

Role of cytosolic calcium, IP₃ release in contraction of gastric muscle cells induced by CCK-8 and motilin in rats

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Author contributions: All authors contributed equally to the work.

Original title: *China National Journal of New Gastroenterology* (1995-1997) renamed *World Journal of Gastroenterology* (1998-).

Received: October 12, 1995

Revised: April 22, 1996

Accepted: May 13, 1996

Published online: September 15, 1996

Abstract

AIM: It's not clear: (1) whether CCK-8 and motilin had direct effect on rat isolated gastric smooth muscle cells; (2) whether specific receptors exist on gastric smooth muscle cells; and (3) whether cytosolic calcium and IP₃ were involved during contraction of gastric muscle cells caused by CCK-8 and motilin. The purpose of this study was to investigate the action of CCK-8 and motilin on antrum smooth muscle cells, and role of cytosolic free calcium and IP₃ during contraction of antral muscle cells caused by these peptides.

METHODS: Isolated gastric smooth muscle cells were prepared to observe the contracting effect of CCK-8 and motilin on them. Specific antiserum or receptor antagonists were used to investigate their effects on the action of the peptides; Fura-2AM fluoro-labelled method was used to measure intracellular calcium concentration changes after CCK-8 and motilin were added to the gastric smooth muscle

cells. Protein competitive binding assay was used to measure IP₃ concentration changes after the above peptides were added.

RESULTS: (1) CCK-8 caused contraction of the antrum smooth muscle cells, the percentage of cell contraction was 10.92% ± 2.26%-19.93% ± 4.30% ($P < 0.01$), the contraction was dose-dependent between 2.5×10^{-8} - 2×10^{-7} mol/L. CCK-8 antiserum (1:100) and loxiglumide (3×10^{-8} mol/L) blocked the effects of CCK-8; (2) Motilin caused contraction of the antrum smooth muscle cells, the percentage of cell contraction was 6.38% ± 1.53%-19.88% ± 1.37% ($P < 0.01$), the contraction was dose dependent between 10^{-11} - 10^{-10} mol/L. Motilin antiserum blocked the effects of motilin; and (3) CCK-8, motilin, increased intracellular Ca²⁺ and IP₃ concentration in gastric antrum circular smooth muscle cells.

CONCLUSIONS: (1) CCK-8, motilin, exert direct effects on gastric smooth muscle cells *via* specific receptor on cell membrane. (2) Contracting effect of CCK-8 and motilin was induced by Ca²⁺ released from the cytosolic Ca²⁺ storage and [Ca²⁺] increase, which was dependent on IP₃ concentration.

Key words: Cytosolic calcium; IP₃; CCK-8; Motilin; Rats

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Wang WY, Hao W, Zhou L. Role of cytosolic calcium, IP₃ release in contraction of gastric muscle cells induced by CCK-8 and motilin in rats. *World J Gastroenterol* 1996; 2(Suppl1): 42 Available from: URL: <http://www.wjgnet.com/1007-9327/full/v2/iSuppl1/42.htm> DOI: <http://dx.doi.org/10.3748/wjg.v2.iSuppl1.42>

E- Editor: Liu WX



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