Generation of a Transgenic Mouse for the Study of Renal Acid/Base Regulation

Kent A. Riemondy, Safia Ahmed, Olivia Lucero (Lance Miller, Raoul Nelson)
Department of Pediatric Nephrology
University of Utah School of Medicine

The renal collecting duct plays an important role in salt, water and acid/base regulation. Within the collecting duct there are two cell types; principal cells and intercalated cells. Principal cells are involved in water and sodium reabsorption, whereas intercalated cells are involved in acid/base regulation. Principal cells have been studied extensively in cell culture systems and isolated tubule perfusion experiments. Intercalated cells however do not grow in culture and therefore have not been well characterized. We report the generation of a B1-CRE transgenic mouse line that allows for Cre-Recombinase (CRE) mediated gene disruption within the intercalated cells of the kidney. This transgenic mouse uses the promoter region of the B1-subunit of the vacuolar H+ ATPase to drive intercalated cell specific expression of CRE within the kidney. The recombination efficiency and specificity of CRE were measured by mating this mouse with a loxp-stop-loxp ROSA26YFP transgenic mouse. This transgenic mouse expresses the fluorescent protein YFP if CRE is present, and thus serves as a marker for CRE expression. Results show that the B1-CRE transgenic mouse mediated YFP expression in 100% of intercalated cells, and no evidence was found for expression within other renal cell types. These results indicate that the B1-CRE transgenic mouse line is a viable tool for intercalated cell gene targeting and allows researchers to identify novel genes important in intercalated cell development and acid/base regulation.