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A Potential Paradigm Shift: Potassium Binders in K+-Restricted Diets in Patients With CKD

By Deborah J. Clegg and Biff F. Palmer

Individuals with chronic kidney disease (CKD) and those receiving kidney replacement therapies are often prescribed diets that are extremely challenging to adhere to. In addition to being low in phosphorus, these diets typically are restrictive in potassium (K^+)-containing foods. The rationale for K^+ restriction among this patient population was derived years ago and was based on K^+ balance studies in which individuals with CKD receiving dialysis were given K^+ supplements. When given as K^+ salts, development of hyperkalemia was common and provided the rationale for K^+-restricted diets. More recent data suggest that consumption of diets rich in fruits and vegetables (food items rich in K^+) in individuals with CKD and on dialysis do not significantly increase plasma K^+ concentration (1, 2). Reflexively encouraging patients with CKD not to consume fresh fruits and vegetables and/or a Mediterranean diet has the potential for harm since these diets have proven health benefits. As a result, there is a growing trend focusing on liberalization of K^+ in the diet among people with advanced CKD and/or on dialysis. One strategy to allow patients to ingest diets higher in dietary K^+ is with simultaneous use of new K^+-binding drugs. A shift toward a more lenient, plant-based diet may be plausible and may enhance compliance while fostering better overall health (3).

Patiromer and sodium zirconium cyclosilicate are new oral drugs that function as K^+-binding agents in the gastrointestinal tract and have demonstrated efficacy in treating hyperkalemia. Both drugs have demonstrated sustained efficacy and tolerability when used on a chronic basis. Patiromer is a nonabsorbed polymer that binds K^+ in exchange for calcium and acts primarily in the colon. Sodium zirconium cyclosilicate has a nonabsorbed microporous structure allowing for binding of K^+ in the gastrointestinal tract in exchange for sodium. Both drugs reduce plasma K^+ in patients with CKD, enabling the chronic use of renin-angiotensin-aldosterone system inhibitors, and in patients with heart failure, CKD, and established cardiovascular disease. Diet was not controlled in studies of these drugs, but patients were instructed to avoid high K^+ intake. What is not known is whether novel binding agents could enable patients who are vulnerable to hyperkalemia to increase their consumption of K^+-enriched fruits and vegetables without inducing hyperkalemia. Such trials would be of great utility. If such trials demonstrated that these drugs were effective in liberalizing the diet, patients with high risk of CKD would be granted the health benefits of K^+-enriched diets and likely would enjoy a better quality of life (4, 5).

The current management of individuals with hyperkalemia is to reflexively impose dietary restrictions on fresh fruits and vegetables, depriving them of the cardiovascular benefits of these foods. This strategy has the potential to contribute to ongoing development of atherosclerosis in patients with CKD. Dietary surveys conducted by the National Health and Nutrition Examination Survey indicate that the average consumer takes in approximately 2000 mg of K^+ per day, and therefore, K^+ has been listed as a nutrient of concern because of inadequate intake (6). This is important because patients with advanced CKD and undergoing dialysis are prescribed low K^+ diets, which provide 2000 mg per day—exactly what consumers are typically (inadequately) eating. We contend that there is insufficient evidence to justify the extent to which K^+ restriction is commonly enforced in many patients with CKD. In cases of hyperkalemia, it is important to note that there are nondietary factors such as metabolic acidosis, poorly controlled diabetes mellitus leading to hypertonic states, increased catabolism, tissue breakdown, constipation, and medications, all of which contribute to hyperkalemia and should be considered first prior to dietary restriction. In addition, there are several characteristics of diets enriched in fruits and vegetables that serve to limit development of hyperkalemia (Table). Nevertheless, dietary counseling remains essential, especially for individuals consuming large quantities of foods rich in K^+ additives or high in sodium content. ■

Table. Characteristics of a diet enriched in fruits and vegetables that minimize hyperkalemia

Carbohydrate load causing stimulation of insulin release and shift of K^+ into cells
Increased alkali content • Shift of K^+ into cells • Increased K^+ secretion brought about by the pH effect on the renal outer medullary channel in the collecting duct
High fiber content • Increased stool bulk and less K^+ absorption • Decreased constipation • Increased kidney K^+ secretion via gastric-kidney crosstalk
Lack of exogenous administration of K^+ for flavoring as commonly present in processed foods

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Dr. Clegg reports having provided consultation to AstraZeneca Pharmaceuticals regarding dietary potassium management in patients with CKD. Dr. Palmer reports having participated in advisory boards for AstraZeneca Pharmaceuticals and Bayer HealthCare Pharmaceuticals.

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