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THE ROLE OF PREJUNCTIONAL β -ADRENERGIC RECEPTORS SUBTYPES ON ACETYLCHOLINE RELEASE IN FEMALE RABBIT BLADDER

Aims of Study:

It has been confirmed that norepinephrine released from sympathetic nerve endings play an important role in relaxation of bladder smooth muscle through β -adrenergic receptors. However, there is no information available on the role of β -adrenergic receptor in prejunctional site of cholinergic nerve ending. Therefore, in the present study, we evaluated the effects of β -adrenergic receptors on ACh release and contractile response induced by electrical field stimulation (EFS) in rabbit bladder smooth muscles, using microdialysis procedure and high-performance liquid chromatography (HPLC) with electrochemical detection (ECD) (1).

Methods:

Bladder smooth muscle strips obtained from female New Zealand white rabbits weighing 3.0 kg were mounted in the thermostatically controlled organ baths for isometric tension recordings. EFS (supramaximum voltage, pulse duration 0.5 ms, frequency 5 Hz, train of pulse 2 s and stimulation interval 2 min) was applied to muscle strips, and tension developments were recorded. Furthermore, using microdialysis technique, we collected the dialysate obtained from microdialysis probe inserted into the muscle strips during EFS, and measured the amount of ACh in the dialysate fraction by high performance liquid chromatography with electro-chemical detection as reported previously (1). The effects of pretreatment with various drugs (0.01 - 10 μ M, isoproterenol: non-selective β -adrenergic receptor agonist, dobutamine: β 1-adrenergic receptor selective agonist, procaterol: β 2-adrenergic receptor selective agonist, GS-332: β 3-adrenergic receptor selective agonist, propranolol: non-selective β -adrenergic receptor antagonist, 0.01 - 10 μ M) on the contractile responses and ACh releases induced by EFS were evaluated.

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Results:

Pretreatment with each β -adrenergic receptor agonists concentration dependently caused decreases in ACh releases and contractile responses induced by EFS. The rank order of maximum decreases in ACh releases and contractile responses was ((isoproterenol) > (procaterol) >> (dobutamine) \geq (GS-332)). On the other hand, the pretreatment with propranolol concentration dependently increased the ACh releases, but did not effect on the contractile responses.

Conclusions:

The data suggest that there are prejunctional β -adrenergic receptors and that the stimulation of prejunctional β_2 -adrenergic receptor may inhibit EFS-induced ACh release from cholinergic nerve endings in rabbit bladder smooth muscles.

References:

1 Life Sci, 62, PL 393-399, 1998.

