

## Effect of acupuncture stimulation on gastric and duodenal motility in anesthetized rats

<sup>1)</sup> Eitaro Noguchi, <sup>2)</sup> Hideo Ohsawa

<sup>1)</sup> Laboratory of Acupuncture Science, <sup>2)</sup> Laboratory of Physiology, Tsukuba University of Technology, Japan

**Background:** Acupuncture has been used for over one thousand years in Asia for the treatment of various diseases including gastrointestinal dysfunction. However, the mechanisms underlying the effects of acupuncture on gastrointestinal function have long awaited clarification.

This presentation introduces the research of Sato et al. (1993) and Noguchi et al. (2003), for analyzing the neural mechanisms of gastric and duodenal motility elicited by acupuncture stimulation in anesthetized rats.

**Materials & Methods:** The effects of acupuncture-like stimulation (manual-acupuncture) on gastric motility and electro-acupuncture stimulation (EAS) on duodenal motility were examined in anesthetized, artificially ventilated Wistar rats. Gastric and duodenal motility were measured using the balloon method.

**Result:** An acupuncture needle was inserted into the skin and underlying muscles to a depth of 4–5 mm, and was twisted manually right and left approximately once every second for 60 s (AS).

Acupuncture stimulation (AS) of the abdomen inhibited gastric motility by increasing the activity of gastric sympathetic efferent nerves, and stimulation of the hindpaw facilitated gastric motility by increasing the activity of the gastric vagal efferent nerves. The inhibitory gastric motility response to the abdominal stimulation was eliminated by severing of the lower thoracic spinal nerves, and the excitatory gastric motility response to the hindpaw stimulation was eliminated by severing the femoral and sciatic nerves. Furthermore, abdominal stimulation induced inhibition of gastric motility persistent in spinalized rats, while the hindpaw stimulation induced excitation of gastric motility disappeared.

Duodenal motility was inhibited by acupuncture stimulation (EAS) at intensities more than 5.0 mA (suprathreshold of group IV afferent excitation) when applied to the abdominal region. The duodenal inhibitory response existed after bilateral vagotomy or spinal transection, but was eliminated by sectioning bilateral splanchnic nerves. Duodenal motility was facilitated by EAS at intensities more than 2.0 mA (subthreshold of group IV, and suprathreshold for groups II and III afferent excitation) when applied to the hindpaw. The duodenal facilitatory response to electric-acupuncture stimulation (EAS) of the hindpaw existed after sectioning the splanchnic nerves, but disappeared after bilateral vagotomy or spinal transection.

**Conclusion:** The inhibitory responses of gastric and duodenal motility elicited by acupuncture stimulation (AS) of the abdominal area were spinal reflex responses involving splanchnic inhibitory efferent nerves, and the enhanced responses of gastric and duodenal motility by acupuncture stimulation (AS) to a hindpaw were supraspinal reflex responses involving vagal excitatory nerves.

**Keywords:** gastric motility, duodenal motility, somato-autonomic reflex, rat