APPLIED PHARMACOLOGY OF THE BLADDER

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The two predominant neurotransmitters controlling LUT function are acetylcholine and noradrenaline (norepinephrine). Acetylcholine from the somatic nervous system causes contrac tion of striated muscle by activating nicotinic receptors, Onuf ’s nucleus refers to a group of motor neurones located in the anterior horn of the sacral (predominantly S2) spinal cord; it is named after Bronislaw Onuf-Onufrowicz, 1863–1928, who discovered this group of cells in 1899. /uni25CF /uni25CF β /uni25CF /uni25CF α whereas acetylcholine from parasympathetic nerves causes detrusor smooth muscle contraction by activating muscarinic receptors. Noradrenaline is released from the sympathetic nervous system and activates β -adrenergic receptors on the 3 - smooth muscle of the detrusor to cause relaxation and α -adrenergic receptors on the smooth muscle of the bladder 1 base and urethra to cause contraction. The underlying second-messenger mechanisms by which smooth muscle contraction and relaxation occur are shown in Figure 83.1 . Smooth muscle contraction is dependent on calcium influx causing contraction via actin and myosin. Smooth muscle relaxation is dependent on calcium e ffl ux back into the sarco - plasmic reticulum, mediated by the cyclic adenosine mono - phosphate and cyclic guanosine monophosphate pathways. The commonly used agents, their principal actions and their side e ff ects are summarised in Table 83.2 .

outlet Contraction of Relaxation of 3-adrenergic smooth muscle of detrusor smooth (bladder) urethra and bladder muscle base Inhibition of -adrenergic 1 parasympathetic (urethra and ganglia, thereby bladder neck) inhibiting detrusor contraction None Contraction of the detrusor smooth muscle of muscle bladder) Contraction of Afferent sensory external urethral nerves (stretch, (striated muscle sphincter temperature and of external pain) urethral sphincter)

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