

## HD 6 – Neural Crest and the Enteric Nervous System

### Learning Objectives:

Understand the origin of the neural crest, what is meant by an epithelial-mesenchymal transformation, dorsalization of the neural tube. Know the role of the ectoderm in induction, roles of BMPs, and the fates of the cells of the crest. Understand migration pathways and why crest-derived cells migrate preferentially through the anterior halves of somites.

*You should be able to:*

- 1) Discuss the innervation of the gut and why it is different from that of other organs, what these differences are, and what is known of the developmental mechanisms that are responsible for them.
- 2) Describe where in the embryo the neurons and glia of the ENS come from and what is known about the functions of guidance molecules in enabling the precursors of enteric neurons and glia to find their way to their correct destinations in the gut and the pancreas.
- 3) Discuss microenvironmental factors that sculpt the differentiation of enteric neurons and glia.
- 4) Explain why differentiation involves a progressive decline in potential accompanied by a matching gain in specification.
- 5) Explain how stages in differentiation can be recognized by demonstrating a number of transcription factors and growth factor receptors that serve as markers.
- 6) Explain why some of these markers are essential for cell survival, and that loss-of-function mutations in genes that encode them lead to congenital neuromuscular diseases of the bowel, such as Hirschsprung's disease.

### Reading Assignment:

- 1) Larsen, Human Embryology, 4th Ed.,  
Neural Crest pp117-128  
ENS pp 467-472
- 2) Gilbert, Developmental Biology, 8th Ed., pp407-418