Editorials

1105 Pathophysiological Implications of Variability in Blood Tacrolimus Levels in Pediatric and Adolescent Kidney Transplant Recipients
Rachel Becker-Cohen
See related article on page 1194.

1107 Physiology of the Aging Kidney: We Know Where We Are Going, but We Don’t Know How …
Pierre Delanaye, Hans Pottel, and Toralf Melsom
See related article on page 1119.

1110 Health Care for Older Adults with Kidney Failure
Jorge I. Fonseca-Correa and S. Vanita Jassal
See related article on page 1159.

1113 Novel Approaches for the Removal of Uremic Solute
Mengyao Tang and Sahir Kalim
See related article on page 1168.

1116 Calamari, Hyperkalemia, and Renin-Angiotensin System Blockade
Emily Janak and Holly Kramer
See related article on page 1139.

Original Articles

Chronic Kidney Disease

1119 Age and the Course of GFR in Persons Aged 70 and Above
Elke S. Schaeffner, Natalie Ebert, Martin K. Kuhlmann, Peter Martus, Nina Mielke, Alice Schneider, Markus van der Ciet, and Dörte Huscher
See related editorial on page 1107.

Clinical Nephrology

1129 Prevalence and Risk Factors for Kidney Disease and Elevated BP in 2-Year-Old Children Born Extremely Premature
Sangeeta Hingorani, Robert Schmicker, Kaashif A. Ahmad, Ivan D. Frantz, Dennis E. Mayock, Edmund F. La Gamma, Mariana Baserga, Janine Y. Khan, Maureen M. Gilmore, Tonya Robinson, Patrick Brophy, Patrick J. Heagerty, Sandra E. Juul, Stuart Goldstein, and David Askenazi, for the PENVIT Trial Consortium

1139 Short-Term Changes in Serum Potassium and the Risk of Subsequent Vascular Events and Mortality: Results from a Randomized Controlled Trial of ACE Inhibitors
Toshiaki Ohkuma, Katie Harris, Mark Cooper, Diederick E. Grobbee, Pavel Hamet, Stephen Harrap, Giuseppe Mancia, Michel Marre, Anushka Patel, Anthony Rodgers, Bryan Williams, Mark Woodward, and John Chalmers, on behalf of the ADVANCE Collaborative Group
See related editorial on page 1116.

Glomerular and Tubulointerstitial Diseases

1150 Short- and Long-Term Progression of Kidney Involvement in Systemic Lupus Erythematosus Patients with Low-Grade Proteinuria
Shudan Wang, Allan Spielman, Mindy Ginsberg, Michelle Petri, Brad H. Rovin, Jill Buyon, and Anna Broder
vasculature is patchy, and the diagnosis may be missed if not enough sections are examined.6 There is no speci

Left image (light microscopy, H&E [400x])

Image Description:
glomerulosclerosis.
cholesterol embolization in the kidney and acute tubular necrosis superimposed on advanced chronic kidney injury with features of diabetic
and kidney ultrasound, was normal/negative. Kidney biopsy showed severe small arterial cholesterol clefts, suggestive of extensive
initiated during the same admission. Extensive workup for AKI, including hepatitis panel, serum and urine electrophoresis, immunofixation
and kidney ultrasound, was normal/negative. Kidney biopsy showed severe small arterial cholesterol clefts, suggestive of extensive
cholesterol embolization in the kidney and acute tubular necrosis superimposed on advanced chronic kidney injury with features of diabetic
glomerulosclerosis.

Image Description:
Left image (light microscopy, H&E [400x])—interlobular artery with cholesterol clefts; middle image (light microscopy, H&E [200x])—zonal
cortical scarring suggestive of recurrent atheroembolization to the kidney resulting in microvascular oblitative injury and zonal ischemic injury in the kidney parenchyma; right image (electron microscopy [5 μm])—highlighted the parallel angular cleft-like spaces in arterioles with surrounding swollen endothelial cells. Macrophages also accumulated and formed giant cell reaction around the cholesterol clefts.

Teaching Points:
Cholesterol crystal embolism is a common cause of kidney failure in older patients with atherosclerosis, and most of them were older than 70 years.1 The risk factors for cholesterol crystal embolism include male sex, White race, tobacco use, cardiovascular disease, cerebrovascular disease, hypertension, hyperlipidemia, diabetes, hypercoagulability, abdominal aortic aneurysm, peripheral vascular disease, and family history of vascular disease.2 The exact incidence of cholesterol crystal embolism is often underdiagnosed with at least 4% of all inpatient admission.3 It is estimated that about 30%–85% of patients with cholesterol crystal embolism have a history of invasive vascular procedure in the preceding 3 months, while only 4.3% had cholesterol embolism in age-matched controls that did not have invasive vascular procedure.4 Clinical presentation includes AKI, CKD, renal infarction, uncontrolled hypertension, and allograft failure. Kidney biopsy is usually diagnostic, and the characteristic lesion is occlusion of cholesterol emboli in the lumina of arcuate, interlobular arteries, and glomeruli. The emboli of cholesterol crystals generally are defined by the empty, biconvex, and needle-shaped clefts, appearing as “ghosts,” because cholesterol crystals usually dissolve during routine histologic preparation procedures. However, in frozen sections, the crystals are birefringent under polarized light and give positive histochemical reactions for lipids.5 Interlobular and arcuate arteries usually show perivascular polymorphonuclear and eosinophilic infiltration. Glomeruli can have normal morphology in the initial stage, but ischemic retraction of podocyte foot processes, focal segmental glomerulosclerosis (FSGS), interstitial fibrosis, perivascular fibrosis around the occluded vessels, and tubular atrophy can be seen frequently due to ongoing ischemic injury in the later stages of the disease. Generally, immunofluorescence staining for immunoglobulins are negative. Kidney biopsy has a sensitivity of about 75%. Involvement of renal vasculature is patchy, and the diagnosis may be missed if not enough sections are examined.6 There is no specific therapy for cholesterol crystal embolism. Withdrawal of any form of anticoagulants, postponing aortic catheterization, and surgery should be considered first to avoid recurrence of cholesterol crystal embolism. The aim of treatment is to prevent the progression of tissue ischemia and further showering of cholesterol crystals or provide supportive care in the event of kidney failure.7

References:

(Images and text provided by Mohankumar Doraiswamy, Division of Nephrology, The Ohio State University Wexner Medical Center, Columbus, Ohio; Sampath Thiruveedi, Division of Nephrology, Kettering Medical Center, Kettering, Ohio; and Anjali Satoskar, Division of Pathology, The Ohio State University Wexner Medical Center, Columbus, Ohio)