

## PACESETTER POTENTIAL CONTROL OF GASTROINTESTINAL MOTILITY

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The pacesetter potential (PP or slow wave) is an omnipresent rhythmical change in electrical potential readily recorded from the longitudinal muscle layer of the stomach and small bowel by electrodes sewn to their serosal surfaces. When contractions occur, bursts of action potentials, or fast oscillations in potential, accompany each PP.

Results indicate that the frequency of contractions and the direction and velocity of their propagation, as well as their duration and length, are controlled by the pacesetter potentials.

To put this hypothesis to test, Keith A. Kelly and I, with colleagues at the Mayo Foundation, have, stimulated the stomach and small bowel electrically. When stimuli of appropriate duration and voltage are used, the natural pacesetter potential may be driven to faster or slower frequencies. Propagation of the new pacesetter potential from the site of stimulation may be in caudad or orad directions or both. Action potential activity and the associated contractions may also be propagated in both directions from the abnormal pacemaker site. The motor consequences of these phenomena will be illustrated in a motion picture made of the small bowel of dogs during artificial electrical entrainment of the pacesetter potential.

The observations demonstrate that the PP is the peripheral regulator or governor of the motor activity of the stomach and small bowel. Through it, the more central control stations in the nerve cells of the intramural plexuses, in the coeliac ganglia, and in the central nervous system, exercise their supervision of motor activity. These centers, in association with some hormones, orchestrate the motility patterns characteristic of digestive and interdigestive periods. They do this within the peripheral framework provided by the pacesetter potential.

The results offer the prospect that artificial electrical pacing of the PP may have some practical applications in the treatment of motor disorders of the bowel, particularly in instances of PP irregularities or failure.

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