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Title: EFFECT OF PROSTAGLANDIN E2 ON ACETYLCHOLINE RELEASE IN RAT DETRUSOR SMOOTH MUSCLES

Aims of Study

The parasympathetic nervous system plays an important role in the function of the lower urinary tract (1). A major neurotransmitter for physiological bladder contraction is acetylcholine (ACh) released from prejunctional parasympathetic nerve endings. Furthermore, prostaglandins are manufactured throughout the lower urinaty tract and have been implicated in bladder contractility, inflammatory responses, and neurotransmission (2). It has been reported that acetylcholine released from peripheral cholinergic nerve endings was modulated by a number of different prejunctional receptors (3) and that some prostaglandins may effect neural release of transmitters (4). However, little information is as yet available on the prejunctional effects of prostaglandins in the detrusor smooth muscles. Therefore, we investigated the effect of prostaglandin E_2 (PGE_2) on ACh release induced by electrical field stimulation (EFS) in rat detrusor smooth muscles, using microdialysis procedure and high-performance liquid chromatography (HPLC) with electrochemical detection (ECD).

Methods

Female Sprague-Dawley rats weighing 200 g were killed by decapitation under pentobarbital anesthesia and the bladders were removed. Uniform longitudinal muscle strips of the bladder were prepared. The microdialysis probe (O-P-100-10; Eicom, Kyoto, Japan) was inserted through the muscle strip, and the inlet cannula of the probe was connected to a microinfusion syringe pump. Ringer solution containing 100 μM physostigmine salfate was continuously perfused at a rate of 2 μl/min. The strips were suspended in a 20-ml bath filled with Krebs-Henseleit solution. Each muscle strip was connected to a force displacement transducer, and isometric forces were recorded. The dialysate during EFS (supramaximum voltage, pulse duration 0.3 ms, frequency 20 Hz and 3 s train of pulse) was collected, and the amount of ACh released in the dialysate was measured by HPLC-ECD. The effects of pretreatment with indomethacine and PGE_2 on ACh release and contractile response were evaluated.

Results

Treatment with indomethacine (10 μM) decreased the spontaneous activity of the preparations and the basic tone, which caused a significant increase in contractile response and ACh release induced by EFS. Pretreatment with PGE_2 (1 μM) in the presence of indomethacine caused a significant increase in the spontaneous activity and produced a slightly increase in the contractile response, but did not cause a significant change in basal ACh release. However, the pretreatment with PGE_2 caused significant decreases in both contractile response and ACh release induced by EFS in rat detrusor smooth muscles.

Conclusions

The data suggest that there may be prejunctional PGE_2 receptors, which contribute to inhibition of ACh release and contractile responses induced by EFS in rat detrusor smooth muscles.

References

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