

# cycle

cycle

**Storage phase** The storage phase of the micturition cycle requires relaxation of the detrusor to ensure low-pressure filling, and contraction of the smooth and striated muscle of the bladder neck, urethra and external urethral sphincter to ensure continence. The higher centres in the cortex receive low-intensity afferent signals during bladder filling, which in turn induces the PMC to inhibit micturition by inhibiting parasympathetic innervation (resulting in detrusor relaxation) and activating somatic innervation (resulting in closure of the bladder outlet). Glutamate is the principal afferent neurotransmitter involved in activating the pudendal nerve through Onuf's nucleus. Detrusor relaxation and bladder outlet contraction are achieved through sympathetic  $\beta$ -noradrenergic activity, resulting in direct relaxation of the detrusor smooth muscle; inhibition of parasympathetic ganglia, resulting in indirect relaxation of the detrusor smooth muscle; and  $\alpha$ -noradrenergic activity, resulting in contraction of the smooth muscle of the bladder neck and urethra. Furthermore, somatic cholinergic activity results in contraction of the striated external urethral sphincter.

**Voiding phase** The voiding phase of the micturition cycle requires coordinated detrusor contraction and relaxation of the bladder outlet to ensure complete bladder emptying. When the desire to void is strong enough, the higher centres in the cortex receive high-intensity afferent signals from the bladder, which in turn switches the PMC to 'voiding' mode. The PMC then activates micturition by activating parasympathetic nerves and inhibiting somatic nerves (by cessation of the glutamate effect on Onuf's nucleus). This is achieved through parasympathetic cholinergic activity via M3 receptors, resulting in detrusor contraction, and central inhibition of somatic and sympathetic nerves, resulting in relaxation of the bladder outlet.

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