

John N. Lorenz, PhD

Associate Professor

Department of Molecular and Cell Physiology

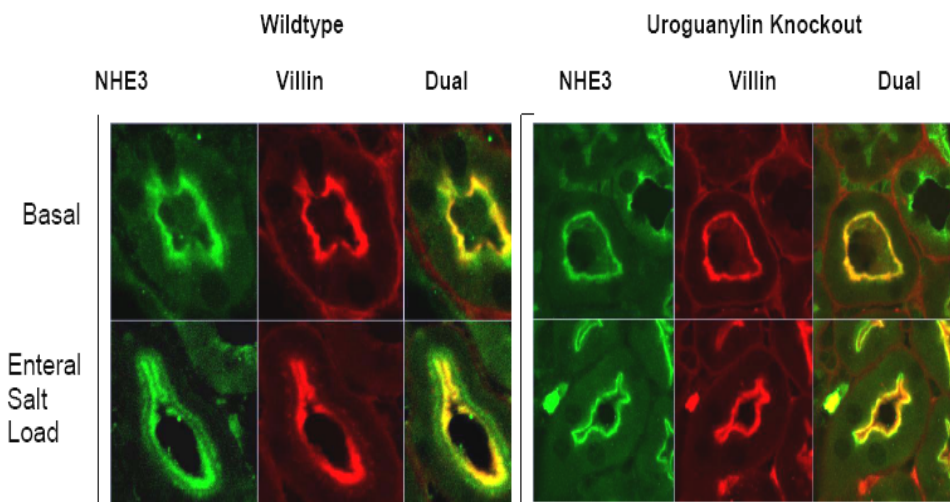
Description of Research:

Dr. Lorenz focuses on the study of integrative physiology in a wide variety of transgenic mice with selectively induced genetic mutations. His research design is to evaluate the biological interplay among various ion transporters in the gastrointestinal-renal-cardiovascular axis. Using molecular techniques to produce mice lacking various gastrointestinal and kidney-specific transporters, he is studying the contribution of these transporters to overall fluid and electrolyte homeostasis. Presently, he is pursuing the phenotypic analysis of several knockout strains of mice including the uroguanylin, guanylin, Na⁺/H⁺ exchanger 3, Na⁺/H⁺ exchanger 2, renal outer-medullary K⁺ channel, colonic H-K-ATPase, and Na-K-Cl cotransporter 1 knockouts. Using sophisticated techniques such as *in vivo* renal micropuncture and microperfusion, Dr. Lorenz hopes to gain a more thorough understanding of the salt and fluid homeostatic mechanisms within the kidney. Ultimately, these studies investigating hemodynamics and fluid and electrolyte balance will provide insights to genetic basis of disease states such as hypertension.

Collaborations:

Dr. Lorenz has used the **Integrative Morphology Core** in collaboration with Drs. Cohen and Shull examining the physiological phenotype of a variety of guanylin, uroguanylin, and H-K-ATPase gene-knockout models.

Representative Figure:



Using confocal imaging, NHE3 is expressed in the apical microvillar membranes of proximal tubules (green) in both uroguanylin (UGN) knockout (KO) and wild type (WT) animals under control conditions. Villin (red) is also expressed in the apical membrane. When co-localized, NHE3 and villin give combined immunofluorescence (yellow). However, after an enteral salt load, the NHE3 distribution within the microvillus membrane (MVM) is distinctly different. In WT animals, NHE3 appears to be retracted toward the base of the MVM to the intermicrovillar cleft region whereas in UGN KO, no such retraction occurs and NHE3 remains distributed along the whole length of the MVM and yellow immunofluorescence predominates. Representative photomicrograph is shown. NHE3= sodium hydrogen exchanger 3. Figure 7 from *J Pediatr Gastroenterol Nutr.* 2006 43:S74-S81