

## **Control of gut motility**

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The motor behaviour of the isolated intestine is the result of interaction of myogenic and neurogenic processes. One of the major functions of these mechanisms is the appropriate propulsion of contents. We have investigated the range of propulsive motor patterns in responses to different mechanical stimuli along the guinea-pig digestive tract by constructing and analysing spatio-temporal maps from video recordings, combined with other physiological parameters including electrical activity, intraluminal pressure and flow. Animals were killed by stunning and exsanguination according to approved protocol by the Flinders University Animal Welfare Committee.

In the resting small intestine pendulum movements were due to slow waves propagating mainly in the longitudinal muscle. Slow fluid distension of small intestine triggered nerve mediated circular muscle peristaltic contraction (neural peristalsis), which was unrelated to slow wave activity. The propulsive contractions along the small intestine propagated with variable speed depending on the viscosity of the contents, indicating that neural peristalsis is adaptive. Peristalsis becomes intermittent if distension is maintained. Endogenous mediators NO, opioids or noradrenaline are not responsible for the intermittency. Neurogenic and myogenic mechanisms are similar along the small intestine.

In the proximal colon slow waves generated myogenic contractions propagating in both oral and anal direction at very slow speed but with little or no propulsive activity. Distension elicited irregular neurally dependent propagating contractions (neural peristalsis), which slowly pushed contents into a flexure where pellets are formed. Liquid or solid luminal contents elicited graded neurally dependent propulsive contractions starting just aboral to the colonic flexure and being present along the distal colon and rectum. Content independent slowly migrating motor complexes were observed in the distal colon.

The use of spatio-temporal maps enables the detection and quantification of a greater variety of propulsive and non-propulsive motor patterns than other recording methods.