

## Effects of electrical stimulated hypothalamic paraventricular nucleus on gastric ischemia-reperfusion injury in rats

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### Abstract

**AIM:** To investigate the effect and regulation of electrical stimulation on the paraventricular nucleus (PVN) of hypothalamus using rat gastric ischemia-reperfusion injury (I-RI) induced ulcer model.

**METHODS:** Adult male Sprague-Dawley rats weighing 150-250 g were used. The surgically prepared rats were kept fasting for 24 h, but allowed free access to water. They were then anesthetized with urethane (1 g/kg), the celiac artery was clamped with a small clip (holding force 145 g) for 30 min, reperfusion was established by removal of the clamp, 60 min after reperfusion, the rats were killed and their stomachs were removed and perfused intragastrically with 100 mL/L formalin for 30 min, and the ulcer index was scored according to Guth *et al*. The PVN was obtained according to atlas of Paxinos and Watson. The electrodes and cannula were inserted

into the PVN for the electrical stimulation, electrical injury and PVN injection.

**RESULTS:** In control group (30 min ischemia and 60 min reperfusion only), ulcer index was  $184.70 \pm 60.80$  ( $n = 8$ ); in electrical stimulation s of PVN (0.2 mA, 0.4 mA and 0.6 mA) + I-RI group, ulcer indexes were  $102.40 \pm 20.39$ ,  $85.37 \pm 39.76$  and  $45.00 \pm 19.04$  ( $n = 8$ ) respectively. Compared with the control group there was significant difference ( $P < 0.01$ ) in a dose dependent manner. In electrical lesion of bilateral PVN + I-RI group, ulcer index was greatly increased ( $230.00 \pm 47.30$ ,  $n = 8$ ). Microinjection of 3% L-glutamate 0.5  $\mu$ L into PVN could produce similar effect to that of PVN stimulation (ulcer index  $75.14 \pm 37.18$ ,  $n = 8$ ). A further study indicated that the MDA, pepsin activity and gastric acidity were reduced by PVN stimulation but no obvious changes of gastric juice volume, total acid output and gastric mucus barrier were observed.

**CONCLUSION:** The PVN is one of the specific CNS areas capable of protecting the gastric ischemic-reperfusion injury in rats, and related to decreased MDA, pepsin activity, gastric acidity, while gastric juice volume, total acid output and gastric mucus do not likely play any important role in it.

**Key words:** Paraventricular nucleus, hypothalamus; Gastric ischemia reperfusion; Electric stimulation; Rat

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