

# Mapping the "Second Brain": Development and Organization of the Enteric Nervous System

**January 31**

**Tuesday, 12:30 pm**

**Zoom only**

**For Researchers**

**SPEAKER:**



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**Host: Julia Kaiser, Ph.D.**

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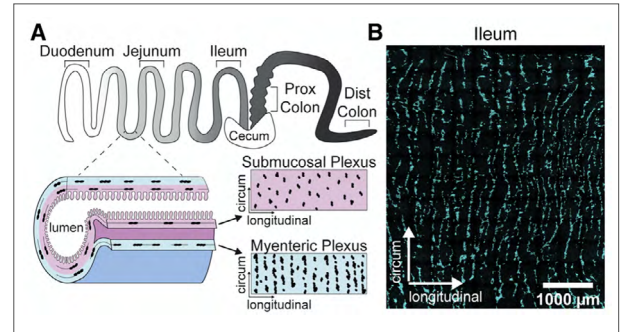
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## Abstract

The organization and cellular composition of tissues are key determinants of their biological function. In the mammalian gastrointestinal (GI) tract, the enteric nervous system (ENS) intercalates between muscular and epithelial layers of the gut wall and can control GI function independent of central nervous system (CNS) input. As in the CNS, distinct regions of the GI tract are highly specialized and support diverse functions, yet the regional and spatial organization of the ENS remains poorly characterized. Cellular arrangements, circuit connectivity patterns, and diverse cell types are known to underpin ENS functional complexity and GI function, but enteric neurons are most typically described only as a uniform meshwork of interconnected ganglia. Here, we present a bird's eye view of the mouse ENS, describing its previously underappreciated cytoarchitecture and regional variation. We visually and computationally demonstrate that



enteric neurons are organized in circumferential neuronal stripes. This organization emerges gradually during the perinatal period, with neuronal stripe formation in the small intestine (SI) preceding that in the colon. The width of neuronal stripes varies throughout the length of the GI tract, and distinct neuronal subtypes differentially populate specific regions of the GI tract, with stark contrasts between SI and colon as well as within subregions of each. This characterization provides a blueprint for future understanding of region-specific GI function and identifying ENS structural correlates of diverse GI disorders.

### Publications

1. Dershowitz L. B., Li L., Paşca A. M.Ş, Kaltschmidt J. A.Ş (2022). *Anatomical and functional maturation of the mid-gestational human intestine*. bioRxiv doi: 10.1101/2022.08.02.501641
2. Hamnett R.#, Dershowitz L. B.#, Sampathkumar V., Wang Z., Andrade V., Kasthuri N., Druckmann S., Kaltschmidt J. A. (2022). *Regional cytoarchitecture of the adult and developing mouse enteric nervous system*. *Curr Biol*. Aug 31:S0960-9822(22)01307-0. Online ahead of print. PMID: 36070775
3. Kobayashi Y.#, Bukowski A.#, Das S.#, Espenel C., Gomez-Frittelli J., Wagle N., Bakshi S., Saha M., Kaltschmidt J. A.Ş, Venkataraman A.Ş, Kulkarni S.Ş (2021) *COUNTEN, an AI-driven tool for rapid and objective structural analyses of the enteric nervous system*. *eNeuro* 8(4), ENEURO.0092-21.2021. PMID: 34266963