

## Dan A. Wiginton, PhD

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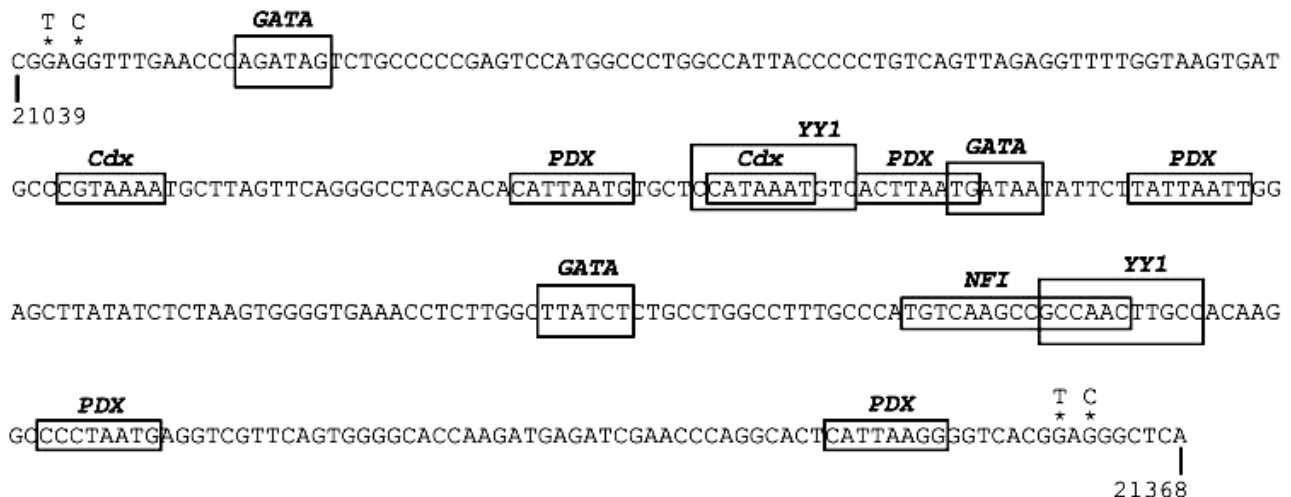
### Description of Research:

Research in the Wiginton lab focuses on *in vivo* mechanisms of gene regulation controlling development of the small intestine and cell differentiation along the crypt-villus axis of the small intestinal epithelium. It is proposed that a discrete network of regulatory factors control these processes. The Wiginton lab is attempting to understand the role of GATA factors (GATA-4/5/6) in the network that controls epithelial cell differentiation from stem cells into four major functional cell types (enterocytes, goblet cells, Paneth cells, and enteroendocrine cells). In addition, Dr. Wiginton's lab is investigating the genetic programs that regulate profiles of gene expression along the various physical and temporal axes of the small intestine. Significant variations in gene expression are observed along the cephalocaudal (horizontal) axis of the intestine within a particular cell type. These functional variations are established and maintained in the adult even though the intestinal epithelium undergoes a constant, continuous renewal. Changes in gene expression are also observed along the intestinal crypt-villus axis, related to cell differentiation status and cell migration. There are also very significant temporal changes in gene expression during fetal and early post-natal stages of intestinal development. Little is understood about how these temporal changes are orchestrated and regulated. The adenosine deaminase (ADA) gene is currently being used as a model in Dr. Wiginton's lab to understand the interrelated network of transcription factors and cis-acting elements that regulate gene expression along the various physical and temporal axes of the small intestine in humans and mice. An intestinal-specific enhancer and a novel temporal control element located in the ADA gene's second intron are under investigation, as part of these studies.

### Collaborations:

Dr. Wiginton has used the **Bioinformatics and Microarray Cores** in collaboration with Dr. Potter in examining the pygous (part of the Wnt signaling pathway) gene expression and function in the intestine and intestinal cell lines.

### Representative Figure:



Sequence of the duodenal enhancer region of the human ADA gene. Shown is the entire sequence of the duodenal enhancer. Numbers below the sequence ends correspond to residues of the human ADA gene sequence. Asterisks mark the nucleotide residues that were altered to create two BsiW1 restriction sites. Matches to several consensus recognition sequences for potential factor binding sites are boxed (two Cdx-type sites; two YY1-type sites; one NFI-type site). Fig. 1 from J Biol Chem 2005;280:13195-13202.