



Lecture title: Anatomy of urinary system.

Lecturer Affiliation:

Summary:

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➤ **Anatomy of urinary system.**

➤ The kidneys, ureters, urinary bladder and urethra are the main components of the urinary system.

➤ Urinary system comprise paired kidneys that form the urine from the blood

➤ **Kidneys:**

➤ Organ as **retroperitoneal structure**, in ventral surface covers by peritoneum (great curvature).

➤ In dogs kidneys located in **retroperitoneal space** ventral to the **thoracolumbar vertebrae's**.

➤ **Right kidney:**

➤ Constantly ventral to the **first 3 lumbar vertebrae** but may reach to the **last thoracic** & enough further forward contacts the liver with **cranial pole**.

➤ Its lies just right of mid line **ventral** to the **hypaxial musculature** of last rib.

➤ Right kidney exposed by elevating **duodenum** & displacing the other loops of intestine toward the animal **left side**

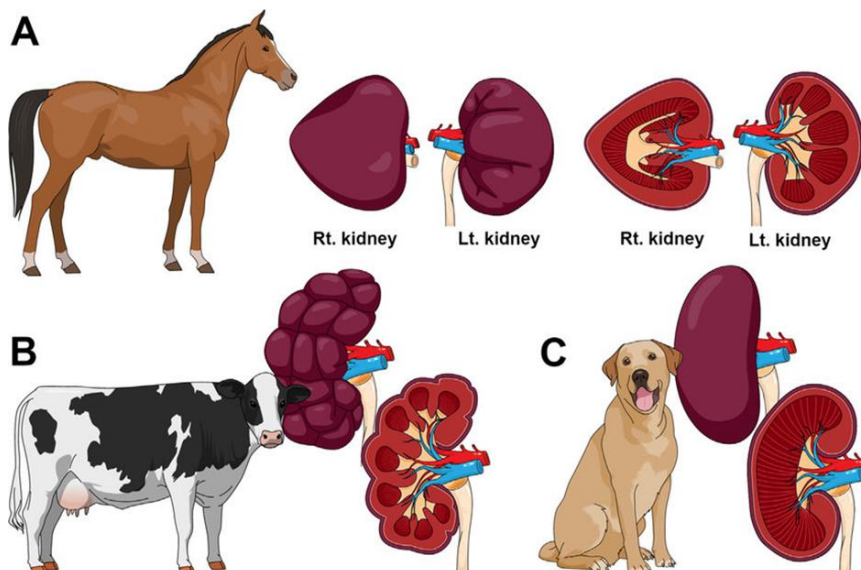
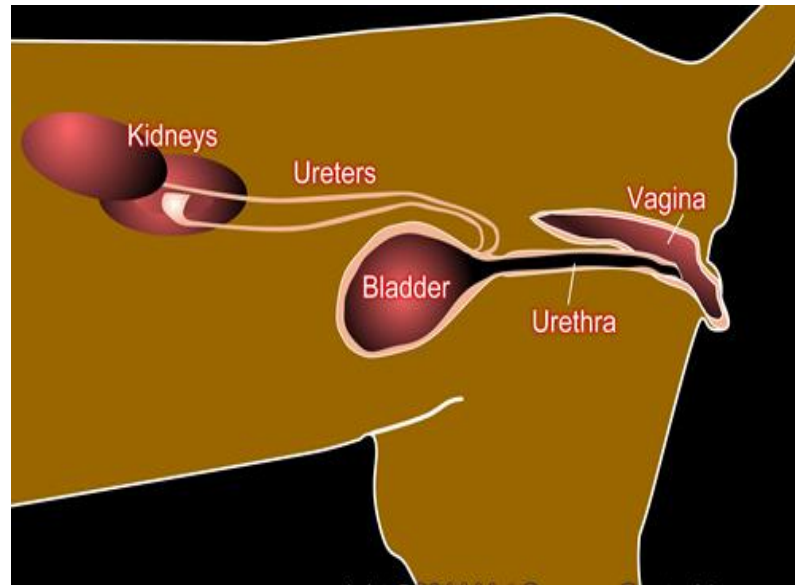
➤

➤ **Left kidney :-**

➤ Its **further caudal** just behind the root of **mesentery**, the position influenced by the degree of gastric distention because its loosely attached by the peritoneum .



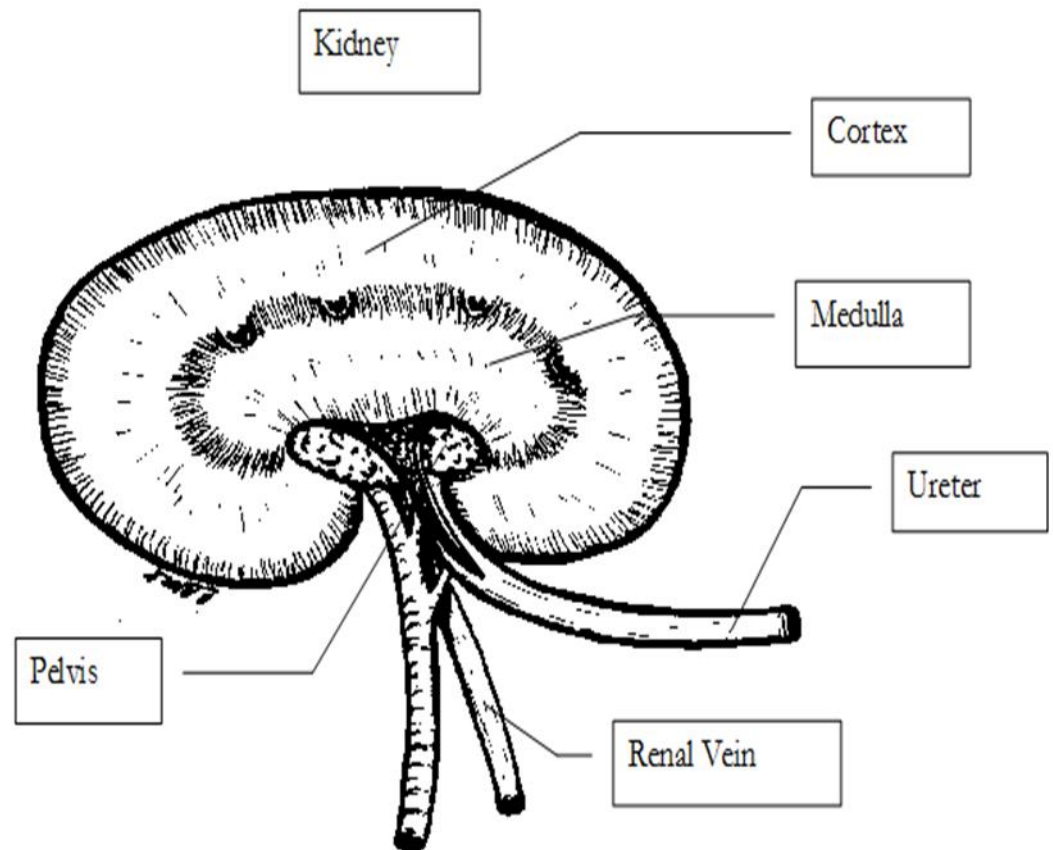
When the left kidney lies beneath the 2nd, 3rd lumbar vertebrae that's mean stomach empty
.L. kidney exposed by elevating mesocolon







Kidneys Anatomy



Kidneys

Renal circulation :

- Blood flow to the kidney approximately (20-25%) of cardiac out put.
- (GFR) determined by measuring urine and plasma concentration of freely filtered by the kidney neither secreted nor absorbed .
- Normal (125ml/min)
- Normal urine daily (1liter/day)



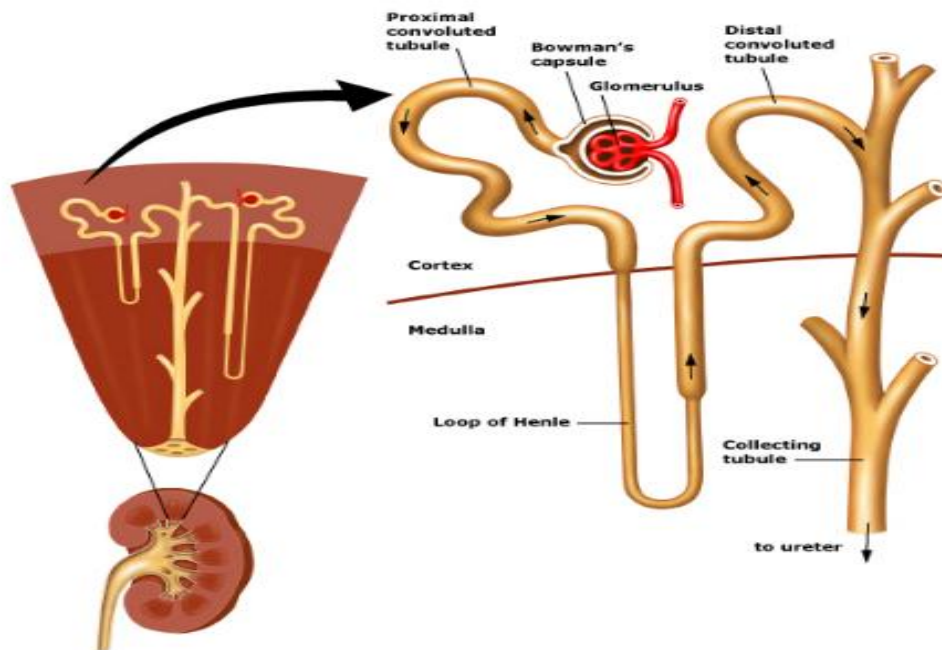
Species	Right K.	Left K.	Shape
Dogs	Th 12,13-L2,3	More caudally	Bean like
Horse	Th 17-L1	Th 16-L3,6	Pyrimde
Small ruminant	Th 13 –L2	L4-L6	Bean like

- **Functions of the Kidneys:**
 - Removal of waste products.
 - Control of blood pressure.
 - Fluid and pH balance.
 - Production of red blood cells.
 - Conversion of vitamin D to its active form.
- In addition, the kidney also functions as an **endocrine organ**.
- **Fibrocytes** in the **cortex** release the hormone **erythropoietin**, which stimulates the formation of red blood cells.
- **Modified fibrocytes** of the **medulla** secrete **prostaglandins** which are able to decrease blood pressure.

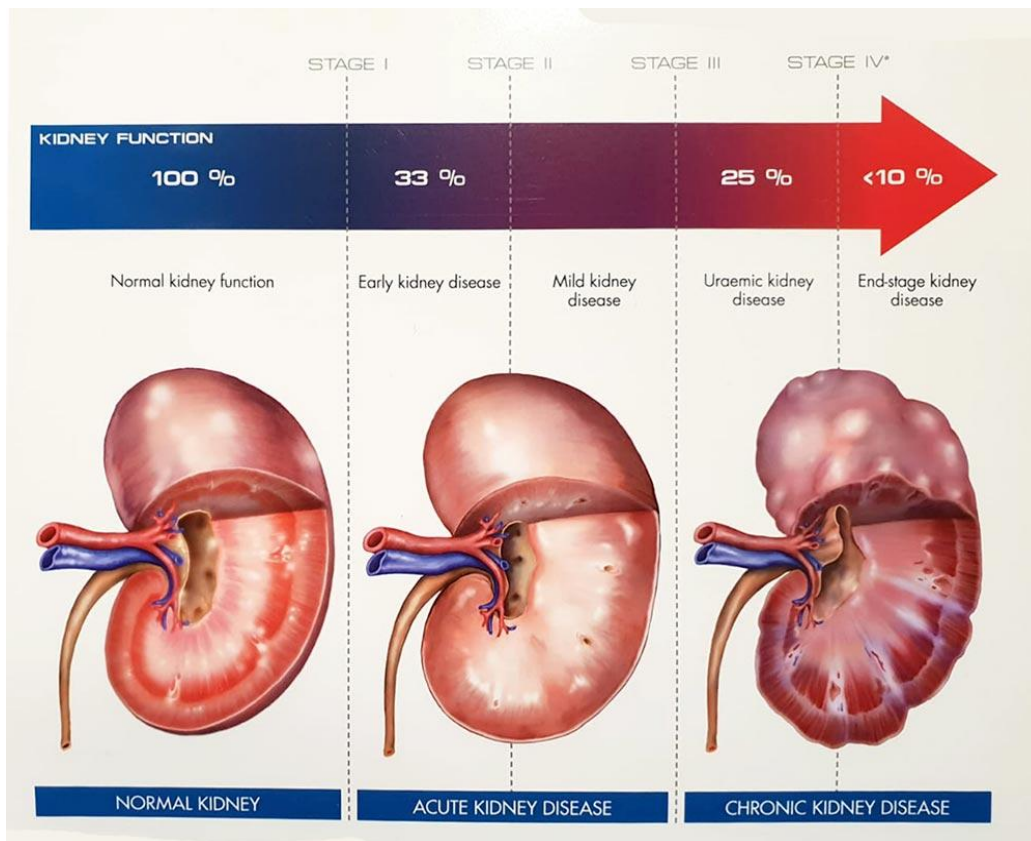
Summary

- The kidney function as a filtration system.
- Reabsorption of substances and helpful molecules back into the blood.
- excretion of waste products.

The kidney function as a waste disposal system. That is the kidney excretes waste products out of the body



- Principles of urinary affections diagnosis
- 1. **Signalmen of the patient** : Many abnormalities of the urinary system can be diagnosed from the **signalment of the patient**, **history** and **physical examination**.
- 2. **History** : include information regarding changes in **water consumption**, **frequency of urination**, **volume of urine produced**, **appearance of urine**, and **behavior of the patient**.
- 3. **Physical examination** should include palpation of the bladder and examination of **external genitalia**.
- **In dogs**, rectal examination should be performed to evaluate the urethra in both sexes and for evaluation of the **prostate in male dogs**.
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- 4. **Rectal examination** in cats may not be feasible due to their small size; however, the kidneys are generally easier to palpate in cats than in dogs.
- 5. **Neurological examination** A full should be performed on all animals with **micturition disorders**.
- Additional diagnostic tests, such as **blood gas analysis for acid-base status**, **blood pressure**, **urine protein: creatinine ratio**
- **Diseases of the urinary system**
- Terms that commonly used in urinary system diseases
- **End- stage kidney (Chronic interstitial nephritis)**: it's used to refer to **all inflammatory** and **ischemic renal diseases** which are **generalized**, **progressive**, **irreversible** and at an advanced stage in development.



- **Urinary incontinence** : loss of voluntary control of micturition which results in frequent or constant involuntary passage of urine this secondary to the **neurological lesion**, **hormonal imbalance** , **congenital abnormalities** and **disease of the bladder**.
- **Uremia** : is the polysystemic toxic syndrome, which develops with the progression of **renal failure** and is characterized by the presence of clinical signs in association with **azotemia**.
- **Clinical signs** :
 - • **Polyuria** and **polydipsia**
 - • **Anorexia** and weight loss
 - • Lethargy
 - • **Pallor** and/or ulceration of mucous membranes
 - • **Vomiting** and, perhaps, **diarrhea**
 - • **Neurologic signs** in some cases

Renal hypoplasia:

- This condition is rare which occurs when normal development of **metanephric** duct ureter is arrested and prevented from reaching **metanephros** (kidney).
- The development of kidney arrested, this is deficiency in the **total nephron population**
- **Renal dysplasia**
- presence of abnormal nephron

Supernumerary Kidney



➤ :if the 2 ureteric bud grow from the same mesonephric duct results supernumerary

Non-ascent of kidney:

➤ this can affect one or both kidney. This kidney remains in its **primary pelvic position**

Renal ectopia

➤ one or both kidneys may be unusual position, such kidney rarely produce signs of illness.

➤ This may be found during abdominal surgery undertaken for unrelated reason.

➤ They also observed during routine **radiographic examination**