Potassium's Protective Mechanisms for People

By David B. Young and Richard D. McCabe

University of Mississippi researchers have found that consuming foods rich in potassium (K) helps keep blood vessels healthy and lowers risk of heart attack and stroke. Specifically, K helps protect blood vessel cells from atherosclerotic lesions.

THE PROTECTIVE effects of K in human and animal physiology have been demonstrated repeatedly over the past 40 years. Studies of hypertensive rats have indicated that high-K diets prevented or reduced the incidence of vascular lesions and cerebral vascular disease and had a prominent effect on animals' longevity. High levels of K in rats' diets reduced the mortality rate due to stroke by 98 percent in one study and 91 percent in a companion experiment in which blood pressures of the control and high K groups were closely matched.

The importance of the protective effects of K against stroke in humans was verified in studies of 1,000 individuals in California. A strong inverse relationship was found among the rate of K intake, the incidence of stroke over the 12-year study period and the mortality rate resulting from stroke.

Although strong evidence of a protective mechanism from K in the cardiovascular system was known, the specific nature of the effect had not been determined until recent studies at the University of Mississippi Medical Center.

Mississippi Studies

The objective of our studies was to systematically analyze the mechanisms responsible for the protective effects of K by focusing on the formation of atherosclerotic lesions in blood vessels. Atherosclerosis occurs when fat deposits build up in blood vessels, attract white blood cells and form plaque which thickens artery walls, reduces pliability of the vessel, restricts blood flow and enhances the possibility of stroke or heart attack.

The effects of K concentrations in blood serum outside of cells were examined by in vitro studies of three types of cells that are major factors in atherosclerotic processes. First, the effects of K on blood platelet aggregation response to thrombin (clotting tendency) declined as K concentrations increased to a mid-range level (**Figure 1**). This implies a reduced

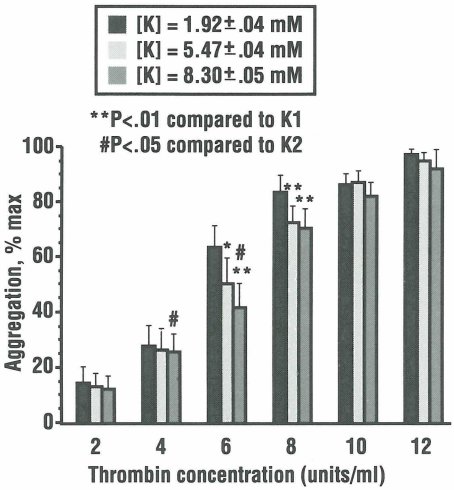

Figure 1. Effects of K on platelet response to thrombin. Higher K concentrations to mid-range were related to lessened tendency for clot formation at the surface of advanced atherosclerotic lesions.

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Secondly, the effects of K on formation of reactive oxygen species or oxygen-free radicals released by white blood cells indicated that higher K concentrations inhibited this process (**Figure 2**). Reactive oxygen species (ions) react with (oxidize) cholesterol . . . low density lipoproteins (LDLs) . . . increasing the attraction of cholesterol to blood vessel walls and enhancing the tendency of plaque formation which inhibits blood flow. Higher K concentrations then suggest a lowered incidence of plaque formation.

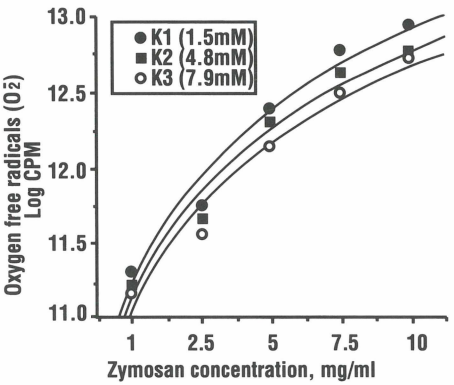


Figure 2. Higher K concentrations inhibit the formation of reactive oxygen species (oxygen free radicals, O_2^-) by white blood cells, lowering the tendency for cholesterol to form plaque on blood vessel walls.

A third area studied was the effects of K concentrations on vascular smooth muscle proliferation. Smooth muscle cells make up the underlayer of blood vessels and are stimulated into abnormal growth during the early stages of atherosclerosis when lesions are forming. Lower than normal K concentrations stimulated growth of these cells . . . higher K concentrations induced the lowest rate of growth (**Figure 3**).

Summary

Changes in K concentrations may affect the functions of these cells by several

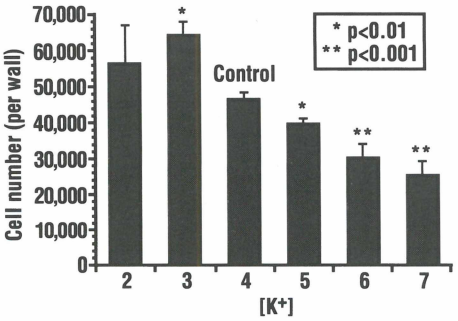
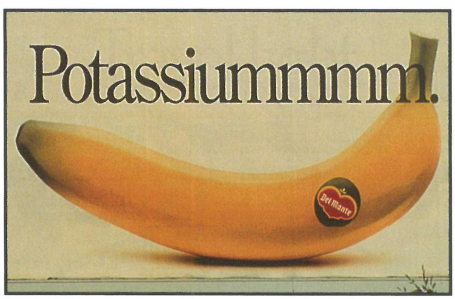


Figure 3. Higher K concentrations tend to depress the growth of vascular smooth muscle cells which are related to the development of atherosclerotic lesions in blood vessels.

mechanisms. Potassium has primary effects on two active transport systems (enzymes) in cell membranes. Increased activity of these enzyme systems brought on by higher K concentrations may affect intracellular activities of hydrogen (H^+), sodium (Na^+) and calcium (Ca^{++}) ions and a variety of cellular functions affected by these ions.

The results of these studies add to the understanding of the potential role of K intake in reducing the incidence of stroke and other forms of vascular disease. These results support the efficacy of increasing K intake as a measure of prevention or treatment of cardiovascular health at very low cost and with minimal risk. Foods containing high amounts of K, such as bananas, whole potatoes, orange juice and leafy green vegetables, are excellent sources of K. ■



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