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FILE: ▪ Coffee (*Coffea arabica*)
▪ Type 2 Diabetes Mellitus
▪ Postmenopausal Women

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RE: Coffee Consumption and Risk of Type 2 Diabetes Mellitus

Pereira MA, Parker ED, Folsom AR. Coffee consumption and risk of type 2 diabetes mellitus: an 11-year prospective study of 28,812 postmenopausal women. *Arch Intern Med*. June 26, 2006;166:1311-1316.

Several large studies have reported an inverse association between coffee (*Coffea arabica*) consumption and the risk of type 2 diabetes mellitus. This may be due to the minerals, phytochemicals, and antioxidants in coffee; the role of caffeine, however, is unclear, say the authors. They report on their study to examine the association between total, caffeinated, and decaffeinated coffee intake and the development of type 2 diabetes mellitus.

The Iowa Women's Health Study is a prospective cohort study of postmenopausal women living in Iowa. A prospective analysis of this study by the authors included 28,812 postmenopausal women free of diabetes and cardiovascular disease in the general community. In January 1986, these women completed a 16-page questionnaire, which included questions on known or suspected risk factors for diabetes: age, body mass index (BMI), waist-hip ratio (WHR), physical activity, alcohol consumption, and smoking history. A 127-item food frequency questionnaire was used to assess past-year typical food intake. For "decaffeinated coffee" and "coffee," the standard serving size was assigned on the questionnaire as "1 cup," and the intake frequency options ranged from "never or less than once per month" up to "6 or more cups per day."

Diabetes incidence was determined by self-report on four follow-up mailed surveys in 1987, 1989, 1992, and 1997. Response rates for those surveys were 91%, 89%, 86%, and 79%, respectively.

The SAS version 9.1 package was used for statistical analysis (SAS Institute Inc, Cary, NC).

Nearly half the cohort (14,224) reported consuming 1 to 3 cups of coffee daily, with 2,928 reporting no coffee consumption, and 2,875 reporting 6 or more cups daily. Regular coffee was more common than decaffeinated coffee, especially at high levels of coffee intake. Statistically significant ($P<0.05$) associations were seen between coffee intake and the intake of other variables (tea, skim milk, and cream) except for soda and whole milk.

The authors report that higher coffee intake was associated with lower BMIs and WHRs, with higher consumption of alcohol and cigarettes, and with lower prevalence of vigorous activity and hypertension. In addition, coffee intake was positively associated with energy intake, all types of fat, high-fat dairy, and intakes of magnesium and phytate. Coffee intake was inversely correlated with intake of dietary fiber intake, fruit, and low-fat dairy. When analyzed separately for caffeinated coffee and for decaffeinated coffee, these associations were not materially different.

During 11 years of follow-up, 1,418 incident cases of diabetes were reported. Relative risks (RR) were adjusted for various demographic, adiposity, and lifestyle measures. Women who reported drinking 6 or more cups of coffee per day had a 34% reduction in the risk of diabetes compared with those reporting no coffee intake. The inverse associations between coffee intake and diabetes risk were stronger for decaffeinated coffee than for regular coffee. The authors note that the association between decaffeinated coffee and diabetes appeared to be independent of many other potentially confounding anthropometric, lifestyle, and dietary factors, such as physical activity, BMI, and cereal fiber. And, intake of magnesium and phytate did not explain these associations.

Intake of caffeine from all sources was not associated with the risk of diabetes. How could coffee consumption, particularly decaffeinated coffee, reduce the risk of diabetes? The authors explain that the coffee bean is a rich source of many minerals and phytochemicals, including certain polyphenols (e.g. chlorogenic and phytic acids) that may improve postprandial carbohydrate metabolism through various possible mechanisms that could attenuate blood glucose concentrations and possibly reduce the risk or delay the onset of type 2 diabetes mellitus. Plus, the antioxidant properties of coffee may protect the pancreatic beta cell from oxidative stress or promote insulin sensitivity in the peripheral tissues, thereby delaying or preventing the onset of the disease. However, the author does not give the range of relative risks that include the overall (listed) and the RR when adjusted for two sets of confounding variables (models 2 and 3 on Table 3). These adjustments decrease the impact of the conclusion. Also the focus of the paper is on the difference between caffeinated coffee vs. decaffeinated coffee. Table 3 also shows a big difference in RR between these two, which was not mentioned in the review (RR for decaffeinated coffee was 0.68 and for caffeinated coffee was 1.0).

The authors of the study admit to several limitations, most notably its reliance on "observational self-reported data": since both diet and outcome were based on self-report, which introduced possibilities for bias relative to studies with objective measures and those using experimental design. Further, "residual confounding" could not be ruled out as an explanation for their findings.

Although this study suggests that the causal mechanism for the inverse association between coffee consumption and the risk of type 2 diabetes mellitus may not be caffeine, magnesium, or phytate, "this study was not equipped" to thoroughly explore possible causal mechanisms for this association. "Although the first line of prevention for diabetes is exercise and diet, in light of the popularity of coffee consumption and high rates of type 2 diabetes in older adults, these findings may carry high public health significance," say the authors.

—Shari Henson

The American Botanical Council has chosen not to use the original article.