A novel contraction mechanism by intracellular GDP in bladder smooth muscle

Kawagoe Kentaro[1], Tomoko Maki[2], Hiromitsu Morita[3], Kenichi Kato[4], Shunichi Kajioka[1]

[1]Dept. Clinical Pharmacol., Kyushu Univ., [2]Spinal Injuries Center, [3]Fukuoka Dental Univ., [4]Fukuoka Medical school

Background: When we tried to elucidate the mechanism of cooling induced contraction using pig urinary bladder smooth muscle, we found the tension force was increased by intracellular GDP with dose dependent manner.
In general, triphosphate ribonucleotides such as ATP and GTP activate cellular energy sources and GTP-binding proteins, and they also lead to contraction in smooth muscle, but contraction by GDP has not been reported.
Objectives: The aim of this study is to clarify the role of intracellular GDP and the mechanism of contraction by GDP, and whether other ribonucleotides have the same action.
Methods: We used the pig urinary bladder smooth muscle. Pig tissue was obtained from the abattoir. We performed tension force measurement. Permeabilization was done by using α-toxin or β-escin.
Results: In bladder smooth muscle intact strips, no change was observed after administration of GDP. Contraction was enhanced by administration of GDP in the presence of 1 μM calcium in α-toxin permeabilized strips. GDPβS, a non-hydrolysis analog of GDP, showed no contraction in the same condition. Furthermore, the contractile effect of GDP was not observed in β-estin permeabilized strips, which enhances membrane permeability.
Conclusions: This study indicated that an intracellular GDP enhanced the contraction of bladder smooth muscle, and that calcium was essential for the contraction.