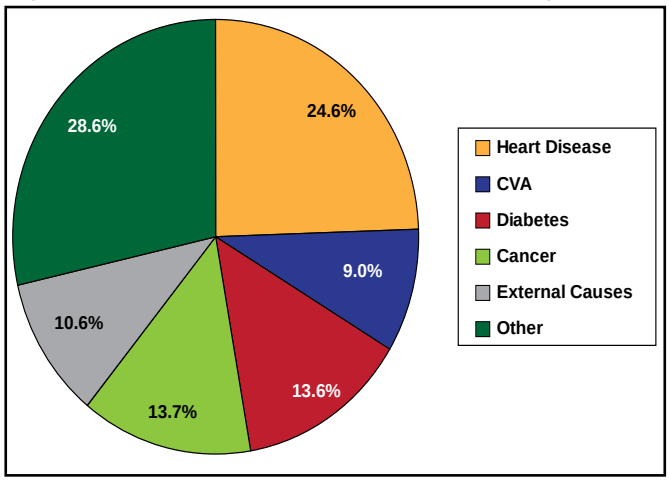
Figure 2. Causes of Death in Trinidad and Tobago in 2006.



CVA=cerebrovascular accident.
Reproduced with permission from M. Chacko, MD.

Hirsch et al. [*JAMA* 2001] report that the prevalence of PAD in primary care practices is high, yet physician awareness of the diagnosis is relatively low. They found that measurement of a simple ABI identified a large number of patients with previously unrecognized PAD. Owens and Conte [*Circulation* 2012] report that clinical history and electrocardiogram detect only 20% to 40% of coexisting disease whereas cardiac catheterization identifies CAD in as many as 90% of PAD patients.

"CAD is just the tip of the atherosclerotic iceberg," said Dr. Chacko, adding that PAD is a common and a poor prognostic marker. He cited a critical need for increased awareness, with early diagnosis and medical therapy. He also said that stopping smoking and walking are vital in the management of PAD and its related CV comorbidities.

Patients with CKD Are at High Risk for CV Death

Written by Rita Buckley

An estimated 26 million American adults have chronic kidney disease (CKD) and millions of others are at increased risk for CKD [National Kidney Foundation. www.kidney.org]. Furthermore, as glomerular filtration rate falls, the risk of cardiovascular (CV) death increases [Go AS et al. *N Engl J Med* 2004].

Robert P. Giugliano, MD, SM, Harvard Medical School, Boston, Massachusetts, USA, reviewed the overlap of CKD and CV risk, highlighted results of key clinical trials and guideline recommendations in patients with CKD and CV disease (CVD), and discussed potential future therapies in this group of patients.

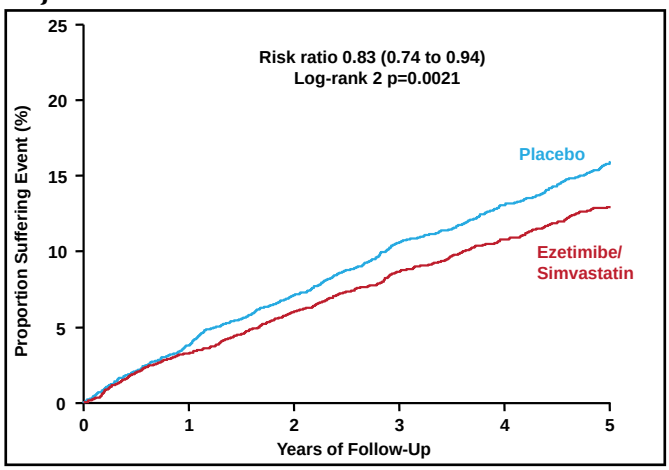
According to Dr. Giugliano, the strong association between CKD and CVD is underappreciated. Patients with CKD have a higher prevalence of both traditional CVD risk factors (eg, hypertension, type 2 diabetes, and dyslipidemia) as well as nontraditional ones, (eg, inflammation, malnutrition, mineral disorders, and anemia). "All patients with CKD, even those with mild-to-moderate renal dysfunction, should be considered at high risk for CV death," he said, noting an inverse exponential relationship between the 2 diseases.

An overlap of 3 common diseases—diabetes mellitus, hyperlipidemia, and CKD–can help explain why these patients are at hightened risk and point towards common solutions (Figure 1). In 2011, 366 million people worldwide had diabetes; 183 million (50%) were undiagnosed [IDF Diabetes Atlas. The Global Burden www.idf.org]. Patients with type 2 diabetes make up the largest and fastest growing single disease group requiring renal replacement therapy [Vora JP et al. *J Hum Hypertens* 2000]. The Hypertension Detection and Follow-up Program [Shulman NB et al. *Hypertension* 1989] found that in CKD patients with creatinine >1.7 mg/dL, 58% died from CVD and 19% from renal failure. General treatment principles at that time included the evaluation and aggressive treatment of CVD risk factors and the assessment of CKD-related factors (eg, proteinuria, anemia, and volume status).

The lipid profile typically seen in renal disease is characterized by high circulating triglycerides, very low-density lipoprotein cholesterol, intermediate-density lipoprotein, cholesterol, chylomicron remnants, low plasma high-density lipoprotein cholesterol particles, and increased levels of lipoprotein A. Numerous studies have shown that lipid derangement is likely to be an independent risk factor for the development of renal disease [Gyebi L et al. *Curr Hypertens Rep* 2012].

Statin administration in CKD is now common practice endorsed by the Kidney Disease Outcomes Quality Initiative (KDOQI) [Ruan XZ et al. *Nat Rev Nephrol* 2009; Gyebi L et al. *Curr Hypertens Rep* 2012]. Subgroup analyses in patients with CKD from prior statin studies demonstrated that the benefits of statin therapy extended to patients with CKD. Indeed, there was a 14.5% decline in total mortality (p=0.045) in the Pravastatin Pooling Project [Tonelli M et al. *Circulation* 2004]. The landmark Study of Heart and Renal Protection [SHARP] trial found that reduction of LDL cholesterol with simvastatin 20 mg in combination with ezetimibe 10 mg daily safely reduced the incidence of major atherosclerotic events in a wide range of patients with advanced CKD, including those managed with dialysis as well as patients not requiring dialysis [Baigent C et al. *Lancet* 2011] (Figure 2).

Figure 2. Reduced LDL Cholesterol Cut the Incidence of Major Atherosclerotic Events in Advanced CKD Patients.



LDL=low-density lipoprotein.
Reprinted with permission from The *Lancet* 2011. Baigent C et al. The effects of lowering cholesterol with simvastatin plus ezetimibe in patients with chronic kidney disease.

Future research will focus on reducing the risk of acute renal failure, defining optimal revascularization and reperfusion strategies, reducing bleeding, and the assessment and treatment of nontraditional CKD-related risk factors (eg, anemia, brain natriuretic peptide, parathyroid hormone, calcium, phosphorus, homocysteine, inflammation, thrombotic factors, and oxidative stress).

The Use of CT Angiography in the Diagnosis of Coronary Artery Disease

Written by Toni Rizzo

High Resolution with CT Angiography

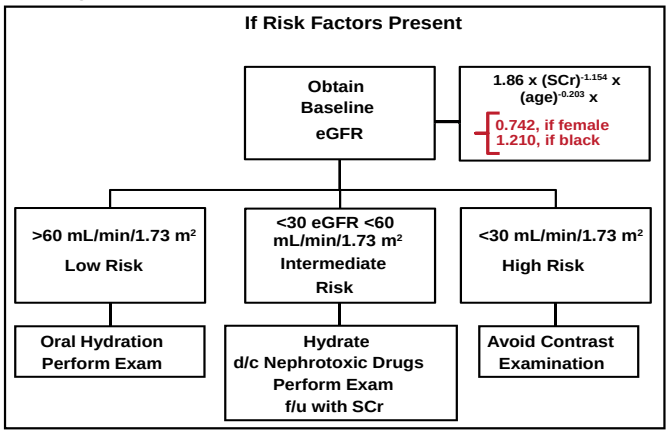
Lawrence M. Boxt, MD, Albany Medical Center, Albany, New York, USA, described the features of computed tomography angiography (CTA) and how these features allow high temporal and spatial resolution of specific cardiac structures. In CTA, the X-ray tube rotates around the patient 3 times per second—much faster than the 1- to 3-second rotation time of conventional CT—providing high temporal resolution. Spatial resolution is high due to the small size (0.6 mm) of the cardiac CT scanner detectors, which ultimately produce 3D images composed of cubes called voxels that are 0.6 mm on a side. The small size allows creation of high-resolution, artifact-free coronary artery and cardiac reconstructions.

CTA data are collected throughout the cardiac cycle, producing a stack of 3D data for each of a series of phases of the cardiac cycle, starting from end diastole through to end systole and back to end diastole. Looking at the data over time allows visualization of cardiac structure as well as cardiac motion. The 3D dataset can be manipulated to select, extract, and view any plane through the heart. Using surface-rendered 3D, part of a structure with a specific attenuation can be identified and the rest of the structure subtracted to produce detailed images of the heart's outer surface. This technique is used for evaluation of coronary artery bypass grafts. Multiplanar reconstruction involves identifying a specific structure such as a coronary artery and locating in each slice to construct multiplanar reconstructions of the entire artery length.

Risks and Benefits of CTA

Iodinated contrast media may induce contrast-induced nephropathy (CIN), defined as a 25% increase in serum creatinine (SCr) from baseline, and may result in acute kidney failure. CIN occurs in 3.3% to 8% of contrast administrations in individuals without pre-existing renal impairment and in 12% to 26% of administrations in those with renal disease or diabetes. Patients at risk for CIN can be identified and prevention strategies implemented (Figure 1) [Levey AS et al. *Ann Intern Med* 2003]. Low-risk patients are given oral hydration prior to CTA.

Figure 1. Evaluation of High CIN Risk and Prevention Strategies.



eGFR=estimated glomerular filtration rate; SCr=serum creatinine.
Reproduced with permission from LM Boxt, MD.

Intermediate-risk patients should receive hydration, discontinue potentially nephrotoxic drugs before CTA, and have follow-up SCr afterwards. Contrast examination should generally be avoided in high-risk patients.

Radiation exposure is another concern. Hausleiter et al. [*Circulation* 2006] studied the radiation doses received during 16- and 64-slice CTA and the impact of different scan protocols on dose. They found that the higher spatial and temporal resolution of 64-slice CTA is associated with an increased radiation dose compared to 16-slice CTA (14.8±1.8 vs 10.6±1.2 mSv). Dose-modulating algorithms significantly reduced the radiation exposure