



Nephrology & CV Disease

The Prieto Lab: Kidney Biology & Hypertension

The kidneys are the central system responsible for controlling blood pressure and cardiovascular function, which they manage by regulating salt concentrations in the blood and urine. This is accomplished through a complex series of interactions and feedback mechanisms that center around the renin-angiotensin signaling system. Both cardiovascular disease and diabetes are closely tied to this system and kidney biology writ large.

The lab of Dr. Minolfa Prieto, MD, PhD, studies how the biology of a specific part of the kidney, the collecting duct, fine-tunes the control of salt concentration in the body and impacts blood pressure. The lab employs a holistic approach that utilizes tissue culture models, animal models, and patient data to gain a nuanced understanding of this process – with a consistent focus on applying basic scientific research to real patient data and the development of new treatments.

Collecting Duct Biology: Fine-Tuning Blood Pressure

Traditionally, most of the research focus on kidney biology and blood pressure has centered on the renin-angiotensin axis in the glomerulus and proximal tubule. The Prieto Lab instead focuses on the collecting duct, which is downstream of the glomerulus and proximal tubule.

Prorenin is converted into its active form renin in the collecting duct, leading to an increase in angiotensin. However, this process appears to be independent of mechanisms that control angiotensin in the context of elevated salt or high blood pressure in the glomerulus/proximal tubule – due to the expression of the pro renin receptor (PRR) in the collecting duct. Not only does the engagement of prorenin with its receptor activate angiotensin signaling, but it also activates pathways that can lead to fibrotic processes in the kidney.

These fibrotic, scarring processes are a major hallmark and cause of chronic kidney disease. The prorenin-PRR signaling axis represents a viable target for therapy, and The Lab is actively pursuing an inhibitor capable of targeting this receptor.



From Cells to Patients: Holistic Kidney Study

Dr. Prieto's medical background allows her to study the basic biology of kidney function while still focused on patient care and intervention, and her lab utilizes a wide array of model systems to study PRR biology. In addition to genetically-manipulated cell culture systems, they employ a variety of murine models to study kidney function in both normal and genetically-deficient contexts.

The Lab also uses mice to model obese and diabetic patient physiology and kidney function, and has access to human patient samples that allow the correlation of findings in the lab to real-world outcomes and human biology. As one example, the lab uses the mice to effectively model fluctuations in kidney function observed in patients pre- and post-bariatric surgery. It accomplishes this by monitoring the levels of key biological markers in urine and blood plasma.

The ability of the Prieto Lab to cover the full spectrum of kidney and hypertension studies (from cell culture to patient samples) is relatively unique in the field. This breadth has contributed to their success and ability to interrogate a variety of aspects of this important piece of human biology and health.

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