High phosphorus linked to coronary calcification in chronic kidney disease

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For patients with moderate chronic kidney disease (CKD), higher levels of phosphorus in the blood are associated with increased calcification of the major arteries and heart valves—which may contribute to the increased risk of cardiovascular disease in patients with CKD, reports a study in the *Journal of the American Society of Nephrology (JASN)*.

"Previous studies have found that a very high level of phosphorus in the blood can lead to cardiovascular disease and vascular calcification in dialysis patients," comments Bryan Kestenbaum, MD, of the University of Washington in Seattle, Washington, one of the authors of the new study. "We are now recognizing that even a mild increase in the serum phosphorus level is associated with cardiovascular events in people with CKD who are not on dialysis."

The researchers looked at the relationship between blood phosphorus levels and vascular (blood vessel) calcification in a group of 439 patients with moderate CKD. Patients with CKD have loss of kidney function that, in many cases, progresses to end-stage renal disease. Detected by a special computed tomography (CT) scan, vascular calcification is an indicator of overall atherosclerosis ("hardening of the arteries"). Coronary artery calcification is also linked to an increased risk of cardiovascular events, such as myocardial infarction (heart attack).

The CT scans showed calcifications of the coronary arteries in two-thirds of the CKD patients. Ninety-five percent of the patients had phosphorus levels within the normal range—between 2.5 and 4.5 milligrams per deciliter (mg/dL).

Even within this normal range, patients with higher phosphorus levels were more likely to have vascular calcification. For each 1 mg/dL increase in phosphorus level, the risk of coronary artery calcification increased by 21 percent, after adjustment for level of kidney function and other characteristics.

The relationship between phosphorus and vascular calcification was unaffected by traditional risk factors, including lower kidney function, dietary factors, or levels of parathyroid hormone or vitamin D—which, like phosphorus, have important effects on bone.

"Higher serum phosphorous levels within the normal range have been associated with cardiovascular events and premature death in people with CKD," according to Dr. Kestenbaum. "Experimental work suggests that phosphorous causes toxicity by promoting calcification of blood vessels. We were able to demonstrate that people with higher serum phosphorus levels tended to have more calcification."

Another study in the same issue of *JASN* shows that high-normal phosphorus levels are also linked to increased coronary artery calcium in healthy adults without kidney disease. Both studies raise the possibility that phosphate-lowering drugs—generally used only in patients with end-stage renal disease, who have higher-than-normal phosphorus levels—might help to reduce cardiovascular risk in CKD patients and even in healthy adults with high-normal phosphate levels.

The study has some important limitations. Serum phosphorus levels were measured at the same time as the calcification scores—it is not clear whether current serum phosphorus levels represent those which were present when calcification was developing. Further, it is possible that calcified lesions give rise to the higher serum phosphorous levels that were observed. Also, people who have higher serum phosphorous levels may have other characteristics that explain their greater tendency toward calcification.

Source: American Society of Nephrology