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Antioxidants from Diet and Supplements in Relation to Cardiovascular Disease

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Abstract

Many epidemiological studies have reported an inverse association between fruit and vegetable consumption and cardiovascular diseases (CVD). Because fruits and vegetables are high in antioxidants they were hypothesized to be one of the factors responsible for the protective mechanisms. However, studies focusing on single antioxidants such as vitamin C, vitamin E and beta-carotene have reported inconsistent results. In diet there is a wide range of substances present with antioxidant properties. Total Antioxidant Capacity is a concept aiming to measure the capacity from all present antioxidants in reducing reactive species by taking into account synergistic and antagonistic interactions. Multivitamin supplements are another source of antioxidants including vitamins and sometimes minerals usually in doses close to recommended daily allowances. A common belief is that multivitamins are good substitutes for dietary derived nutrients and may help prevent CVD.

The aims with this thesis were to: 1) examine the validity and reproducibility of food-frequency questionnaire (FFQ)-based Total Antioxidant Capacity estimates. 2) examine whether Total Antioxidant Capacity of diet is associated with the risk of myocardial infarction and stroke among women and if the association is different between CVD-free women and women with CVD history at baseline. 3) examine whether multivitamin supplement use is associated with the risk of myocardial infarction and if the association is different between CVD-free women and women with CVD history at baseline. 4) examine whether multivitamin supplement use is associated with coronary heart disease (CHD) by quantitatively summarizing accumulated evidence with a meta-analytic approach.

The main contributors to Total Antioxidant Capacity of diet were fruits and vegetables (44%), whole grains (18%) and coffee (14%). The FFQ-based Total Antioxidant Capacity estimate, as measured with Oxygen Radical Absorbance Capacity (ORAC) assay, correlated with ORAC in whole plasma ($r=0.29$) and ORAC in the lipophilic part of plasma ($r=0.32$). Total Antioxidant Capacity of diet was inversely associated with the risk of myocardial infarction (HR in the highest quintile as compared to the lowest = 0.80, 95% CI: 0.67-0.97) and total stroke (HR in the highest quintile as compared to the lowest = 0.83, 95% CI: 0.70-0.99) among women who were CVD-free at baseline. Among women with CVD history Total Antioxidant Capacity of diet was not associated with myocardial infarction and total stroke. Multivitamin use was inversely associated with the risk of myocardial infarction only among CVD-free women and not among women with CVD history. The summarized evidence from 5 prospective cohort studies indicated a 21% (95% CI: 10-30%) decreased CHD risk among CHD/CVD-free study populations at baseline.

Taken together, these results suggest that Total Antioxidant Capacity may be of importance in primary prevention of myocardial infarction and stroke. Multivitamin supplement use may be of importance in primary prevention of CHD.

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