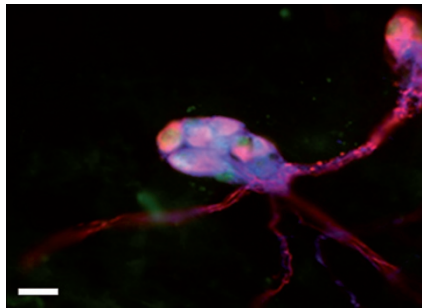


NEUROGASTROENTEROLOGY

New approach enables live recordings of nerve activity in intestinal biopsy samples

Intestinal biopsy samples taken during routine endoscopy provide enough viable human enteric neurons to enable live recordings of enteric neuron activity via calcium (Ca^{2+}) imaging. “By combining precise microdissection and Ca^{2+} imaging, we were able to record nerve activity in human neurons wired in their original environment,” says Pieter Vanden Berghe, corresponding author of this recent study.

Although other researchers have studied the activity of human enteric neurons, they have been restricted to using surgical tissue samples, which are from patients with severe disease and are of limited availability. Vanden Berghe and colleagues Carla Cirillo and Jan Tack developed their method to circumvent limited tissue availability and the presence of disease-linked confounding factors. “Performing biopsies can be considered low risk and rather noninvasive; therefore, this method makes it possible to investigate human nerve activity from a wide variety of



Human intestinal neurons in an intestinal biopsy sample, labeled with three different neuronal markers: NF200 (red), HuC/D (green) and β -tubulin (blue). Scale bar = 20 μm . Image courtesy of P. Vanden Berghe.

patients and even volunteers,” explains Vanden Berghe.

Analysis of 72 duodenal biopsy samples (from 48 patients referred for evaluation of presumed functional gastrointestinal disorders) identified an average of 7.7 ± 6.0 ganglia, 35.1 ± 25.3 neurons and 2.1 ± 1.8 isolated neurons per biopsy sample. Neurons could be activated by exogenous application of a

nicotinic cholinergic receptor agonist or serotonin, or by electrical stimulation of interganglionic fiber tracts. Tetrodotoxin and zero- Ca^{2+} solution were both able to suppress these responses in part or in full.

The researchers are now using their technique to see whether enteric neuron function is affected in specific gastrointestinal disorders. They also suggest that it could be used to study the physiological properties of enteric neurons in the setting of gastrointestinal and neurological diseases in general. “This method also offers the opportunity to perform drug testing on human neurons and may be a first step in the development of testing personalized drug treatment,” concludes Vanden Berghe.

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Original article Cirillo, C. *et al.* Nerve activity recordings in routine human intestinal biopsies. *Gut* doi:10.1136/gutjnl-2011-301777