USCAP 2026 SUP-Companion Meeting
San Antonio, TX
22 March 2026
4:30-6:30 PM
Room 303A

Lysosomes and the Kidney: Small Organelles, Big Impact

Organizer/Planner:

Giovanna M. Crisi, MD PhD, Associate Prof. Pathology, UMASS-CHAN Medical School-Baystate, Springfield, MA

Moderator(s): TBD (preliminary)

Eric Warthow, PhD., Electron Microscopist, Department of Pathology, Colorado Childrens Hospital, Aurora, CO

Detailed Course Outline

- **Lysosomal dysregulation in chronic kidney disease**
  - Joseph P. Grande, MD PhD
  - Professor of Laboratory Medicine and Pathology
  - Mayo Clinic, Rochester, MN
  - **(35 minutes, 4:30-5:05PM)**

- **Central role of Lysosomes in Proximal tubulopathy- LCPT 20 years later?**
  - Maria M. Picken MD, PhD
  - Professor of Pathology
  - Internal Medicine (Nephrology) and Urology
  - Loyola University Medical Center,
  - Chicago, IL
  - ph: 708-327-2366
  - Fax: 708-327-2620
  - **(35 minutes, 5:10-5:45PM)**

- **Lysosomes in mesangial / proximal tubular cells and renal vasculature. Pathological events resulting from interactions with circulating monoclonal light chains. Morphology and molecular mechanisms.**
  - Elba A. Turbat-Herrera MD
  - Professor, Pathology
  - University of South Alabama / Whiddon College of Medicine
  - Mobile, Alabama
  - ETurbat-herrera@health.southalabama.edu
  - **(35 minutes, 5:50-6:25PM)**

References (selected)

- Kapur U, Barton K, Fresco R, Leehey DJ, Picken MM. Expanding the pathologic spectrum of immunoglobulin light chain proximal tubulopathy. *Arch Pathol Lab Med. 2007 Sep;131(9):1368-72.*

- Surendran K, Vitiello SP, Pearce DA. Lysosome dysfunction in the pathogenesis of kidney diseases. Pediatric Nephrology. 2014, Volume 29, pages 2253–2261

- Meyer-Schwesinger C. Lysosome function in glomerular health and disease. Cell Tissue Res. 2021 Jan 12; 385(2):371–392.

- Jung M, Lee H, Moon KC. Morphometric Analysis of Lysosomes in the Renal Tubule in Monoclonal Gammopathy Using Transmission Electron Microscopy: "Mottled Appearance" and Beyond. Microsc Microanal. 2022 Apr 19:1-9.

Course Description

The cell contains about 12 organelles, all of which play a specific and essential function in the well-being of each organ system. Lysosomes are membrane bound organelles considered as the “housekeeping” cell organelle. Lysosomes contain several enzymes responsible for breaking down proteins, cellular debris and toxins, and for recycling of nutrients. Lysosomes have a role in programed cell death and stress response, and in immune regulation and autoimmunity. Lysosomal dysfunctions may result in lysosomal storage diseases, metabolic syndromes, neurodegenerative diseases, cardiovascular diseases, aging, and cancer. In the kidneys lysosomes are involved in physiologic functions, such as protein reabsorption, autophagy and recycling of debris, water and electrolyte balance, and immune responses and signaling. Alternations in lysosomal functions results in several disease processes affecting the kidneys including storage disorders (e.g. Fabry’s and Cystinosis), Diabetic disease, Proteinuric diseases, Acute kidney injury, and Crystalline nephropathy. The program will present on the role of Lysosomes in chronic renal diseases including those with a significant vascular component, and in renal involvement by pathologic protein, monoclonal light chains, affecting glomeruli, tubules and vessels.

Why the topic was chosen - Identification of the professional practice gap and educational need.

The physiologic functions of cell organelles and the pathologic conditions that result from their dysfunction is essential in understanding human diseases. The fast pace of research on cell organelle function in the last 30 years has significantly increased the knowledge in the role of each organelle in human pathophysiology, including Lysosomes. Knowledge of these advances will enrich the in-training and already practicing professionals. Lysosomes are known as the “housekeeping” organelle, and when dysfunctional can lead to several alterations that affect all organ systems. In the kidney lysosomal dysfunction is seen in several conditions, including metabolic storage diseases, systemic vascular diseases, autoimmune processes, and in plasma cell dyscrasias. The topic of this program is selected to enhance the knowledge of participants in the role of lysosomes in selected diseases that affect the kidneys. The application of Electron microscopy as a diagnostic tool in these diseases will aid in recognizing the ultrastructural characteristics that indicate lysosomal dysfunction, and the ultrastructural abnormalities essential in the diagnosis of these acquired diseases. The participants will learn about the applications of EM in basic and translational research.

Course Learning Objectives

Upon completion of this educational activity, participants will be able to recognize the significant role of lysosomes in physiologic and pathologic states of certain diseases affecting the kidney. The participants will be able to:

- Name several functions of lysosomes related to kidney pathophysiology
- Describe lysosomal function and dysfunction in selected renal diseases
- Describe the role of lysosomes in proximal tubulopathy
- Describe lysosome function and deregulation in the accumulation of paraproteins in all renal compartments

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- Describe the role of lysosomes in proximal tubulopathy
- Describe lysosome function and deregulation in glomerular, tubular and vascular deposition of paraprotein

Target Audience

The target audience for this Companion Meeting includes general surgical pathologists and subspecialty renal and hematopathologists, ultrastructural pathologists, electron microscopists and researchers, pathologists in training, and pathologists wishing to learn about the current and future applications of diagnostic electron microscopy.

Professional practice gap

Research in basic pathophysiology of disease processes is continuously expanding with significant advances in understanding the intricate roles that each cell organelle has. In addition to playing an essential role in waste management by autophagy and phagocytosis, lysosomes play an essential role in immune regulation, degenerative diseases and cancer. Electron microscopy has been at the forefront in studies on organelle function/dysfunction and currently complements modern techniques in these advances. In-training and practicing pathologists may not be familiar with the role of EM and new EM modalities that are available and essential for the characterization of lysosomal related diseases at the ultrastructural level.

Educational Needs

The understanding of the basic pathophysiology of disease processes is continuously expanding, and a need to cover these advances is necessary for the general and subspecialty pathologists. In current training there is limited EM exposure, however the ultrastructural characteristics of certain diseases/disorders remains essential for guiding the differential diagnoses and/or essential to render a specific diagnosis. The topics that will be presented will educate the participants on the contributions of EM in several diseases associated to lysosomal dysfunction, including ultrastructural abnormalities seen in chronic renal diseases and pathologic light chain conditions affecting different renal compartments.