

Noah F. Shroyer, PhD

Assistant Professor

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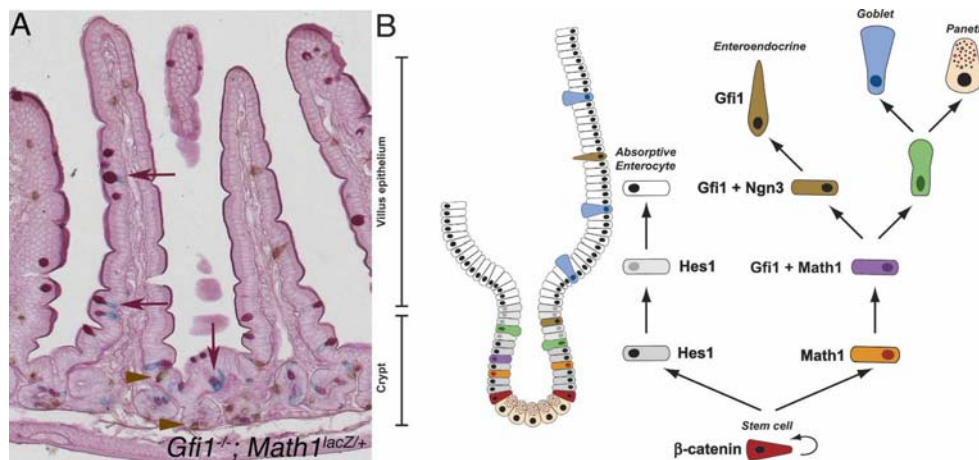
Description of Research:

Dr. Shroyer studies cellular networks that maintain epithelial homeostasis in the intestinal tract. In the intestinal epithelium, the balance between proliferation and apoptosis within the crypts of Lieberkuhn maintains villus height and crypt depth; disruption of this balance leads to cancer. Within the crypts, stem cells produce both absorptive and secretory cells. Several genes have been implicated in this process, but delineation of an ordered hierarchy for control of intestinal epithelial differentiation is lacking. One gene in this hierarchy, Math1, is required for secretory lineage development as demonstrated by findings in mice lacking Math1, which produce absorptive enterocytes but none of the secretory lineages. Dr. Shroyer hypothesizes that Math1-dependent secretory lineages are required locally for proliferative homeostasis in the intestine, and that delineation of the genetic pathway for secretory lineage differentiation will clarify the mechanism of intestinal epithelial homeostasis. He is currently characterizing the genetic pathway for intestinal differentiation by microarray-based expression profiling of Math1^{-/-} crypts and crypts null for Gfi1, a putative Math1 target gene also shown to have a role in intestinal epithelial development. Additionally he will develop an in vivo lentiviral-siRNA system to ascertain the phenotype of Notch1 loss in the intestine, and ascertain its position in the hierarchy of intestinal differentiation.

Collaborations:

Dr. Shroyer is a new faculty member in the Division of Gastroenterology, Hepatology and Nutrition. He is developing a line of collaboration with Dr. Montrose to characterize the nature of cell death and extrusion (anoikis) within the intestinal epithelium. Dr. Shroyer will provide animals that lack goblet cells in the distal ileum to Dr. Montrose for image analysis. Dr. Cohen is his K01 mentor.

Representative Figure:



Secretory cells remain lineage committed in Gfi1^{-/-} intestine. A. Ileum from Gfi1^{-/-};Math1 lacZ/+ mice stained with Xgal (blue) for cells that expressed β-galactosidase under the control of the Math1 locus to mark intestinal secretory cells, periodic acid-Schiff (pink) to mark goblet and Paneth cells, and anti-serotonin immunohistochemistry (brown) to mark enteroendocrine cells. All cells marked by Xgal are marked by acid-Schiff (arrows) or serotonin (arrowheads) indicating secretory lineage restriction in Gfi1^{-/-} intestine. B. Model for intestinal epithelial differentiation. On the left is a cartoon drawing of a crypt and adjoining villus epithelium and on the right is a diagram detailing the cellular and molecular events in epithelial differentiation. Fig. 4 from Genes Dev, 2006;19:2412-2417.