Fruit and Vegetable Consumption, Biomarker Score for Fruit and Vegetable Intake and Mortality in the Third National Health and Nutrition Examination Survey (NHANES-III)

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Objectives: Fruit and vegetable (FV) are part of a healthy diet as sufficient consumption has been associated with decreased incidence of a range of chronic diseases and mortality through changes in several biomarkers in blood. The present study aimed to examine the association between FV consumption and mortality among US adults, and the extent to which a composite score comprising of six biomarkers of FV intake and a biomarker of inflammation explained this association.

Methods: We used data on 13,892 adults aged ≥20 years enrolled in the NHANES-III between 1988 and 1994 and followed up through Dec 31, 2015. Daily serving of FV was assessed using 24-hour dietary recall and mortality was determined from the National Death Index records. Serum concentrations of lycopene, β-carotene, α-carotene, β-cryptoxanthin, lutein/zeaxanthin, vitamin C, and C-reactive protein (CRP) were measured in blood samples. Multiple regression analyses were performed to evaluate the association between FV intake and mortality while controlling for confounding. We estimated the mediating effects of biomarkers associated with FV intake and inflammation on mortality through causal mediation analyses.

Results: Over the follow-up, 5023 participants died (1503 from cardiovascular diseases, 1110 from malignant neoplasms). Each increase in FV serving/day was associated with reduced risk of mortality from all-cause (HR: 0.97, 95% CI: 0.95–0.99) and cardiovascular (HR: 0.95, 95% CI: 0.91–1.00), but not from malignant diseases (0.95, 95% CI: 0.60–1.23). The causal mediation analysis showed that the biomarker score of FV and CRP mediated approximately 4% and 50%, and 12% and 50% of the association between FV intake and all-cause and cardiovascular mortality, respectively.

Conclusions: Our findings confirmed the beneficial effects of FV intake and revealed that the associations were partly mediated by a reduction in circulating inflammatory biomarker.

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