Temporal relationships between intraluminal manometry and actual gut movement in the isolated rabbit small intestine

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The content of the intestine is propelled by coordinated movements of the muscle layers involving both myogenic and neurogenic mechanisms. The relation between motions of the gut wall and the resulting intraluminal pressure has not been well established. We have investigated this relationship in isolated segments of rabbit small intestine taken from 4 animals killed by i.v. injection of lethobarbital (0.5ml/Kg). Segments of 40 cm were placed into an organ bath containing warm (36°C) oxygenated Krebs solution, constantly bubbled with carbogen gas. Krebs was infused *via* the cannulated oral end at 2-4ml/minute and the contents could be expelled and measured at the anal end *via* a non-return valve. Motions of the intestinal wall was recorded by a video camera placed above the bath. Spatio-temporal maps of changes in diameter (Dmaps) were constructed from the video recordings (Hennig *et al.*, 1999). Spatiotemporal maps of intraluminal pressure (Pmaps) were constructed from high-resolution fibre-optic manometry recordings (Arkwright *et al.*, 2009). The relation between movements and intraluminal pressure were compared during periods of motor activity that occurred spontaneously or elicited by slow distension or by erythromycin (10-6M). A total of 85 minutes of combined Dmaps and Pmaps were analysed. During this period 813 longitudinal muscle contractions, 288 circular muscle contractions in the diameter maps and 1049 pressure events were identified in the pressure maps. All antegrade propagating circular muscle contractions were associated with high pressure waves and with outflow at the anal end indicating propulsive motor activity. Incomplete propagating circular muscle contractions were also associated with pressure waves. In the segment of intestine not invaded by these contractions, peaks of pressure were recorded simultaneously indicating a common cavity. Pressure waves of a much lower amplitude were also associated with spontaneous pendular longitudinal muscle contractions. These results will enable a more appropriate interpretation of manometry *in vivo*.

Hennig GW, Costa M, Chen BN, Brookes SJ. (1999) *Journal of Physiology* **517:** 575-590.

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