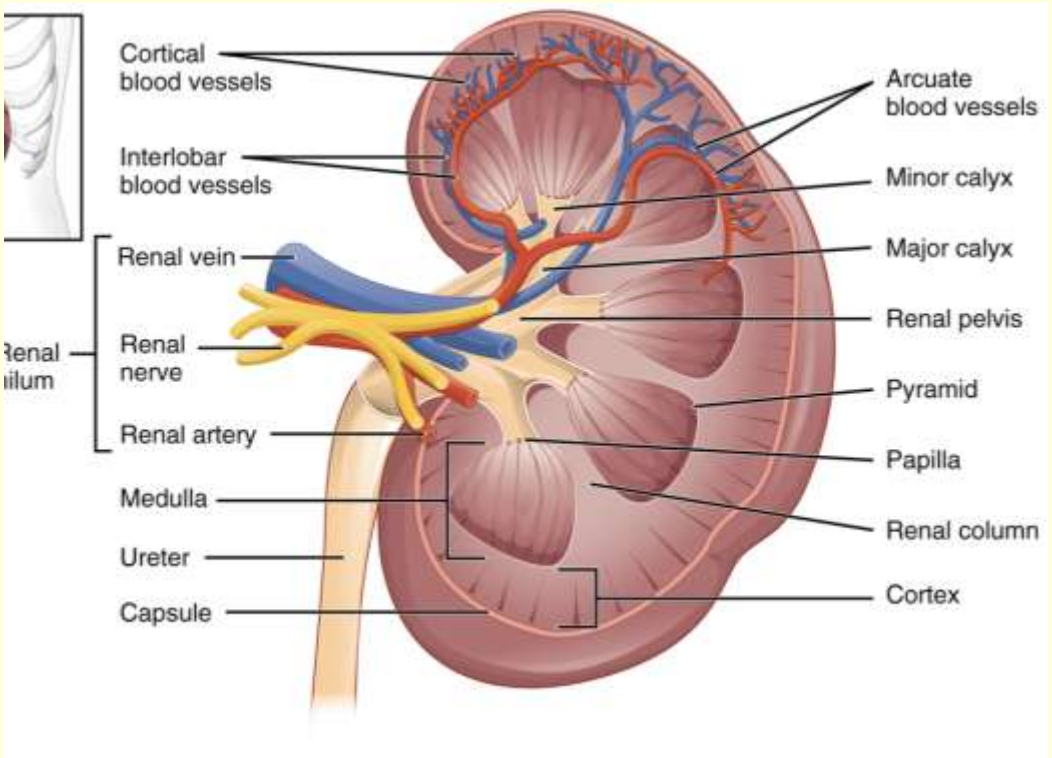
- **Cortex:** the outer layer of the kidney parenchyma beneath the capsule, characterized grossly by its light color and granular appearance. The cortex contains renal corpuscle and the convoluted parts of the renal tubules.

- **Medulla:** the inner layer of the kidney parenchyma, characterized by its striated appearance. It contains collecting ducts and nephric loops.

Lobes: the kidney units, obvious in the ox, but not in the other domestic species.

Renal papilla: the apex of a kidney lobules that drips urine into the proximal end of the ureter. The degree of fusion of the lobes results in individual papillae or a renal crest.

individual papillae: found in the ox and pig results from incomplete fusion of the medullary pyramids.

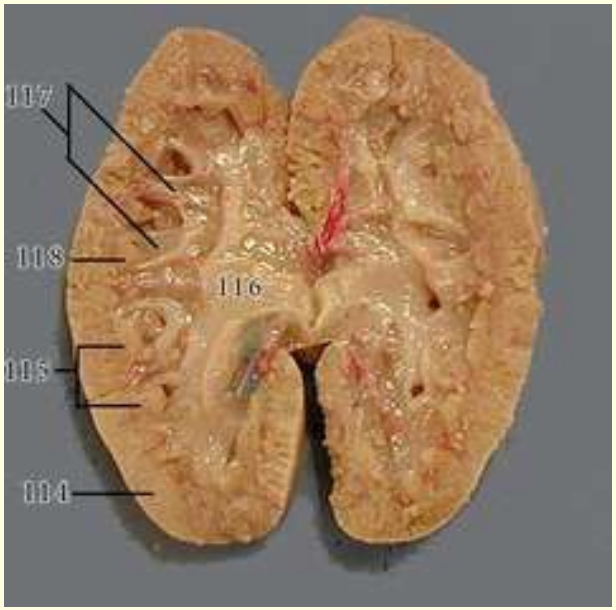


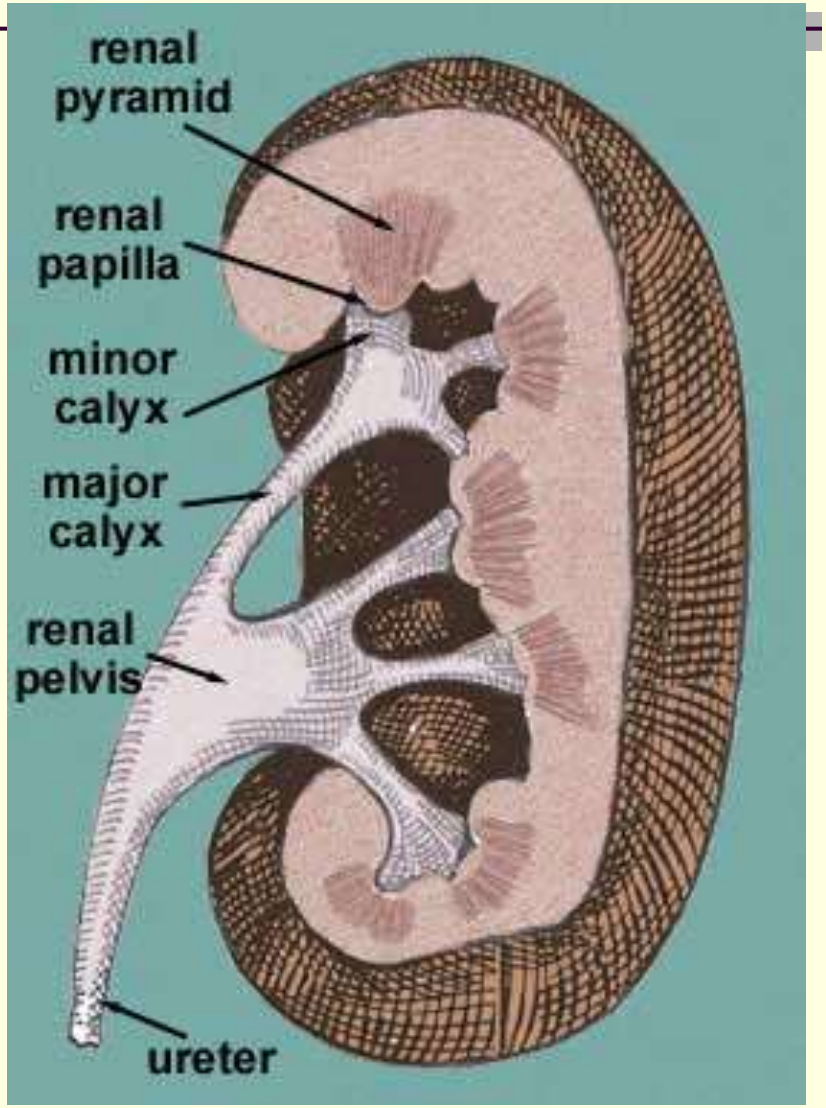
Renal crest: the ridge resulting from complete fusion of the medullary pyramids, found in carnivores, small ruminants and horse.

Proximal end of the ureter: The part of the ureter receiving urine from the renal papillae. Its shape varies depending on the shape.

Renal pelvis: The expanded proximal end of the ureters in kidneys with a renal crest(carnivores, small ruminants and horse) and in pig (which has papillae).

Calyx: the cup- shaped structure receiving urine from individual papillae in the ox and pig. In the ox individual calyces empty into two branches of the ureter some time called major calyces. In the pig, calyces empty into a renal pelvis.





Renal sinus: the potential space occupied by ureter, branches of the renal artery and vein, and lymphatics and nerves entering the kidney.

Renal hilus: the opening into the renal sinus where the ureter and renal vessels enter the kidney.

Animal	papillae	Renal crest	Calyces	Pelvis
Carnivores		+		+
Horse		+		+
Small ruminants		+		+
Ox	+		+	
Pig	+		+	+

Smooth kidney: appearance results from complete fusion of the kidney cortical tissue.

Ex. Carnivores, horse, pig and small ruminants,

Kidney of the dog, goat, sheep are hard to distinguish grossly.

pig: has a smooth kidney due fused cortical tissue, but has unfused medullary tissue resulting in papillae in a smooth kidney. It has no renal crest.

Lobated kidney: found in the ox, resulting from incomplete fusion of kidney lobes. It has calyces and papillae, but no renal pelvis.

Terminal recesses: (horse) the long tube like extensions that collect and carry urine from the kidney poles to the small renal pelvis. Different source consider then either large collecting ducts or diverticulum of the renal pelvis.

Gland in the wall of the horse renal pelvis: secrete mucous which give the horses urine a turbid appearance.