# MYOELECTRIC ACTIVITY OF GASTRIC ANTRUM AND JEJUNUM IN ANAESTHETISED GUINEA PIGS

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( Received on December 15, 1985 )

**Summary :** The myoelectric activity of gastric antrum and jejunum was recorded in anaesthetised guinea pigs with Ag-AgCl electrodes. The investigation demonstrated the presence of slow waves and spike potentials. The variability in the pattern of myoelectric activity observed in our study might be due to anaesthesia.

**Key words :** myoelectric activity guinea pig jejunum gastric antrum

## INTRODUCTION

The presence of the major types of electrical activities of the smooth muscle of the gastrointestinal tract, namely, the slow waves (basal electrical rhythm) and the spike potentials (electrical response activity) have been reported in various species. It is generally believed that the slow waves are present in all the species and in all segments of the gastrointestinal tract from lower oesophagus sphincter downwards. Costa *et al.* (3) suggested that the guinea pig small intestine may differ from other mammals regarding myoelectric activities. In experiments with guinea pigs it had been shown that the generation of slow waves in guinea pigs differs from other mammals (8). There are certain studies which even cast doubt for the presence of spontaneous slow-waves in the small intestine of guinea pigs (1,7). Recently Galligan *et al.* (5) reported the spontaneous slow waves in conscious guinea pigs. In view of the few reports, that too with contradiction, the present investigation was undertaken to study the myoelectric activity of the gastrointestinal tract of the anaesthetised guinea pigs.

## MATERIAL AND METHODS

Twelve male guinea-pigs (340-460 gms) fasted for 16 hours with water *ad libitum* were mildly anaesthetised with one half of full dose (1500 *mg/kg* body weight) of 25%

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urethane (IP) followed by local infiltration of 1 *ml* of Xylocaine 2% in the anterior abdominal wall. The midline incision was made in the abdomen. A bipolar Ag-AgCl electrode was sutured in six animals on the serosal surface of the gastric antrum and also on the antimesenteric side of the small intestine about 30 *cms* from the pylorus in rest of the animals. A grand eledtrode, made of stainless steel-needle was fixed under the skin of the right thigh of the animal. The rectal temprature was maintained between 34-37°C by electrical heating of the operation table. The recording was started after 30 minutes to avoid the possible effects of electrode placements and handling of the viscera. The myoelectric recordings were made on Grass 7 Polygraph using the Preamplifier 7P5A with Time constant 0.45 and high cut off frequency at 75 Hz. In those guinea pigs where small intestinal myoelectrical activity was recorded it turned out to be necessary to record the spontaneous respiration of the guinea pig and it was recorded using the volumetric pressure transducer Grass PT 5A, and the Preamplifier 7PIA with high cut off trequency at 15 Hz, through a three way cannula in the trachea of the animal. To avoid drying up of the viscera the obdominal opening was covered with saline soaked cotton. Whenever the animal started making movements in between the recording time, 1.0 *ml* of 25% urethane was given (1 M) in the thigh and usually such maintenance anaesthesia was necessary once or twice in any given guinea pig. Analysis was made visually, from the polygraph tracings. A few tracings had to be discarded as they were much contaminated with the respiratory artifacts.

## RESULTS

*Myoelectric activity of the gastric antrum (Fig. 1)* : The myoelectric activity consisted of slow waves. The slow waves had an average amplitude of 120 microvolts and an average frequency of 7.5 cycles/min. It could be recorded at least for two hours after the actual recording was started. The slow waves were sometimes briefly replaced by irregular slow voltage fluctuations. The slow waves occasionally showed discrete sharp spikes, the amplitude of which varied from 50 to 300 microvolts. There was no periodicity in the occurrence of spikes. However, four guinea pigs showed most of the time irregular slow voltage fluctuations instead of typical slow waves as described above.

*Myoelectric activity of the small intestine (Fig. 2)* : The location of the electrodes in all the six animals was in the jejunum. The figure represents the typical slow waves of the jejunum. The slow waves were of average ampliiude 100 microvolts with average frequency of 22.7 cycles/min. The slow waves carried occasional discrete spikes the amplitude of which was about 200 microvolts. No periodicity in the occurrence of spikes was observed. The slow waves were most often

**replaced by irregular slow fluctuations. In two guinea pigs intense spikes (Fig. 3) occurred in bursts suppressing the slow waves, resembling the Phase II and the Phase III of the reported interdigestive-myoelectric complex (4, 5, 9).**

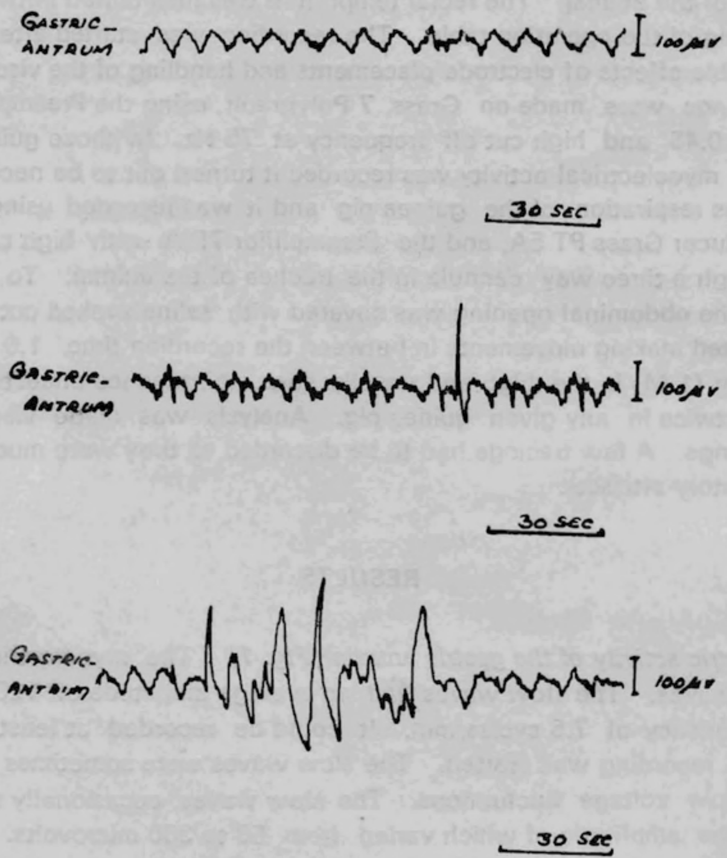


**Fig. 1 : *Upper recording :* myoelectric activity of the gastric antrum. Small respiratory movements are superimposed on the slow waves. *Middle recording ;* spike potentials on some of slow waves. *Lower recording :* slow waves are changed to large amplitude waves.**

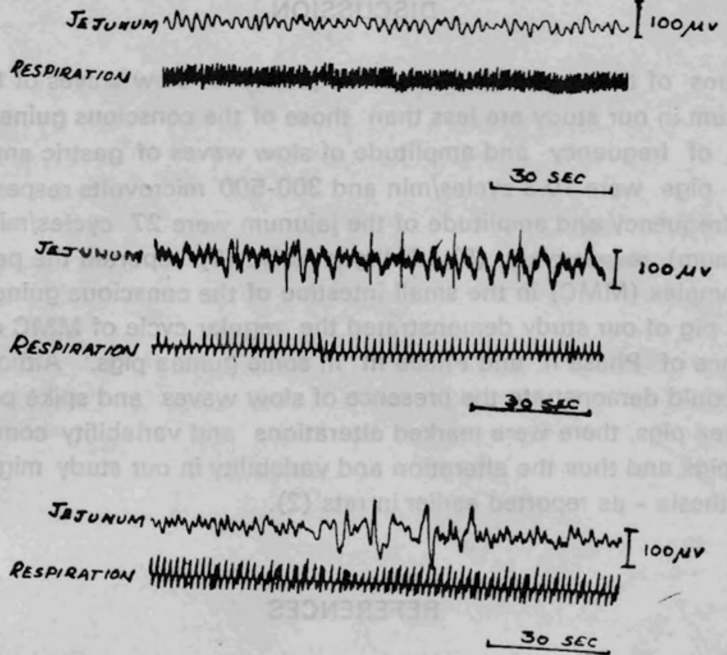


**Fig. 2 :** *Upper recording :* myoelectric activity of the jejunum. *Middle recording :* spike potentials on the slow waves. *Lower recording :* slow waves are changed to large amplitude waves.

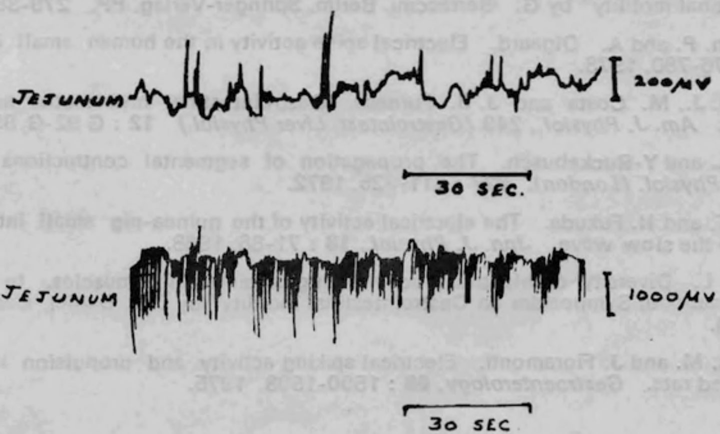


**Fig. 3 :** Myoelectric activity of the jejunum. *Upper recording :* Phase II of the interdigestive myoelectric complex. *Lower recording :* Phase III of the interdigestive myoelectric complex.

## DISCUSSION

The values of the amplitude and the frequency of slow waves of both gastric antrum and jejunum in our study are less than those of the conscious guinea pigs. The reported values of frequency and amplitude of slow waves of gastric antrum of the conscious guinea pigs were 10.3 cycles/min and 300-500 microvolts respectively, whereas the values of frequency and amplitude of the jejunum were 27 cycles/min. and 240 microvolts (maximum) respectively (5). Galligan *et al.* (5) reported the periodic migrating myoelectric complex (MMC) in the small intestine of the conscious guinea pigs. But no single guinea pig of our study demonstrated the regular cycle of MMC except the occasional occurrence of Phase II and Phase III in some guinea pigs. Although the present investigation could demonstrate the presence of slow waves and spike potentials in anaesthetised guinea pigs, there were marked alterations and variability compared with conscious guinea pigs and thus the alteration and variability in our study might be due to the effect of anaesthesia - as reported earlier in rats (2).

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