SNS COLLEGE OF ALLIED HEALTH SCIENCES

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai

DEPARTMENT: ALLIED HEALTH SCIENCES

COURSE NAME: PHYSIOLOGY

Unit: Physiology of Kidney

Topics: Micturition

URETHRA

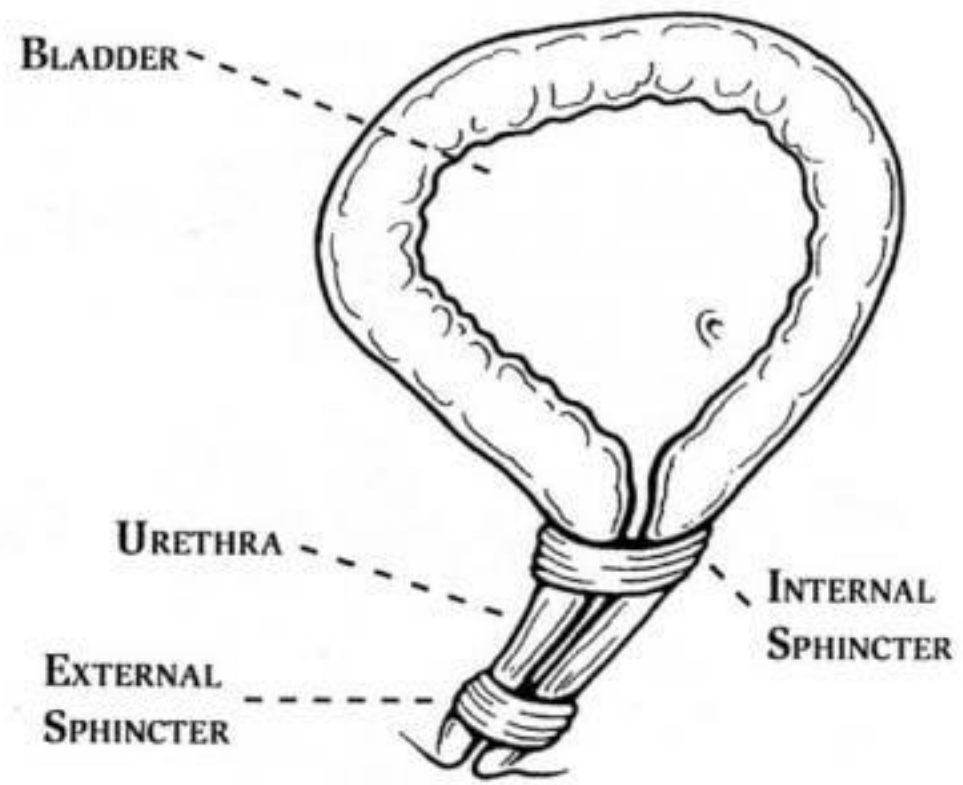
- A Tubular structure emerging from the neck of bladder and opens to the exterior
- It is the outlet of the bladder and eliminates urine to outside

Internal Urethral Sphincter

- It has thickened detrusor muscle
- It is involuntary in control

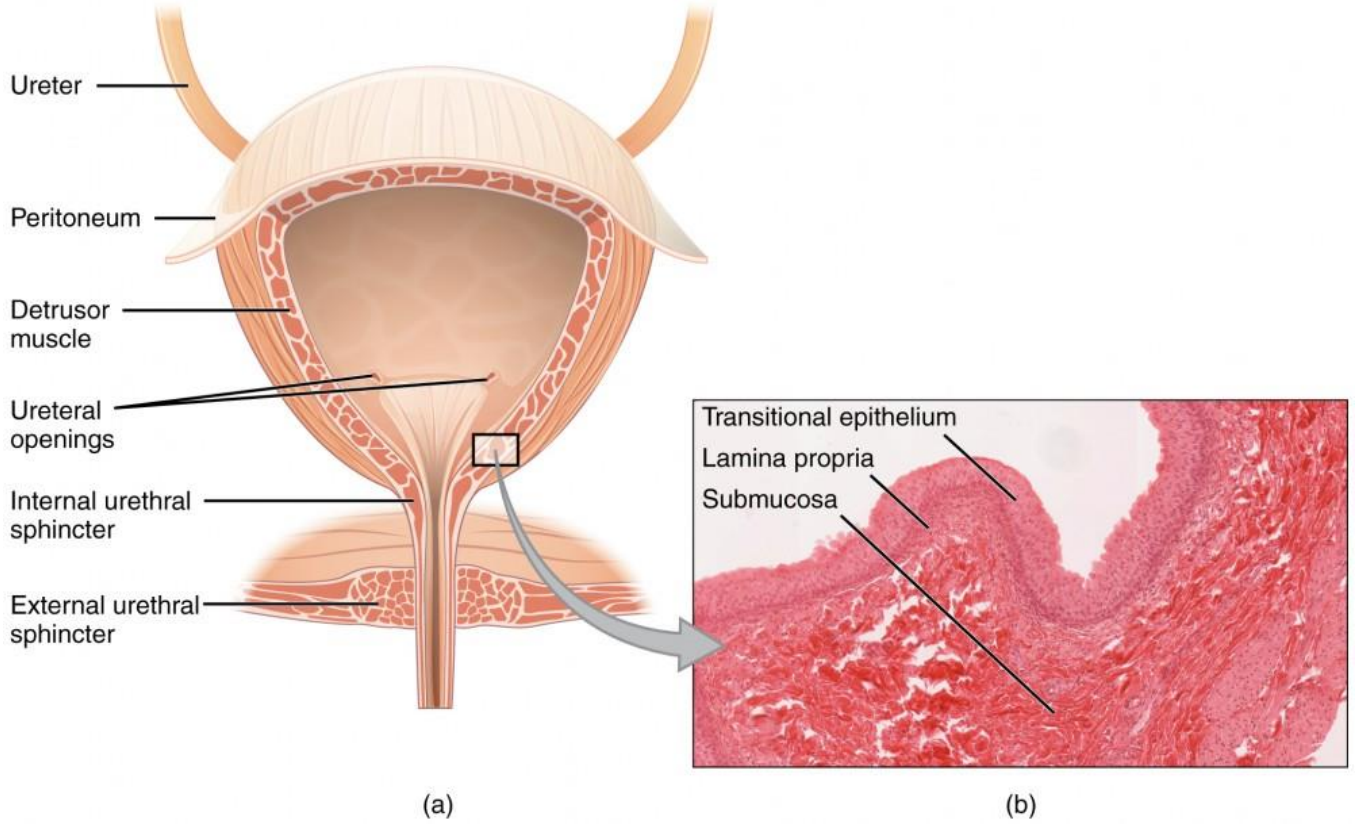
External Urethral Sphincter

- It has smooth muscle
- It is voluntary in control



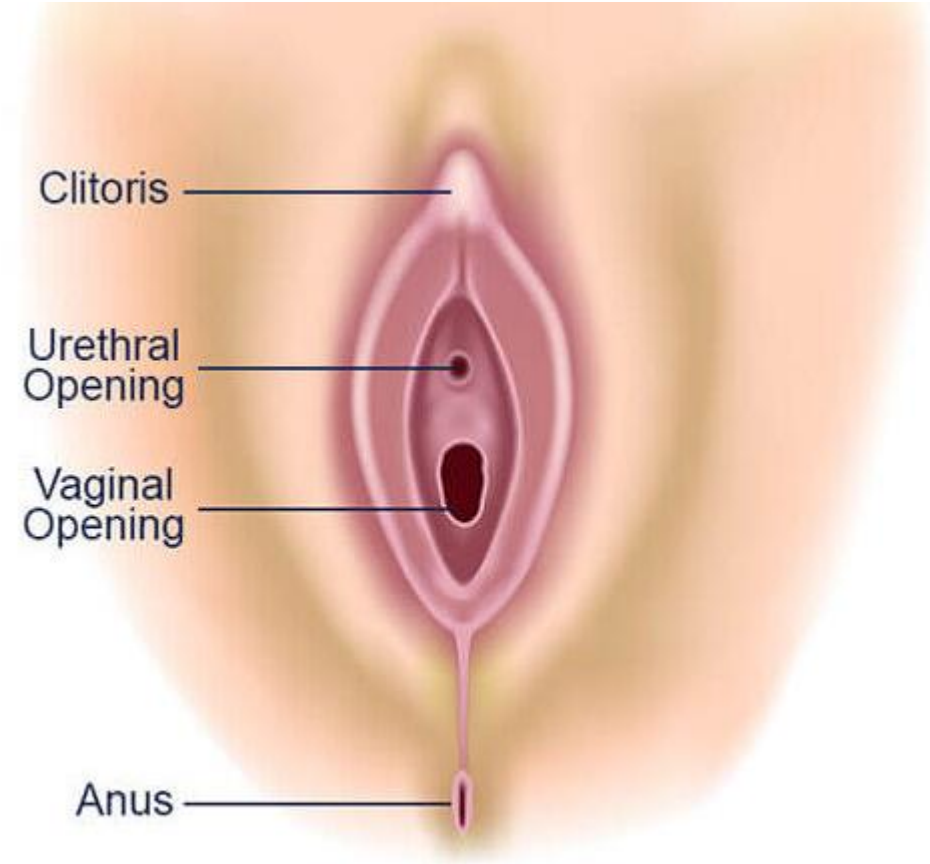
EPITHELIUM OF URETHRA

- **Transitional epithelium** at the proximal end (near the bladder)
- **Stratified squamous epithelium** at the distal end (near the urethral opening)



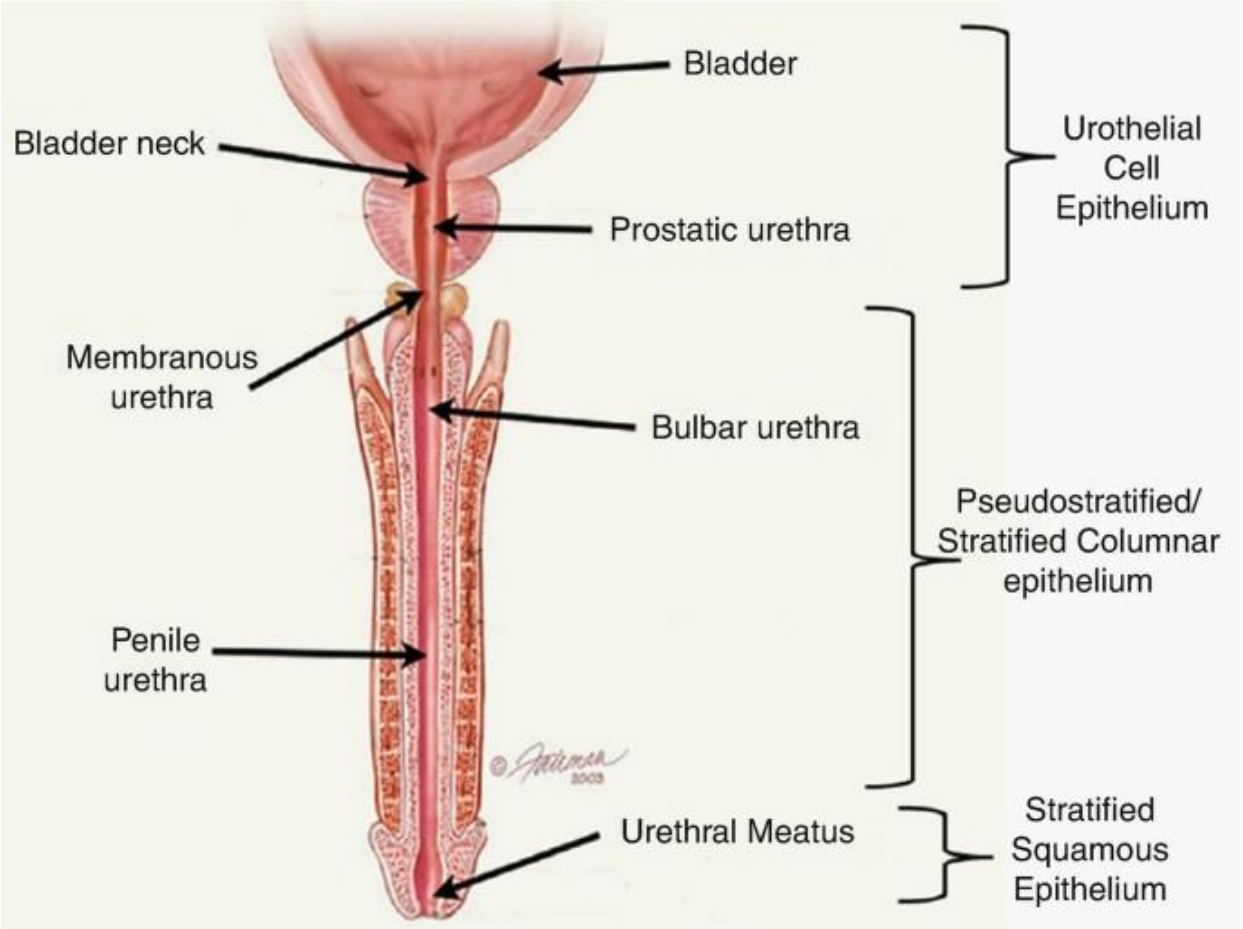
FEMALE URETHRA

- It is **4cm** long and **6mm** in width
- It begins from internal urethral orifice and passes downwards and forwards
- Opens in the vestibule b/w clitoris and vaginal orifice



MALE URETHRA

- It is 18 cm long
- It includes Internal urethral sphincter & External urethral sphincter
- 3 regions of urethra
  - **prostatic urethra** - during orgasm receives semen
  - **membranous urethra** - passes through pelvic cavity
  - **penile urethra –** voiding of urine



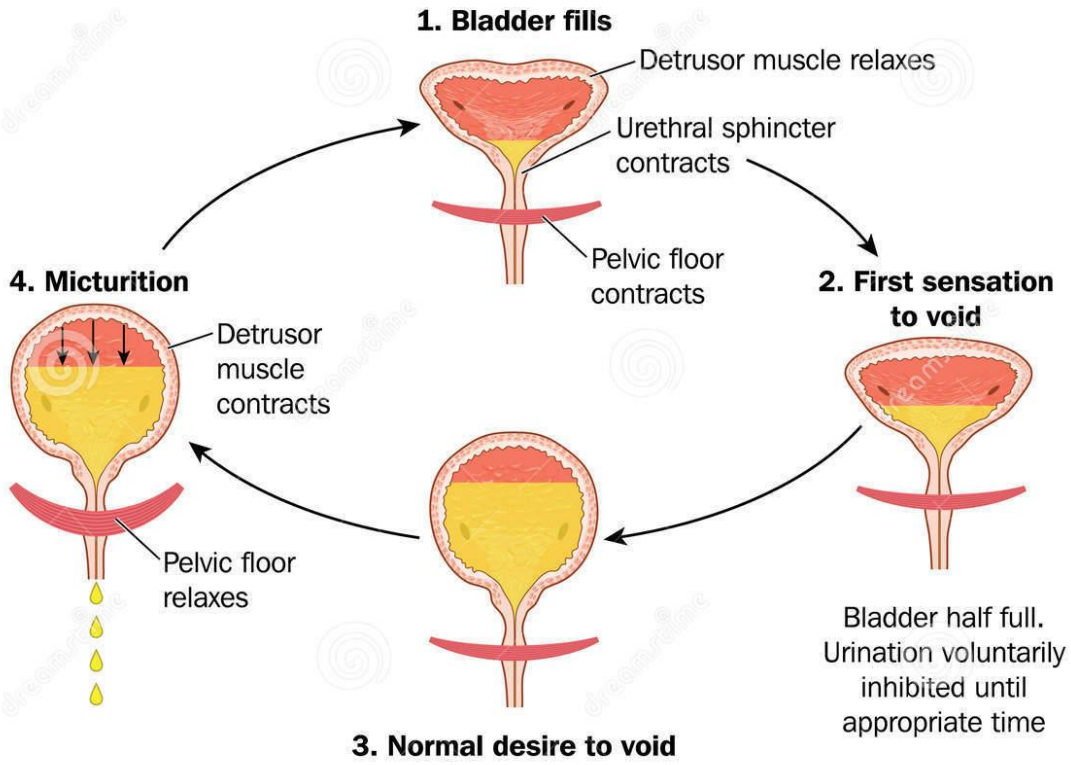
MICTURITION

- Micturition is a process by which **urine is voided** from the urinary bladder.

- It involves two main steps:

First step, **the bladder fills** progressively until the tension in its walls rises above a threshold level.

Second step, is a nervous reflex called the micturition reflex that **empties the bladder.**



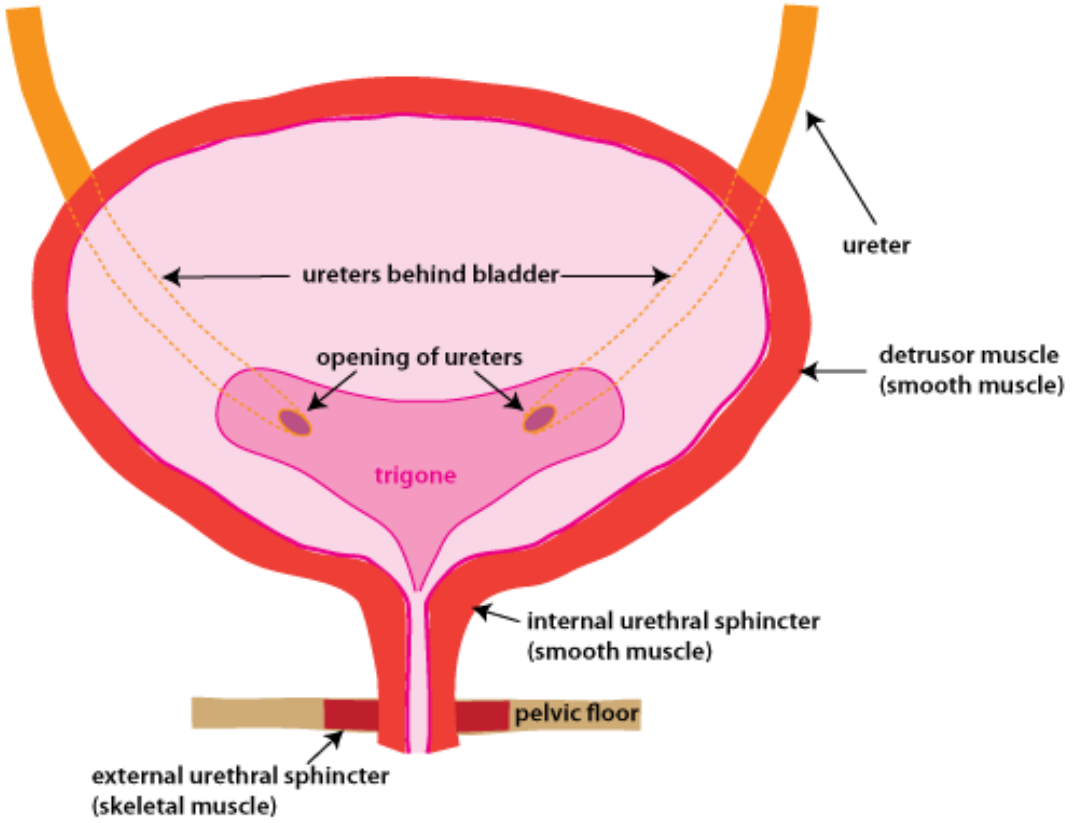
PHYSIOLOGY OF BLADDER

The urinary bladder is a **smooth muscle chamber** composed of two main parts:

The body, which is the major part of the bladder in which urine collects

The neck, which is a funnel shaped extension of the *body*, passing inferiorly and anteriorly into the urogenital triangle and connecting with the urethra.

The smooth muscle of the bladder is called the ***detrusor muscle*** – contraction of the detrusor muscle is a major step in emptying the bladder.

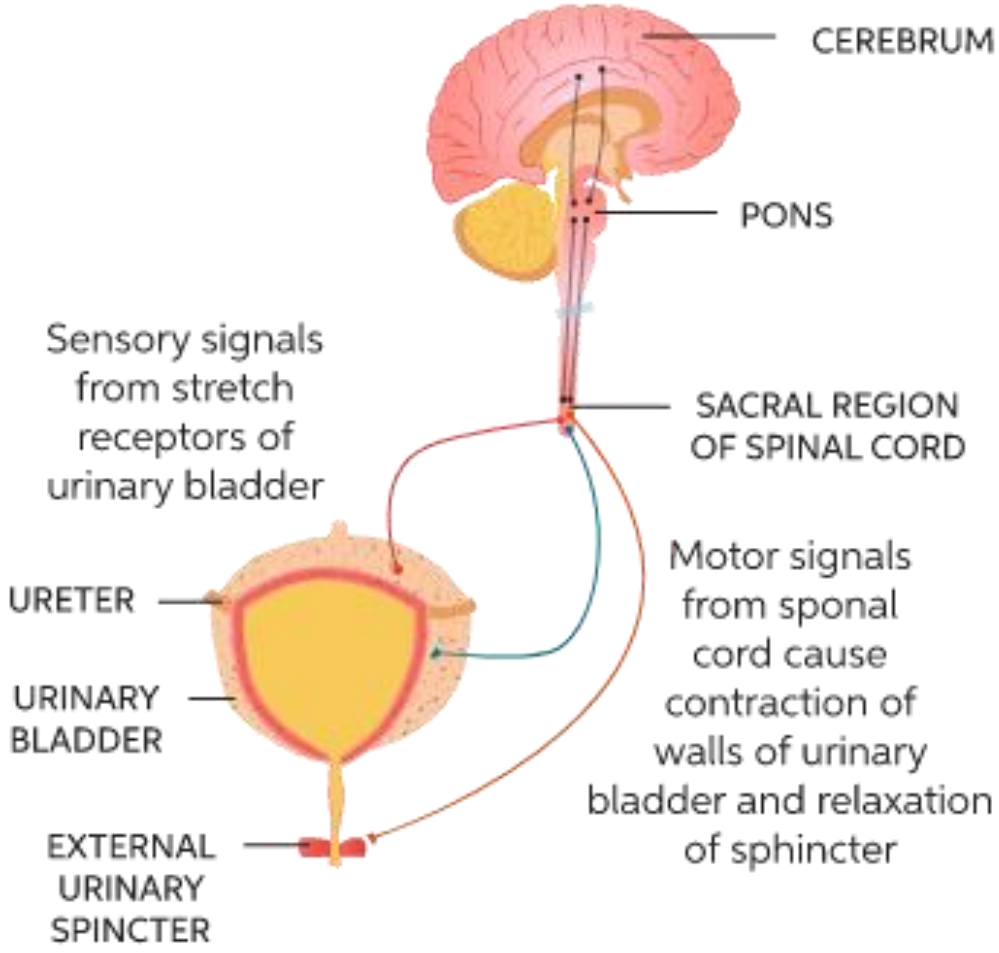


MICTURITION REFLEX

The micturition reflex is an autonomic spinal cord reflex, it can also be inhibitied or facilitated by centers in the cerebral cortex or brain stem.

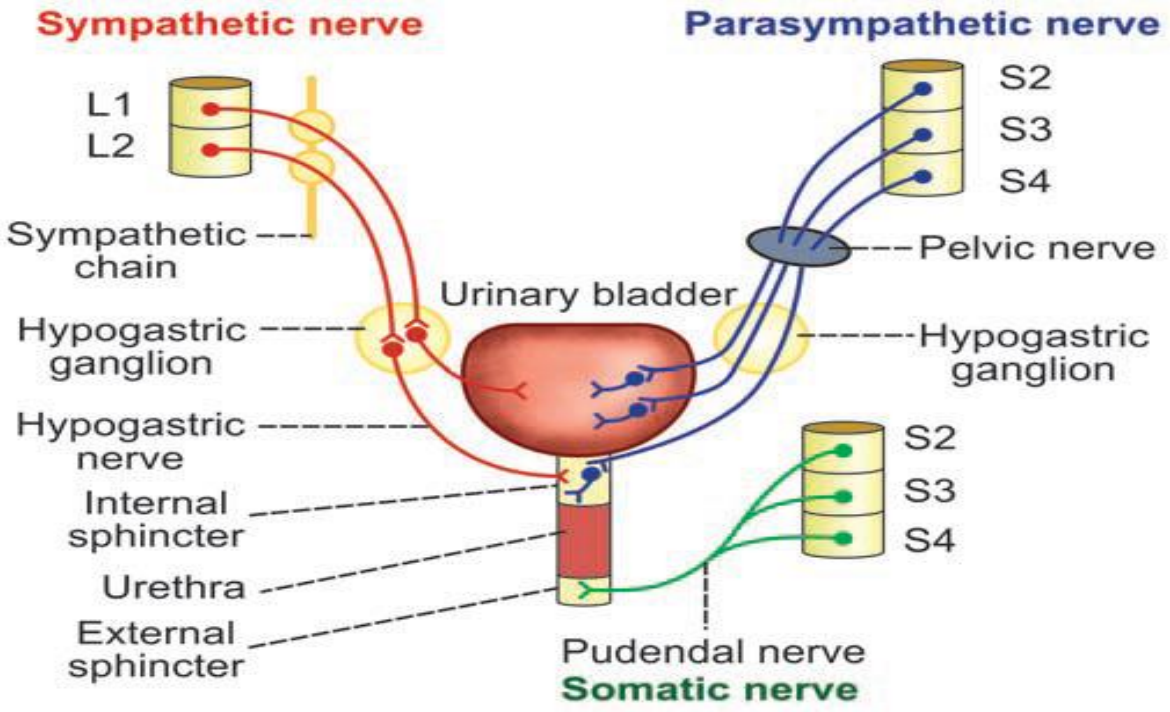
- **Facilitatory centres** for micturition are present in the pons, and some are even in the cerebral cortex. It facilitates micturition through spinal centres.

- **Inhibitory centres** for micturition are present in the cerebral cortex and midbrain. It inhibits the micturition by repressing spinal micturition centres.



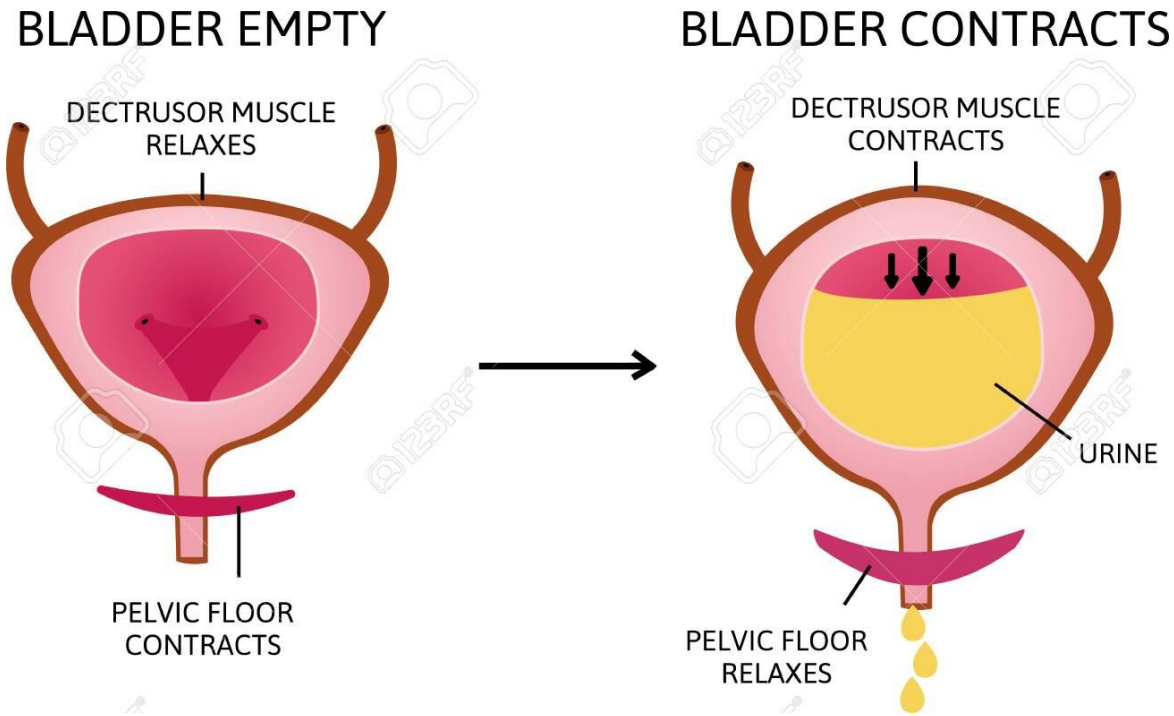
AUTONOMIC CONTROL OF MICTURITION

- **Sympathetic:** contraction of the internal urethral sphincter and relaxation of the detrusor muscle allows the bladder to fill and prevents emptying.
- **Visceral non – pain:** Stretch receptors in bladder wall (esp. trigone) detect "fullness"
- **Parasympathetic:** Contraction of the detrusor muscle, relaxation of internal urethral sphincter.
- **Somatic motor (voluntary):** Pudendal nerve maintains tonic contraction of external urethral sphincter until voluntarily inhibited.



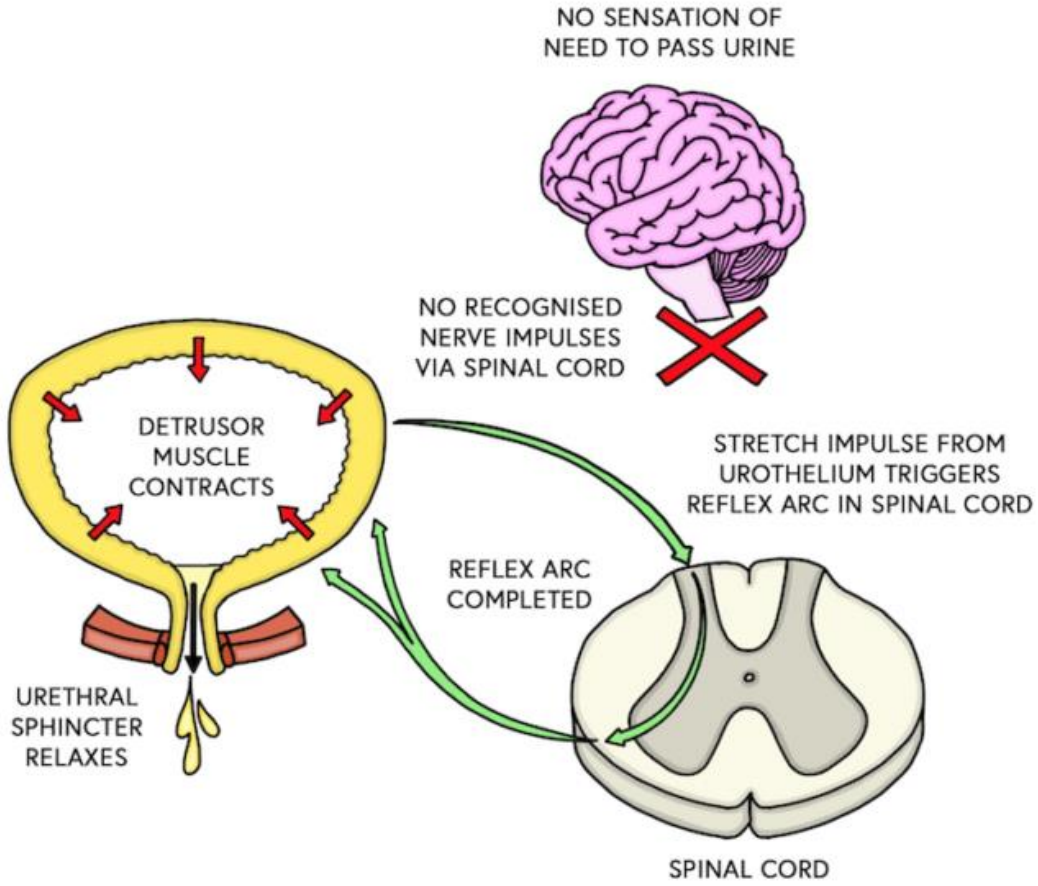
FILLING OF URINARY BLADDER

- Urine fills in urinary bladder drop by drop from ureter
- Marked sense of filling occurs when the urine volume increase by 400ml
- There is the threshold level to decide the micturition reflex
- Threshold levels are adjusted by centers of micturition



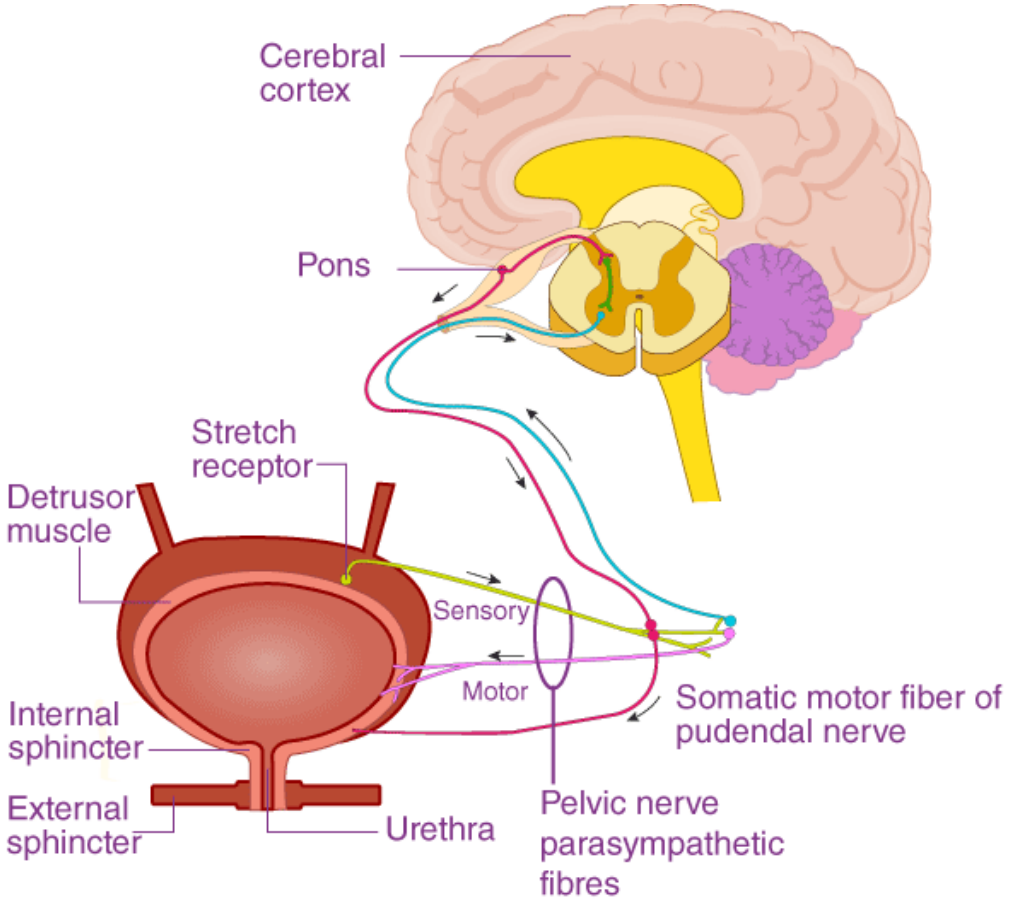
PATHWAY OF MICTURITION REFLEX

- When the volume of urine reaches 400ml, bladder wall stretches
- Stretch receptor on bladder gets activated
- Sensory signal is given to spinal centers through sensory fibers of parasympathetic nerve
- Reflex arc is produced in spinal cord
- Motor signal is given to the urinary bladder through motor fibers of parasympathetic nerve
- As a result of activity, detrusor muscle contracts and internal sphincter relaxes
- Urine pass to the proximal urethra



PATHWAY OF MICTURITION REFLEX

- Again afferent impulse is given to spinal cord
- Afferent impulse reach the higher center
- If the signal from brain stem is to micturate, impulse create from the spinal cord is to block pudendal nerve
- At the same time, sympathetic efferent are inhibited
- External sphincter relaxes and micturition occurs



Summary

- Filling of the urinary bladder
- Stimulation of stretch receptors
- Afferent impulses pass through the pelvic nerve and reach the spinal cord
- Efferent impulses through the pelvic nerve
- Contraction of the detrusor muscle and relaxation of the internal sphincter
- The flow of urine into the urethra and stimulation of stretch receptors
- Afferent impulses through the pelvic nerve
- Inhibition of pudendal nerve
- Relaxation of the external sphincter
- Voiding of the urine or micturition

ASSESSMENT – I

- What are the sphincters present in urethra?
- What is micturition?
- What muscle is present in the urinary bladder?
- What is the function of pudendal nerve

THANK YOU

Reference:

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