VISWASS SCHOOL & COLLEGE OF NURSING

GNM 1ST YEAR

ANATOMY AND PHYSIOLOGY

UNIT-8

THE EXCRETORY SYSTEM

SHORT QUESTIONS AND ANSWERS

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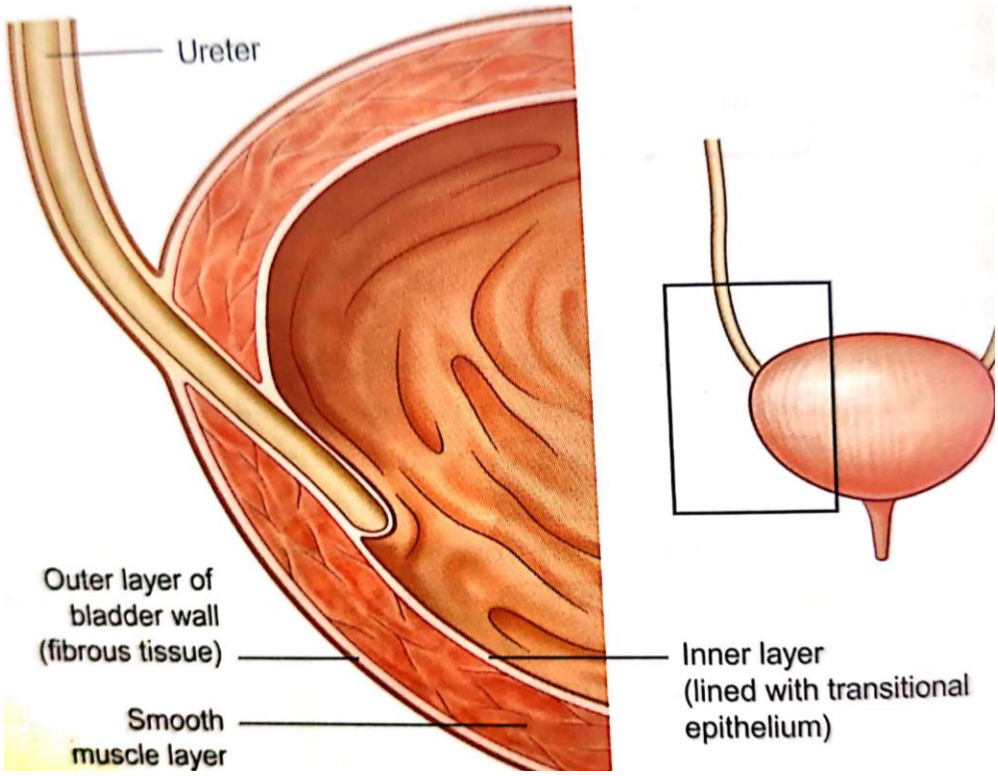
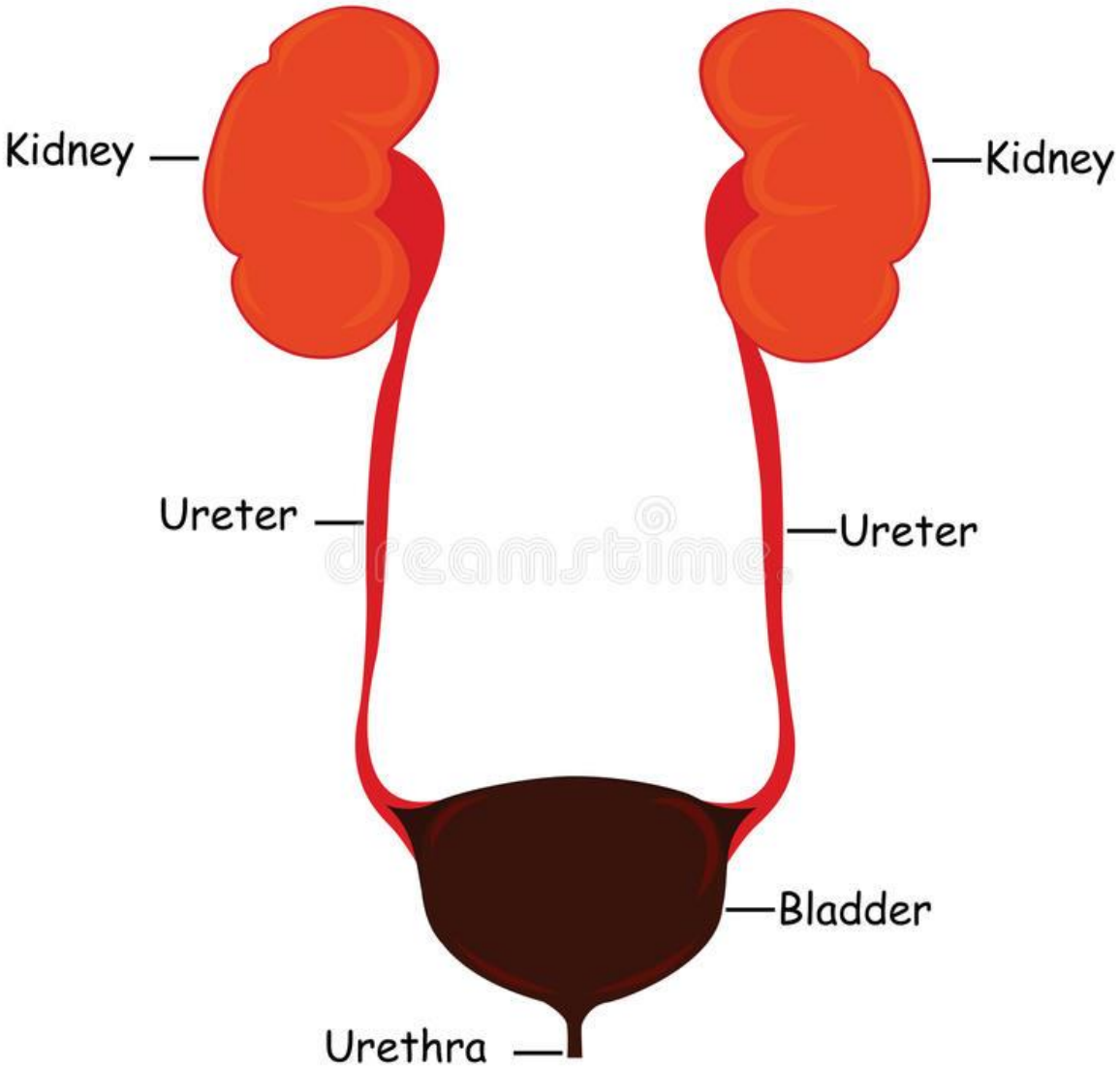
1)Structure and function of ureter.(5)

Ureter

- The ureters carry urine from the kidneys to the urinary bladder.
- They are hollow muscular tubes about 25-30cm long with a diameter of approximately 3mm.
- The ureter is continuous with the funnel-shaped renal pelvis.
- It travels downwards through the abdominal cavity, behind the peritoneum in front of the psoas muscle into the pelvic cavity, and passes obliquely through the posterior wall of the bladder.
- This arrangement means that, as urine accumulates and the pressure in the bladder rises, the ureters are compressed and the openings into the bladder are occluded.
- This prevents backflow (reflux) of urine into the ureters (towards the kidneys) as the bladder fills and also during micturition, when pressure increase as the muscular bladder wall contracts.


Ureter
Outer layer of bladder wall (fibrous tissue)
Smooth muscle layer
Inner layer (lined with transitional epithelium)



Structure

- The walls of the ureters consist of three layers of tissue
  - An outer covering of fibrous connective tissue, continuous with the fibrous capsule of the kidney
  - A middle muscular layer consisting of interacting smooth muscle fibres that form a functional unit round the ureter and an additional outer longitudinal slayer in the lower third
  - An inner layer, the mucosa, composed of transitional epithelium

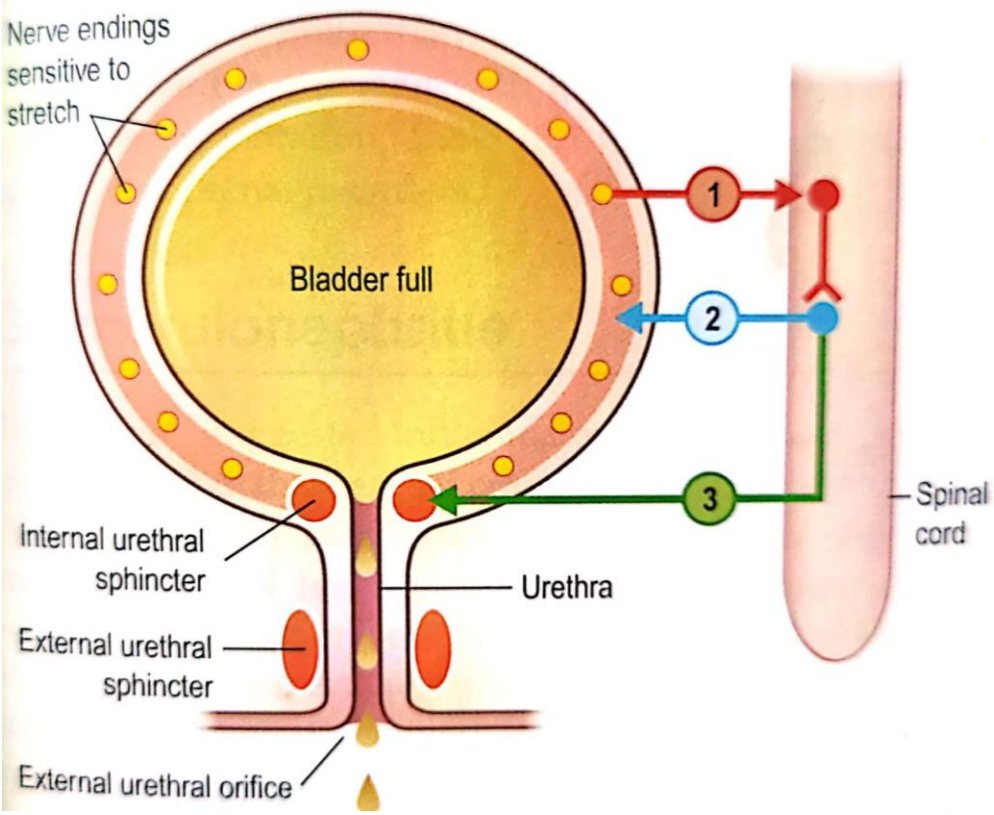
Function

- Peristalsis is an intrinsic property of the smooth muscle layer that propels urine along the ureter.
- Peristaltic waves occur several times per minute, increasing in frequency with the volume of urine produced, and sending little spurts of urine along the ureter towards the bladder.

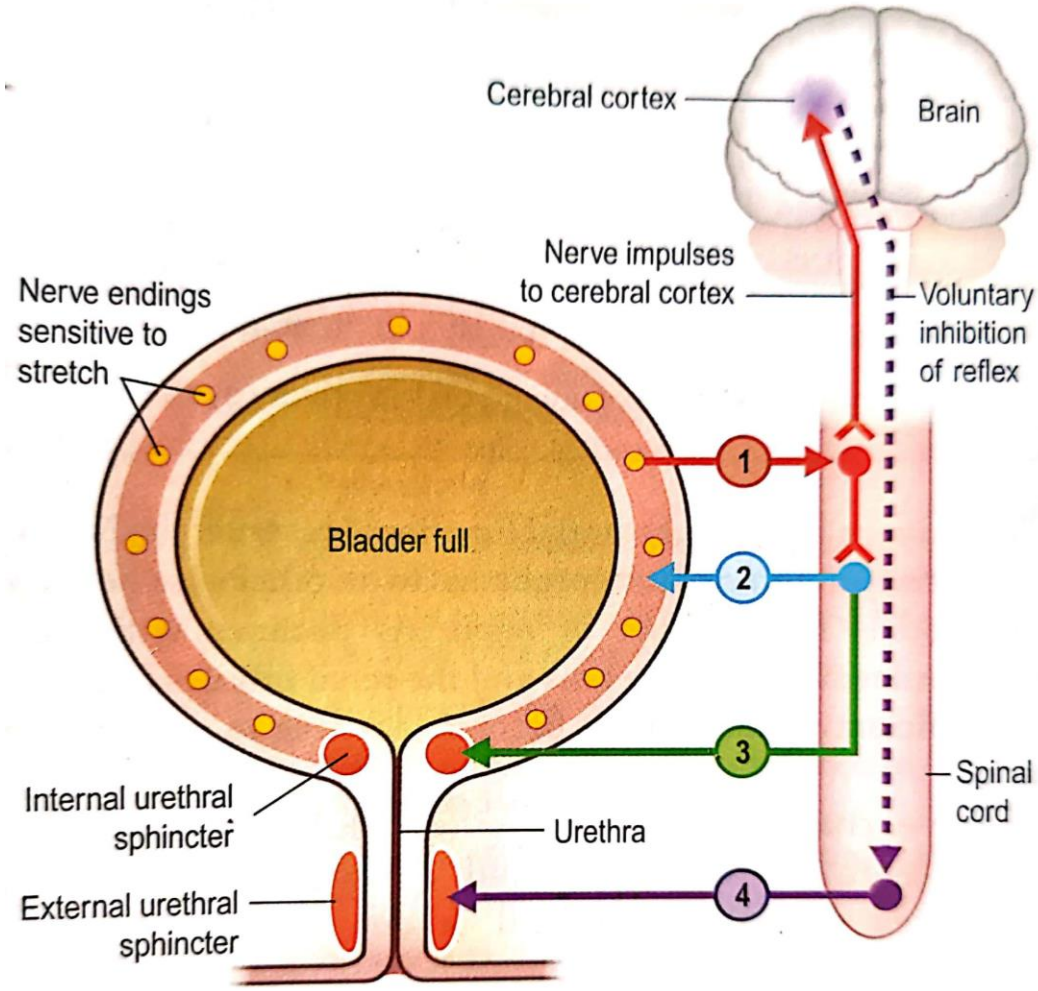
2)Explain about micturition.(5)

Micturition

- In infants, accumulation of urine in the bladder activates stretch receptors in the bladder wall, generating sensory (afferent) impulses that are transmitted to the spinal cord, where a spinal reflux is initiated.
- This stimulates involuntary contraction of the detrusor muscle and relaxation of the internal sphincter, and expels urine from the bladder: this is known as micturition, urination or voiding of urine.



- When bladder control is established, the micturition reflex is still stimulated but sensory impulses also pass upwards to the brain and there is awareness of the need to pass urine as the bladder fills (around 300-400 mL in adults).
- By learned and conscious effort, contraction of the external urethral sphincter and muscles of the pelvic floor can inhibit micturition until it is convenient to pass urine.
- Urination can be assisted by increasing the pressure within the pelvic cavity, achieved by lowering the diaphragm and contracting the abdominal muscles.
- Over-distension of the bladder is extremely painful, and when this occurs there is a tendency for involuntary relaxation of the external sphincter to occur, allowing a small amount of urine to escape, provided there is no mechanical obstruction.
- Incontinence is the voluntary loss of urine after bladder control has been established.



3)Write down medical significance of fluid and electrolyte imbalance?(5)

- **Electrolyte imbalance**, is an abnormality in the concentration of electrolytes in the body.
- Electrolytes play a vital role in maintaining homeostasis in the body. They help to regulate heart and neurological function, fluid balance, oxygen delivery, acid–base balance and much more.
- Electrolyte imbalances can develop by consuming too little or too much electrolyte as well as excreting too little or too much electrolyte.

- Electrolyte disturbances are involved in many disease processes, and are an important part of patient management in medicine.
- The causes, severity, treatment, and outcomes of these disturbances can vastly differ depending on the implicated electrolyte.
- The most serious electrolyte disturbances involve abnormalities in the levels of sodium, potassium or calcium.
- Other electrolyte imbalances are less common and often occur in conjunction with major electrolyte changes.
- The kidney is the most important organ in maintaining appropriate fluid and electrolyte balance, but other factors such as hormonal changes and physiological stress play a role.

Sodium:

- Sodium is the most abundant electrolyte in the blood
- Sodium and its homeostasis in the human body is highly dependent on fluids. The human body is approximately 60% water, a percentage which is also known as total body water.
- The total body water can be divided into two compartments called extracellular fluid (ECF) and intracellular fluid (ICF).
- The majority of the sodium in the body stays in the extracellular fluid compartment. This compartment consists of the fluid surrounding the cells and the fluid inside the blood vessels.
- When evaluating sodium imbalances, both total body water and total body sodium must be considered.

❖ Hypernatremia:

- Hypernatremia means that the concentration of sodium in the blood is too high.
- An individual is considered to be having high sodium at levels above 145 mEq/L of sodium.
- Hypernatremia is not common in individuals with no other health concerns.

- Most individuals with this disorder have either experienced loss of water from diarrhea, altered sense of thirst, inability to consume water, inability of kidneys to make concentrated urine, or increased salt intake.

❖ Hyponatremia

- Hyponatremia means that the concentration of sodium in the blood is too low.
- It is generally defined as a concentration lower than 135 mEq/L.
- This relatively common electrolyte disorder can indicate the presence of a disease process, but in the hospital setting is more often due to administration of hypotonic fluids

Potassium:

- Potassium resides mainly inside the cells of the body, so its concentration in the blood can range anywhere from 3.5 mEq/L to 5 mEq/L.
- The kidneys are responsible for excreting the majority of potassium from the body.
- This means their function is crucial for maintaining a proper balance of potassium in the blood stream.

❖ Hyperkalemia

Hyperkalemia means the concentration of potassium in the blood is too high. This occurs when the concentration of potassium is >5 mEq/L. It can lead to cardiac arrhythmias and even death.

❖ Hypokalemia

- The most common electrolyte disturbance, hypokalemia means that the concentration of potassium is <3.5 mEq/L.
- It often occurs concurrently with low magnesium levels.

Calcium:

- Though calcium is the most plentiful electrolyte in the body, a large percentage of it is used to form the bones.
- It is mainly absorbed and excreted through the GI system.

- The majority of calcium resides extracellularly, and it is crucial for the function of neurons, muscle cells, function of enzymes, and coagulation. The normal range for calcium concentration in the body is 8.5 - 10.5 mg/dL.
- The parathyroid gland is responsible for sensing changes in calcium concentration and regulating the electrolyte with parathyroid hormone.

❖ Hypercalcemia:

Hypercalcemia describes when the concentration of calcium in the blood is too high. This occurs above 10.5 mg/dL

❖ Hypocalcemia:

Hypocalcemia describes when calcium levels are too low in the blood, usually less than 8.5 mg/dL