Physiological function of ATP-sensitive K^+ channel in human stomach: regulation by neuropeptides (CGRP, VIP)

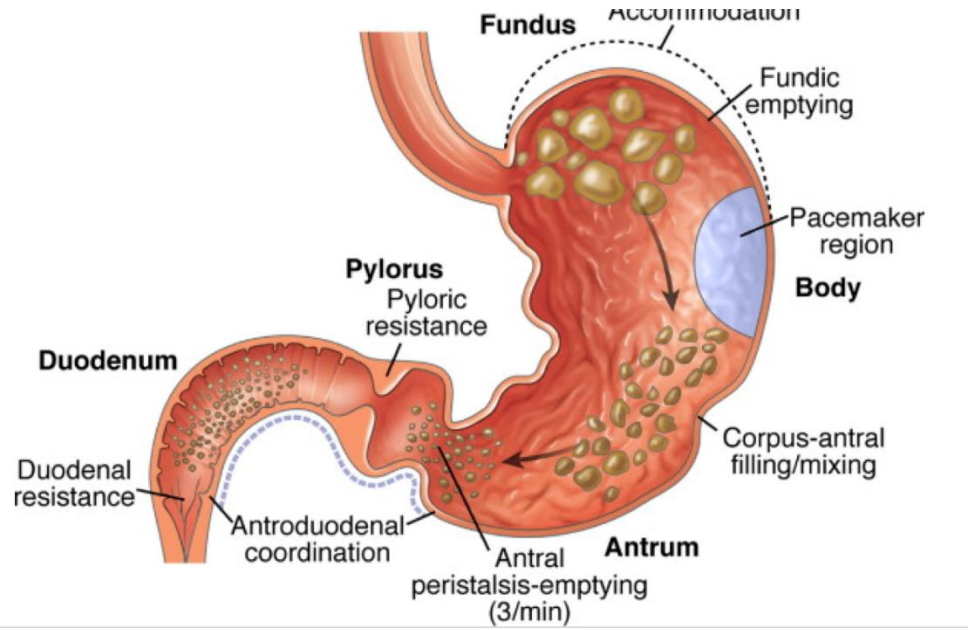
Young Chul Kim, Sang Eok Lee, Dae Hoon Kim, Seung Myeung Son, Sang Jin Lee, Hyo-Yung Yun

Department of Physiology, College of Medicine, Chungbuk Natoional University,

Cheongju, Chungbuk, 28644, Korea

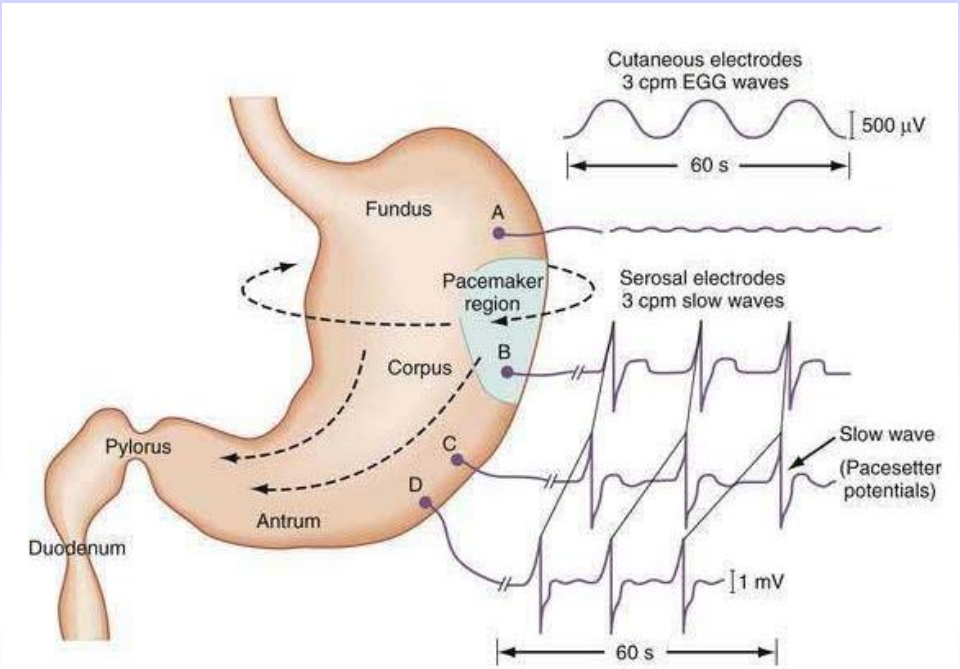
Introduction

Major regions of the human stomach

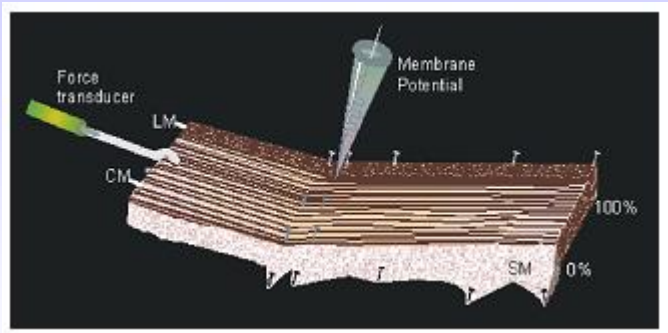


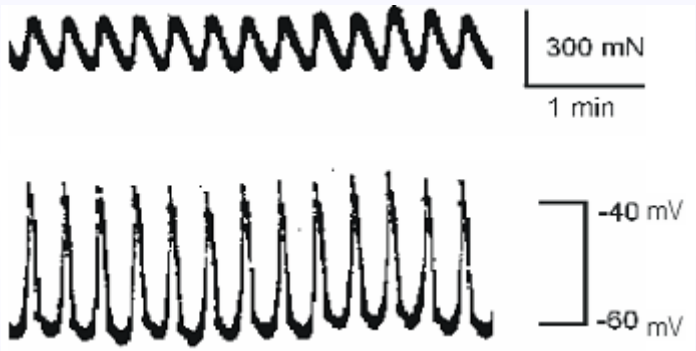
- The Fundus, provides a reservoir for fold allowing it to be accommodated without an excessive increase in intragastric pressure
- The Corpus, where the enzyme pepsin is produced. The gastric pacemaker is located at the great curvature of the corpus.
- The antrum, where the hormone gastrin is produced and where mixing and grinding of the food takes place
- The pylorus, is the valve between the stomach and duodenum, It helps controlling the emptying of the stomach contents into the duodenum.

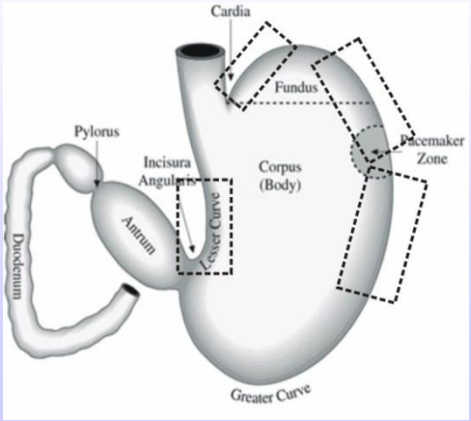
Motor and electrical activity of stomach

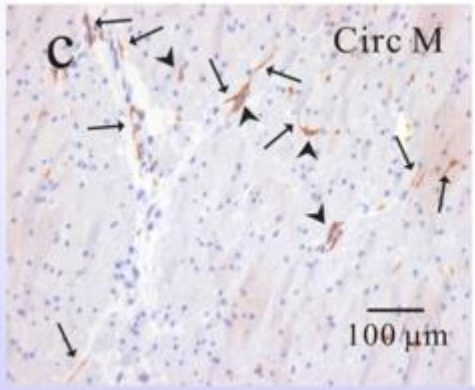


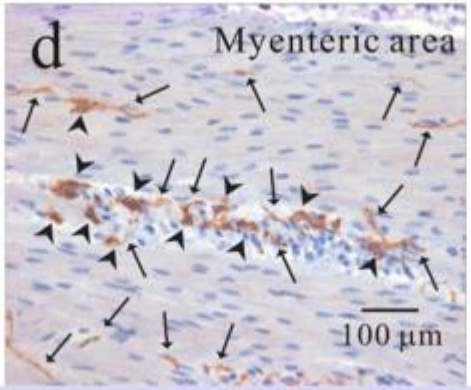
(Modified from Koch KL. Electrogastrography. In: Schuster M, Crowel M, Koch, KL, editors. Atlas of Gastrointestinal Motility. Ontario, Canada: BC Decker; 2002. pp 185-201.)

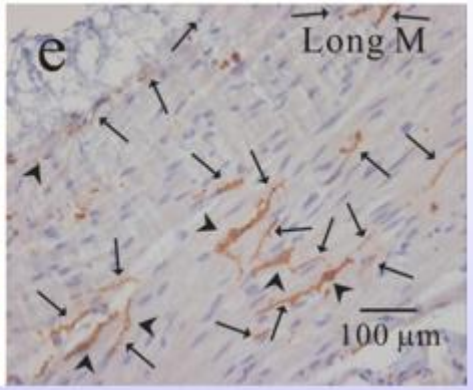












Hyo-Yung Yun, Young Chul Kim et al., Korean J Physiol Pharmacol. 2010 Oct;14(5):317-24.

Hypothesis

Energy metabolism & homeostasis

ATP <− −> ADP + Pi

diabetes mellitus

gastroparalysis, dumping syndrome..

Open : Pinacidil, Cromakalim …

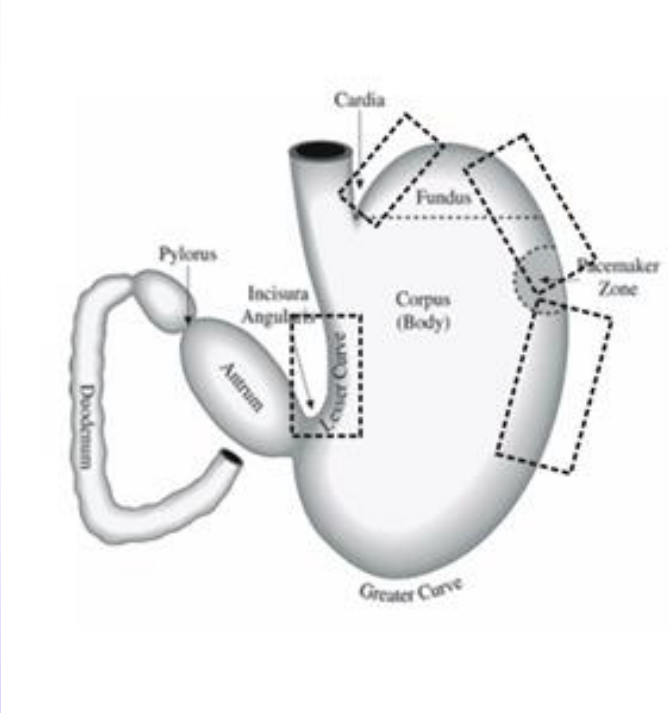
Block : Glibenclamide

Neuropeptide(?): CGRP, VIP …

CajalReview_Adv Exp Med Biol. 2019_SandersKM_Review

Materials & Methods

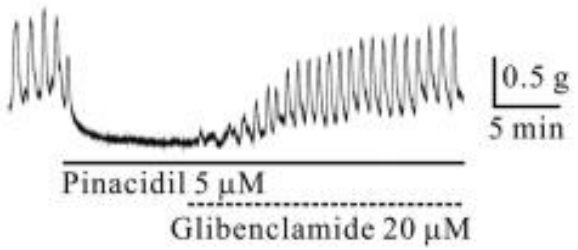
1. **Human stomach (for 10 years(2011-2020), CBNUIRB)**
2. **Tension recording by isometric recording system**
3. **Western blot – subtypes of K_{ATP} channel**



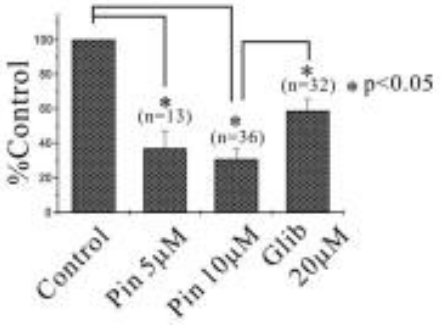
Body

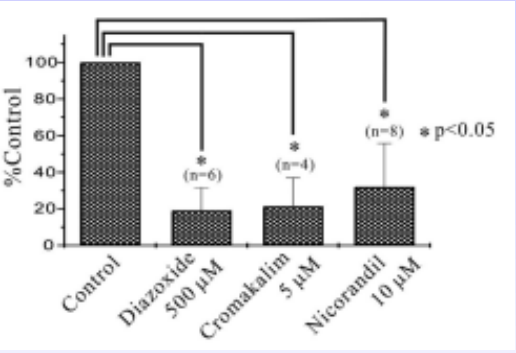
A

a

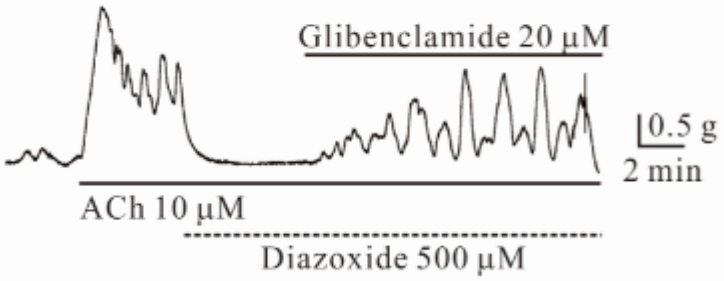


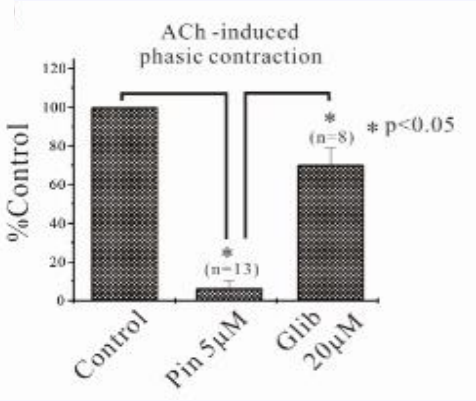
b

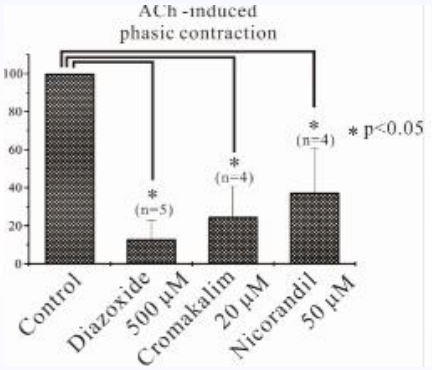




B

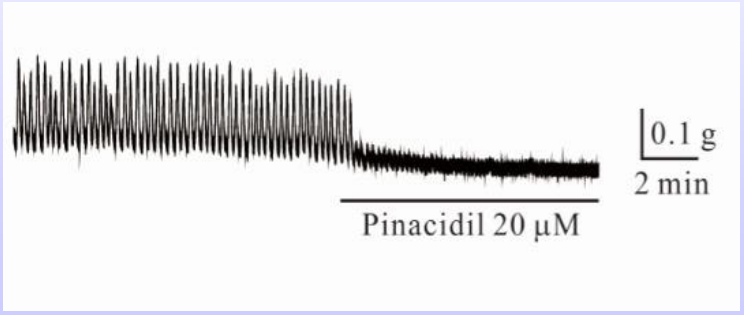




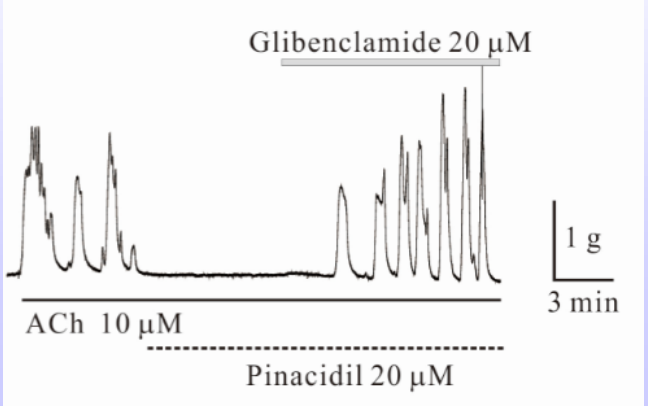


Antrum

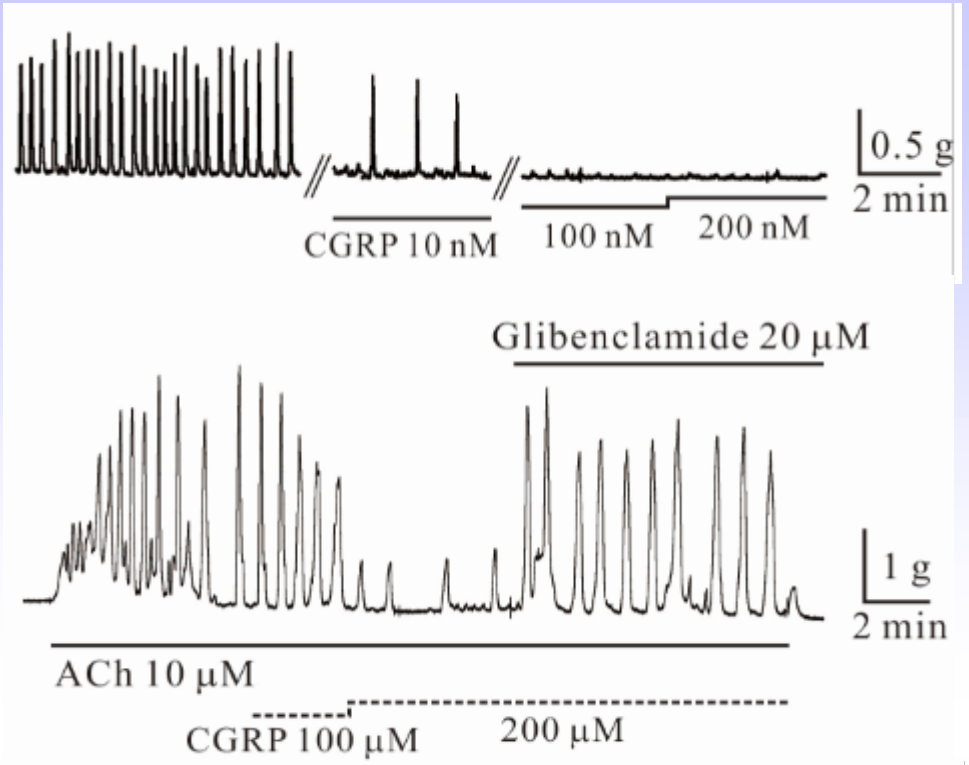
C



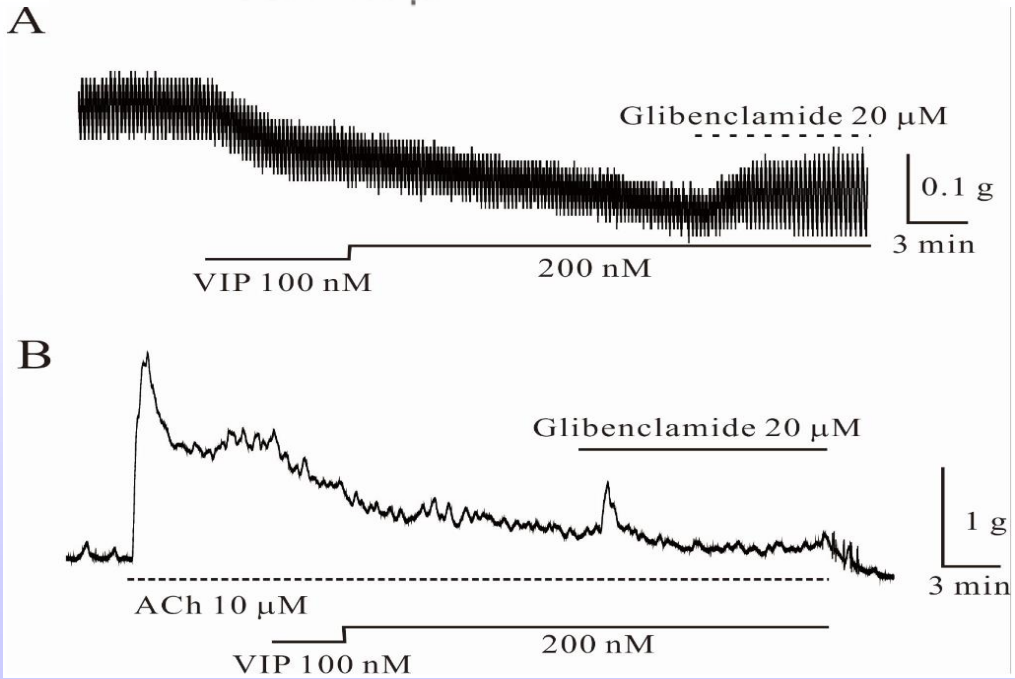
D

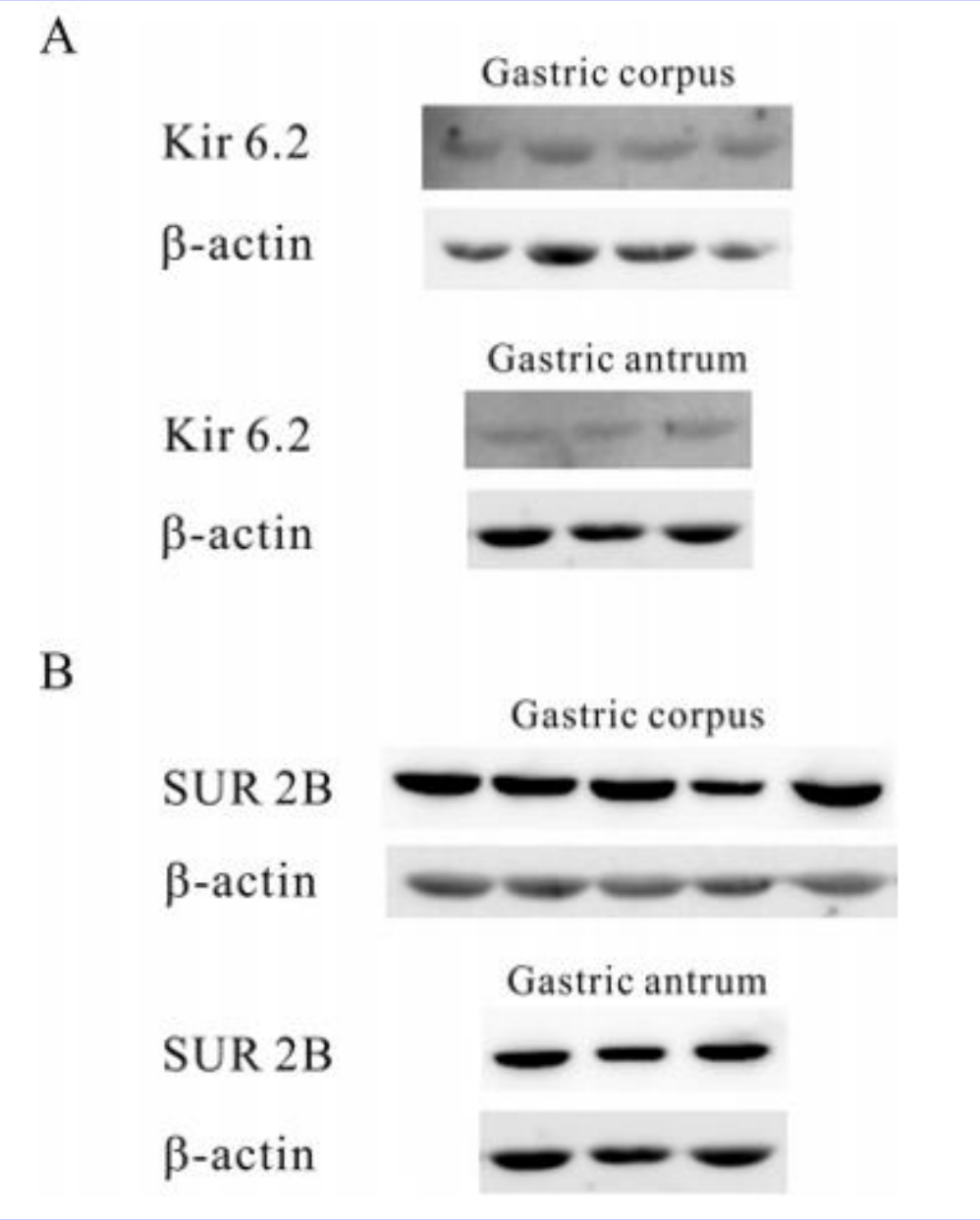


CGRP


0.5 g
2 min
CGRP 10 nM
100 nM
200 nM
Glibenclamide 20 μM
1 g
2 min
ACh 10 μM
CGRP 100 μM
200 μM

VIP


A
Glibenclamide 20 μM
0.1 g
3 min
VIP 100 nM
200 nM
B
Glibenclamide 20 μM
1 g
3 min
ACh 10 μM
200 nM
VIP 100 nM


A
Gastric corpus
Kir 6.2
β-actin
Gastric antrum
Kir 6.2
β-actin
B
Gastric corpus
SUR 2B
β-actin
Gastric antrum
SUR 2B
β-actin