Nobel Winner Smithies to Discuss Gel Permeation in the Kidney

Oliver Smithies

The ASN welcomes Oliver Smithies, PhD, as he presents the Barry M. Brenner Endowed Lecture on "Gel Permeation in the Kidney" during Saturday's Meeting-Within-a-Meeting on "Novel Insights of Glomerular Function and Structure (Controversies)." The session will be held from 1:30 to 3:30 p.m.

Dr. Smithies' innovations in genetics have revolutionized genetic research and have led to improvements in the treatment of many diseases. He is the Weatherspoon distinguished professor of pathology and laboratory medicine at the University of North Carolina, Chapel Hill, School of Medicine.

Dr. Smithies will discuss his hypothesis that the kidney glomerular basement membrane separates molecules by gel permeation. He also will describe experiments testing this idea.

In the 1950s, Dr. Smithies invented gel electrophoresis—a technique now used to separate DNA, RNA, and protein molecules using an electric current applied to a gel matrix. This method helps to identify genes and is used in many analytic methods such as DNA sequencing and mass spectrometry (a technique for analyzing the composition of a sample or molecule). Gel electrophoresis is now a standard practice in laboratories worldwide.

Dr. Smithies advanced all fields of biomedicine when, in the mid-1980s, he (along with Mario Capecchi, independently) devised a technique to introduce DNA into cells in a manner that replicates the natural process of homologous DNA recombination. This technique—now called gene targeting—allows an investigator to alter genes in a pre-planned manner. When carried out in embryonic stem cells, the genetic changes can be introduced into living animals.

Dr. Smithies' original work was aimed at helping people with genetic disorders by correcting mutations in bone marrow stem cells. Although this still is not possible, gene targeting led to the development of mice that replicated human disease. Gene targeting is widely used to study specific genes by creating "knockout mice." After knocking out a specific gene, researchers can uncover what happens when the product of the gene is missing.

Dr. Smithies and his colleagues produced the first animal model of cystic fibrosis, a disease caused by one defective gene. He has used the technique to study high blood pressure, atherosclerosis, and other diseases. The genetic research methods he developed are now routine in biomedical research and have greatly helped advance genetic medicine and therapy.

Dr. Smithies received the Nobel Prize in Physiology or Medicine in 2007 (with Mario Capecchi and Martin Evans) for his "discoveries of principles for introducing specific gene modifications in mice by the use of embryonic stem cells." Among other honors, Dr. Smithies received the Wolf Prize in Medicine in 2003 and the Albert Lasker Award for Basic Medical Research in 2001 for work on homologous recombination. He was elected to the U.S. Institute of Medicine in 2003 and is a member of the University of North Carolina's Lineberger Comprehensive Cancer Center. Dr. Smithies received his DPhil in biochemistry in 1951 at Balliol College, University of Oxford, England.

Coburn Endowed Lecturer Quarles to Address Hormone-Bone-Kidney Axis

L. Darryl Quarles

L Darryl Quarles, MD, will present the 6th Annual Jack W. Coburn Endowed Lecture on "FGF23 and its Receptors: Lessons from Studies in Mice." He will give the lecture during the Basic and Clinical Science Symposium "CKD-MBD and Outcomes," held Saturday, October 31, from 1:30 to 3:30 p.m.

Dr. Quarles is known for his research on how kidney disease affects other organ systems, such as bone. He is currently the Summerfield Endowed Professor of Nephrology at the University of Kansas Medical Center, where he is director of the Kidney Institute, the division of nephrology, and the National Institutes of Health (NIH) T32 fellowship training program in nephrology.

Dr. Quarles will discuss the fibroblastic growth factor 23 (FGF23) hormone-bone-kidney axis as a conceptual framework for understanding the pathogenesis, diagnosis, and treatment of disorders characterized by high or low levels of phosphates in the blood and urine. Produced by osteocytes in the endocrine organ bone, FGF23 helps to regulate phosphate, vitamin D, and mineral homeostasis.

New knowledge is emerging regarding the complex systems biology surrounding FGF23 regulation and function. In helping to elucidate these studies, Dr. Quarles has investigated the cross-talk between bone and other organs that plays a role in adjusting phosphate balance and bone mineralization in response to changing physiological requirements.

Dr. Quarles has maintained an active NIH-funded research laboratory that studies disorders of mineral metabolism using mouse genetic approaches. In addition to studying the regulation and function of FGF23 in health and in chronic kidney disease, the laboratory also studies the role of polycystins and calcium-sensing receptors in bone, and the differential function of Runx2 isoforms.

Dr. Quarles is an elected member of the American Society of Clinical Investigation and the Association of American Physicians. He has authored more than 148 peer-reviewed articles and 15 book chapters.

Dr. Quarles received his medical degree in 1979 and completed his residency in internal medicine in 1982, both at the University of Alabama, Birmingham. He completed his fellowship in nephrology at Duke University Medical Center in 1985, and was professor of medicine and director of the Bone Center at Duke until 2004.