

## Supplemental Figure legends

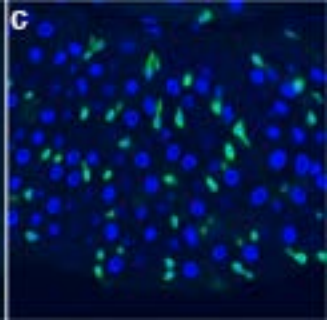
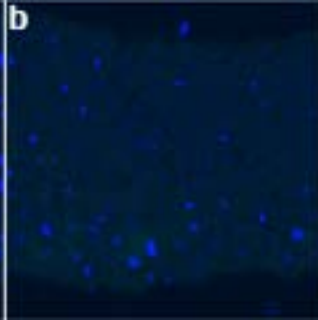
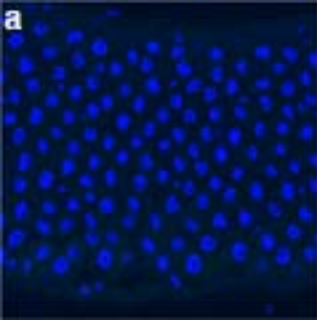
Figure S1: Whole mount adult *Drosophila* gastrointestinal tract imaged in cross-section (anterior to left, dorsal is up, phalloidin, white). The cardia (c) and pylorus (p) are landmarks that define three regions of the adult gastrointestinal tract; foregut (just out of frame at left), midgut, and hindgut. According to the nomenclature of Strasburger the midgut can be further subdivided in to the magen, a straight section of the midgut just posterior to the cardia, followed by the first and second loop of the midgut. The midgut is lined with epithelial cells that project into the luminal space (l) and have a prominent striated border (sb). The adult gastrointestinal tract is surrounded a layer of longitudinal muscle and a layer of circumferential muscle (m).

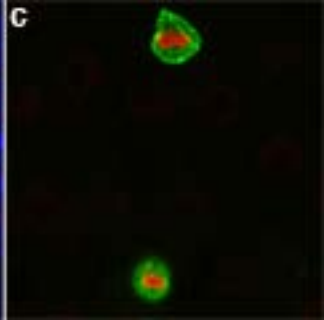
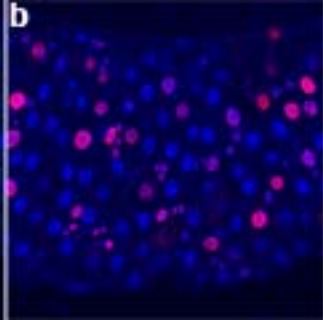
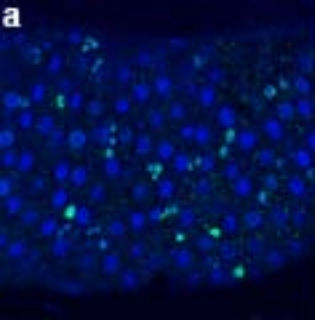
Figure S2: *esg*<sup>+</sup> cells define a population of midgut progenitors. (a, b) DNA synthesis is detected in *esg*<sup>+</sup> cells following a BrdU pulse. (a) Overlay (*esg-lacZ*, green; DAPI, blue). (b) Overlay (anti-BrdU, red; DAPI, blue). (c) Mitosis is detected in *esg*<sup>+</sup> cells. *esg-Gal4, UAS-GFP* cells express high levels of phospho-histone H3 (anti-GFP, green; phospho-histone H3, red).

Figure S3: *Gal80<sup>ts</sup>* provides control of transgene expression in the adult midgut (anti-GFP, green; DAPI, blue). (a,b) *esg-Gal4, UAS-GFP, tub-Gal80<sup>ts</sup>* flies grown at 18° C, the permissive temperature. No GFP signal is detected in midguts in either (a) Luminal or (b) Superficial sections of the midgut. (c) *esg-Gal4, UAS-GFP, tub-Gal80<sup>ts</sup>* flies shifted to 29° C, the non-permissive temperature, for 2 days. GFP is now detectable in the *esg*<sup>+</sup> cells.

Figure S4: A model of the adult *Drosophila* midgut. (a) Wild type progenitor cells indicated in green, epithelial cells in blue, and enteroendocrine cells in red. (b) Manipulations that reduce N signaling in *esg*<sup>+</sup> cells. (c) Manipulations that activate N signaling in *esg*<sup>+</sup> cells.





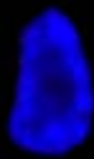


**a wild type:**

progenitor cell;  
esg<sup>+</sup>,  
pros<sup>-</sup>,  
Su(H)GBE<sup>-</sup>



high N



epithelial cell

low N



progenitor cell

N independent



enteroendocrine cell

**b N loss:**



**c N gain:**

