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THE ROLE OF BETA ADRENOCEPTOR SUBTYPES IN MEDIATING RELAXATION OF THE PIG BLADDER TRIGONAL MUSCLE IN VITRO

Aims of Study

It has been reported that beta adrenoceptors (ARs) predominate in the bladder body and mediate relaxation via beta2- or beta3-AR subtypes [1]. In contrast the contraction of the bladder trigone is predominantly mediated by alpha ARs. Although the predominance of beta3-ARs present in the trigonal muscle has been reported [2], little have been known on the functional characteristics of beta adrenoceptor subtypes in this region. The aim of this study is to investigate the role of beta AR subtypes in mediating relaxation of the pig bladder trigonal muscle in vitro.

Methods

Longitudinal strips of bladder trigonal muscle of the female pig were isolated, and the mucosa and serosa were removed. Tissues were mounted in 30ml organ baths containing Krebs solution, which was gassed with 95%O2 and 5% CO2. Tissues were precontracted with 50mM potassium chloride. When the contraction had stabilized, increasing concentrations of beta-AR agonists (non-selective, isoprenaline; beta2-selective, salbutamol; beta3-selective, BRL37344) were added cumulatively and concentration-relaxation curves (CRCs) were obtained. Antagonist affinity values (pA2 or apparent pK_B values when the antagonism was not competitive) of beta1and beta2-AR antagonist propranolol, beta1-AR antagonist CGP20712A, beta2-AR antagonist ICI118551 and beta3-AR antagonist SR59230A against CRCs to beta-AR agonists were calculated.

Results

Isoprenaline relaxed KCl precontracted muscle strips with high potency (pEC_{50}=7.3). Salbutamol relaxed with relatively low potency (pEC_{50}=6.6) and with maximum responses of 72% to those of isoprenaline. BRL37344 had low potency (pEC_{50}=5.5) with maximum responses of 79% to those of isoprenaline. Propranolol antagonized CRCs to isoprenaline with a high affinity (apparent pK_B=8.76), but with Schild slope significantly ($p<0.01$) less than unity (0.61), suggesting that responses were mediated by more than one β-adrenoceptor. CGP20712A antagonized CRCs to isoprenaline with a low affinity (apparent pK_B=5.13), indicating beta1-AR was not present. ICI118551 competitively antagonized responses to salbutamol with a high affinity (pA2=8.05). However the affinity of ICI118551 against CRCs to isoprenaline was relatively low (apparent pK_B =6.9), and the Schild slopes were significantly ($p<0.01$) less than unity (0.58) suggesting that responses were mediated by more than one β-adrenoceptor. SR59230A antagonized CRCs to isoprenaline with a relatively low affinity (apparent pK_B=7.5), and with Schild slope significantly ($p<0.05$) less than unity (0.77), suggesting that responses were mediated by more than one β-adrenoceptor. SR59230A antagonized CRCs to BRL37344 with a high affinity (apparent pK_B=7.9), but with Schild slope significantly ($p<0.01$) less than unity (0.59), again indicating that responses were mediated by more than one β-adrenoceptor.

Conclusions

These data suggest that β-adrenoceptor mediated responses of this tissue are mediated via both the β_2- and β_3-adrenoceptor subtypes.

References

1. Br J Pharmacol, (2002)135:129-134.
2. Neurourol Urodyn (2002)20:467-468.