166

van Koeveringe G[1], Dambros M[1], de Jongh R[1], Bast A[1], van Kerrebroeck P[1]
1. University Hospital Maastricht

INHIBITORY EFFECTS OF A HIGH CONCENTRATION OF THE FLAVONOID, GALANGIN, ON URINARY BLADDER SMOOTH MUSCLE CONTRACTILITY

Hypothesis / aims of study

Flavonoids comprise a large group of naturally existing polyphenolic compounds, which possess a wide spectrum of physiological and pharmacological effects [1]. Galangin is a flavonol with several biological activities such as an anti-oxidative effect and an inhibitory effect on vas deferens contractility [2]. Apart from its possible interaction with smooth muscle contractility, there is no information, in the literature, about the possible effects of Galangin on pig bladder contractile responses. The aim of the present study was to investigate the muscle actions of Galangin on the pig bladder smooth muscle and to examine their possible underlying mechanisms.

Study design, materials and methods

Male pig detrusor strips were mounted between stainless steel hooks in 20ml organ baths containing Krebs-buffer solution which was aerated continuously with 5% CO_2 – 95% O_2, at 37^0C. Mechanical responses were recorded using an isometric force transducer. Measurements were started after an equilibration period of 60 min with an initial tension of 2 g. After an initial equilibration time, all strips were stimulated at 32Hz electrical field stimulation (EFS), and subjected to a metacholine concentration curve (MCC), then the incubation medium was changed to one with the following additions for each of the 7 experimental groups: all tissues in group 1 were incubated with normal krebs; those in group 2 with Galangin (30µM); group 3 with Galangin (30µM) + Propranolol (1µM); group 4 with Galangin (30µM) + Verapamil (0,1µM); group 5 with Galangin (30µM) + Phentolamine (1µM); group 6 with Galangin (30µM) + Atropine (1µM) and those in group 7 with Galangin (30µM) + Calcium free solution. All strips were equilibrated in these buffers for 1,5 hours then stimulation at 32Hz and response curve to metacholine were performed. After that, all strips were washed and incubated with normal krebs solution for 1,5 hours and, at the end of that period, responses to field stimulation at 32Hz and MCC were re-assessed. Student's *t* - test and one factor ANOVA were used to determine the statistical significance to 0.05 levels.

Results

Galangin at a dose of 30 µM reduced the amplitude of the EFS and metacholine-evoked contractions to 2% and 5% of the initial value, respectively. The inhibitory effect of Galangin was unaffected by a combination of atropine, propranolol and phentolamine ($p > 0,05$). The amplitude of contractions induced by the cholinergic agonist and EFS reduced significantly (to 29% and 1%, respectively) in a calcium free solution compared to normal krebs. In verapamil solution the amplitude of contractions-evoked by metacholine and EFS were significantly reduced compared to normal krebs (to 48% and 53%, respectively) ($p < 0,05$). However, when Galangin was added in the calcium free solution (group 7) and verapamil solution (group 4), the amplitude of contractions were reduced to 0%. After 1,5 h of washing out with normal krebs the amplitude of contractions induced by EFS and metacholine returned to the initial values, in all groups.

Interpretation of results

We have demonstrated that Galangin, at high concentrations, exerted an inhibitory effect on pig bladder smooth muscle contractility and the effect was more profound in association with a reduced availability of extracellular calcium. These experiments also showed that the inhibitory effect of Galangin was totally reversible after 1,5 h of recovery period with normal krebs.

Concluding message

In a wider perspective, the results of this study indicate that Galangin may provide a new approach to further research into the treatment of detrusor overactivity.

References

1. Structural aspects of antioxidant activity of flavonoids. Free Radical Biology & Medicine 1996; 20(3):331-342.
2. Inhibitory effect of the plant flavonoid galangin on rat vas deferens in vitro. Life Sciences 2003; 72:2993-3001.