2016 Robert W. Berliner Award for Excellence in Renal Physiology

Michael J. Caplan
Department of Cellular and Molecular Physiology, Yale University School of Medicine, New Haven, Connecticut

The Robert W. Berliner Award for Excellence in Renal Physiology is the most prestigious award of the American Physiological Society (APS) Renal Section. It recognizes distinguished lifetime achievement in renal physiology research. This year’s recipient is Peter Aronson, M.D., of Yale University. Dr. Aronson will be honored at the 2016 Renal Dinner, and will participate in the Renal Section’s Posters and Professors Reception at EB 2016 in San Diego, California.

It is indeed fitting that Dr. Peter Aronson’s selection for the Berliner Award follows that of Dr. Heini Murer. Like Dr. Murer, Dr. Aronson was one of the pioneers of the use of membrane vesicles to study renal transport processes. By taking elegant advantage of this technique, he and his colleagues defined the properties of the sodium proton exchanger of the renal proximal tubule. These studies essentially established the foundation of our understanding of this critical transport system and dramatically expanded our mechanistic insight into the physiology of renal sodium bicarbonate absorption.

Dr. Aronson and his colleagues next sought to identify anion transport systems that might collaborate to account for transcellular chloride transport in the proximal tubule. To their surprise, they found robust chloride:formate and chloride:oxalate exchange activities. He hypothesized that a recycling mechanism involving membrane permeation from lumen to cytoplasm of formic acid, dependent upon protonation of lumen formate as a consequence of the acidification of the tubule fluid produced by the activity of the sodium proton exchanger, could drive net chloride uptake across the apical membrane. Furthermore, in beautiful microperfusion studies performed in collaboration with Dr. Tong Wang, Dr. Aronson and his colleagues showed that both chloride and oxalate in tubule fluid substantially stimulate chloride absorption, demonstrating that these transport systems are both present and important contributors to proximal tubule transport processes.

Dr. Aronson used the tools of molecular biology in his efforts to identify and characterize a chloride:oxalate exchange system that he postulated might play an important role in proximal tubule chloride absorption. His laboratory generated a knockout mouse and was initially terribly disappointed to find that these animals did not exhibit any substantial defect in chloride absorption. They did, however, develop severe calcium oxalate renal stones. This totally unexpected result initially made no sense at all. How could the loss of a transporter that should be delivering oxalate into the tubule lumen lead into an increase in the propensity for calcium oxalate stones to form? With his typical creativity and insight into physiology, Dr. Aronson realized that the chloride:oxalate exchanger might function not only in the kidney but also in the small intestine, where it might play an important role in oxalate excretion. A series of beautiful flux studies proved this hypothesis conclusively, revealing the existence of a completely new and unanticipated physiological and pathophysiological mechanism.

These highlights touch upon some of Dr. Aronson’s major discoveries, but they certainly do not constitute an exhaustive inventory of his many fundamental contributions. Furthermore, it is important...
to note that Dr. Aronson’s contributions extend beyond those that he has developed in his laboratory. Like Dr. Berliner before him, Dr. Aronson has been a tireless advocate for the development of physician scientists. He is a gifted and generous mentor, who has guided the development of generations of fellows and students, both in his own laboratory and as the Director of Yale’s Renal Fellowship Program and as an Associate Director of Yale’s M.D., Ph.D. Program. He has been an international advocate for renal research and training, serving on the Council and as the President of the American Society of Nephrology. In addition, his enormous contributions to renal physiology have been recognized by numerous honors, including the Homer Smith Award of the American Society of Nephrology and invitations to deliver the APS’s Carl W. Gottschalk Distinguished Lecture and Hans Ussing Lecture.

In summary, Peter Aronson has succeeded in pursuing a problem in renal physiology exactly as Dr. Berliner would have himself suggested. He immersed himself in an important process, characterized its activities, identified its components, defined its physiological role, and revealed its pathophysiological correlates. He accomplished this while at the same time being a tireless and generous advocate for students, fellows, and junior colleagues and a truly humble and decent person. Dr. Aronson’s career, accomplishments, and commitment honor Dr. Berliner’s extraordinary legacy of intellect, insight, rigor, and humility.