“Claudin-2, Claudin-12 and Cadherin-17: Novel Targets of Vitamin D Action”

National Institutes of Health
National Institute of Diabetes and Digestive and Kidney Diseases
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The National Institutes of Health has funded a project entitled “Claudin-2, Claudin-12 and Cadherin-17: Novel Targets of Vitamin D Action.” Dr. Angela R. Porta, Department of Biological Sciences at Kean University, will be the Principle Investigator. The object of this proposal is to obtain a better understanding of vitamin D action on intestinal calcium transport.

Vitamin D is a principal factor required for the development and maintenance of bone and for the maintenance of calcium homeostasis. It is well established that vitamin D mediates active transcellular transport of calcium in the intestine. Recent findings show that components of tight junctions and cell adhesion proteins are novel targets of vitamin D action in the intestine. The hypothesis to be tested is that vitamin D mediates intestinal calcium transport not only by the established active transport pathway but also via the paracellular pathway. Studies are proposed to examine these novel targets of vitamin D action that include claudin-2, claudin-12 and cadherin-17; proteins that are components of the extracellular matrix between intestinal cells where passive calcium transport occurs.

The proposed research will involve undergraduate students in all phases including experimental design, laboratory preparation, execution of experiments, data collection and analysis, scientific write-up and presentation of the results. The experience will provide undergraduates with a foundation in contemporary research concepts and methodology related to the function of proteins in cell physiology.

Experiments proposed will give insight for the first time into the in vivo role of the extracellular matrix proteins claudin-2, claudin-12 and cadherin-17 in vitamin D mediated intestinal calcium transport in the duodenum, jejunum and ileum. Insight into how vitamin D regulates the paracellular process will provide a more complete understanding of 1,25(OH)₂D₃ mediated intestinal calcium absorption. Elucidation of these mechanisms is critical to the future development of drugs that may influence calcium entry by the intestine, helping to maintain calcium homeostasis in metabolic and degenerative diseases associated with calcium imbalance such as osteoporosis.