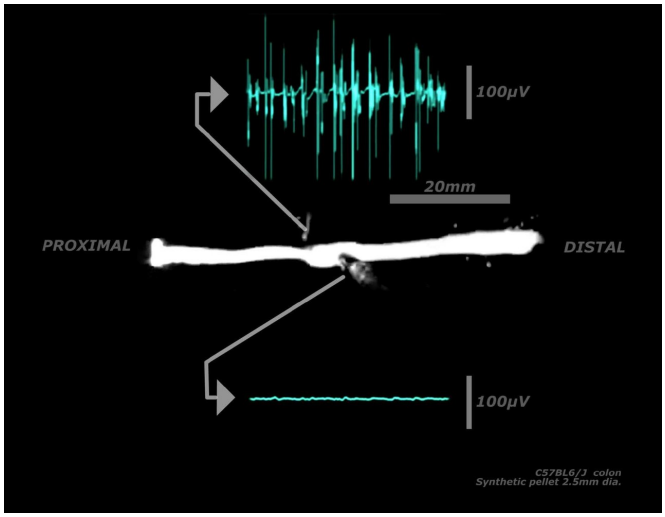
'Second brain' neurons keep colon moving

29 May 2018



Smooth muscle electrical activity recorded during fecal pellet propulsion along the isolated mouse colon. Isolated whole colon is shown from a video recording made above the colon. The fecal pellet inserted into the proximal colon propagates anally. As the fecal pellet passes over the first electrode a discharge of compound action potentials occurs in bursts at ~2 Hz. As the pellet passes over the second electrode a similar burst of 2 Hz muscle action potentials occurs behind the fecal pellet causing contraction of the muscle that underlies propulsion. Credit: Spencer et al., JNeurosci (2018)

Millions of neurons in the gastrointestinal tract coordinate their activity to generate the muscle contractions that propel waste through the last leg of the digestive system, according to a study of isolated mouse colons published in *JNeurosci*. The newly identified neuronal firing pattern may represent an early feature preserved through the evolution of nervous systems.

The enteric nervous system (ENS) is known as the "second brain" or the brain in the gut because it can operate independently of the brain and spinal cord, the central nervous system (CNS). It has also been called the "first brain" based on evidence suggesting that the ENS evolved before the CNS. Despite the known role of the ENS in generating motor activity in the colon, observing ENS neurons in action has been a challenge.

Nick Spencer and colleagues combined a new neuronal imaging technique with electrophysiology records of smooth muscle to reveal a pattern of activity that involves many different types of neurons firing simultaneously in repetitive bursts to activate the muscle cells at the same rate. They demonstrate how this rhythmic activity generates so-called colonic migrating motor complexes to transport fecal pellets through the mouse colon. These findings identify a previously unknown pattern of neuronal activity in the peripheral nervous system.

More information: Nick J Spencer et al, Identification of a rhythmic firing pattern in the enteric nervous system that generates rhythmic electrical activity in smooth muscle, *The Journal of Neuroscience* (2018). DOI: 10.1523/JNEUROSCI.3489-17.2018

Provided by Society for Neuroscience