Mineral intake and blood pressure in African Americans

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African Americans have more than twice the risk of developing hypertension of their white counterparts, and thus are at dramatically increased risk of excessive mortality from cardiovascular disease (1). This greater risk is evident in all age groups and both sexes. Excessive body weight and sensitivity to dietary sodium chloride are 2 nutrition-related factors often thought to contribute to this excessive risk. Neither, however, can fully explain this relation. Even in groups with comparable weights and body mass indexes, African Americans have higher mean blood pressure than whites. Salt sensitivity is more prevalent in African Americans, but there is no evidence that sodium chloride intake is notably greater in this population. Genetic factors have also been proposed to explain the higher hypertension risk in African Americans, but exploration of that theory has failed so far to reveal specific genetic alterations.

Alternative explanations for this critical public health problem emerged in the past decade and have been crystallized by recent additions to the literature. The report of Dwyer et al (2) in this issue offers valuable and complementary evidence in support of the concept that adequate dietary calcium intake is essential to optimal blood pressure regulation in humans. This benefit on blood pressure of calcium and other minerals found in a diet rich in dairy products, fruit, and vegetables, is greatest when these foods are added to the diets of individuals whose dietary patterns are deficient (3).

With our analysis of the first National Health and Nutrition Examination Survey [NHANES I (4)], we showed for the first time that there were important, relevant dietary intake patterns that predicted blood pressure in Americans. That report confirmed our earlier observation that a diet poor in dairy products, fruit, and vegetables, is greatest when these foods are added to the diets of individuals whose dietary patterns are deficient (3).

Numerous subsequent observational reports confirmed these findings. Birkett (6) recently summarized the effect of dietary calcium (per 100 mg added to the diet) on blood pressure from published observational reports. His estimates of the reduction in blood pressure that would occur if 800–1000 mg Ca was added to the diet predict, remarkably, the actual blood pressure decreases that have been reported in the past 18 mo in 3 comprehensive nutrition intervention trials in persons at increased risk of cardiovascular disease (3, 7, 8). In each of these trials, dietary calcium rather than supplements was added to the diets of subjects who were not consuming enough calcium and the other minerals that commonly occur with it in food sources.

The Dietary Approaches to Stop Hypertension (DASH) Study perhaps shows best the importance of a diet that incorporates low-fat dairy products and fruit and vegetables in improving blood pressure control in African Americans (3). That landmark National Heart, Lung, and Blood Institute trial documented that the cardiovascular benefits of such a dietary pattern could be generalized to the adult population, confirming the associations we identified in 1984 (4). The DASH population was 60% minorities and the blood pressure reduction in the minority group was nearly twice that of the nonminority group, which is pertinent to the findings of Dwyer et al (2). Both sodium chloride intake and body weight were held constant and therefore changes in these factors cannot account for the observed reductions in blood pressure.

Dwyer et al have added to our understanding by studying specifically the effect of increasing calcium intake in African American teenagers. These adolescents represent a segment of the US population that consistently consumes suboptimal quantities of dietary minerals and one in which cardiovascular risk factors such as elevated arterial pressure cluster earlier in life than in other groups. The findings of Dwyer et al confirm and extend our understanding in several important ways. They have confirmed that even before adulthood, improving calcium intake lowers arterial pressure. Also, they have shown what we and others have postulated regarding a threshold for adequate calcium intake, a level below which blood pressure is elevated.

What we should not conclude, however, is that the improvement they observed reflects what would have been achieved with dietary sources rather than supplements. Investigators from McMaster University recently updated their 1996 meta-analysis of randomized controlled trials of the effect of increased calcium intake on blood pressure to include more recent trials and a comparison between those using dietary calcium and those using supplemental calcium (9). Their current analysis suggests that calcium derived from food sources may have as much as twice the
the beneficial effect of supplements, which is consistent with the concept that it is not simply the calcium component of dairy products, but the critical interactions among nutrients found in dairy food that modulate blood pressure favorably.

The findings of Dwyer et al, as well as those in younger children (10, 11), suggest that maternal nutrition may influence the children’s risk of hypertension in later life. Indeed, along with the report of Belizán et al (12), our own recent research (13) indicates that these effects may be expressed in utero. The mineral-poor diets of African American women may be not only increasing their own risk of hypertension and hypertensive disorders of pregnancy, but also establishing biological set points in their offspring such that the children’s cardiovascular risk is increased throughout their lifetimes.

A picture is emerging that the excessive hypertension risk in African Americans may be, in substantial part, due to multiple dietary inadequacies. Increased consumption of dairy products and fruit and vegetables appears to be the dietary pattern that needs to be promoted for the reduction of hypertension risk rather than continued emphasis on decreasing salt intake (14). A dietary approach to reducing hypertension risk in this population subgroup, which is both at increased cardiovascular risk and known to have inadequate nutrient intakes, offers a public health measure that could ensure that African Americans at all ages meet optimal nutrient recommendations. It might be argued that lactose intolerance will prevent many African Americans from achieving these dietary goals, but the experience in the DASH Study argues strongly against this. Most DASH participants were African Americans and the diet that was high in dairy products resulted in few reported adverse side effects, in fact, fewer than the control (typical American) diet. For African Americans, improved dietary patterns may be critical to reducing what is widely recognized as a frighteningly excessive risk of premature death from heart disease and related conditions such as obesity and type 2 diabetes.

REFERENCES