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From MedscapeCME Clinical Briefs

Fruits and Vegetables Have Only Weak Effect in Cancer Prevention CME

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April 16, 2010 — Eating more fruits and vegetables has only a modest effect on reducing the risk of developing any cancer, a new study reports. But the public health message to eat more fruits and vegetables still holds, because of benefits to cardiovascular health, say experts.

The finding was reported online April 6 in the *Journal of the National Cancer Institute*, and comes from the massive European Prospective Investigation Into Cancer and Nutrition (EPIC) study, which involved 478,478 people followed for a median of 8.7 years.

People who ate an extra 200 g of fruits and vegetables — equivalent to about 1.5 or 2 extra servings — showed a small but statistically significant 4% reduction in the risk of developing any cancer.

"We found a linear relationship, so no matter where you were in your fruit and vegetable intake, if you increase it by 200 g, then you would have this 4% reduction," lead author Paulo Boffetta, MD, from the Mount Sinai School of Medicine in New York City, explained in an interview. Only about 20% of the study participants ate the recommended 5 portions of fruits and vegetables each day, he noted.

"We found some effect, but a weak one; this is not surprising overall," he said.

Dr. Boffetta explained that there was a prevalent view up until about 10 to 15 years ago that fruits and vegetables were protective against cancer, but then came studies — mainly from the United States — which showed no effect at all, so opinion has swung back and forth. "Our finding probably falls in the middle ground," he added.

When asked if he thought that the reduction seen in this study was a true effect, Dr. Boffetta said the only way to be certain is to conduct a randomized trial, and the current study is observational. But he added that the fact that the finding was statistically significant suggests that it is not likely to be due to chance.

No Need to Change Public Health Message

There are no results yet from the EPIC study on cardiovascular health, but other studies have shown the benefit of eating fruits and vegetables on cardiovascular health, and this benefit seems to be "bigger and more consistent " than any effect on cancer prevention, Dr. Boffetta pointed out. "So the message about eating fruits and vegetables still holds," he said.

"There is no need to modify the message, because the overall effect is beneficial," he continued. "The message to the public should be to eat as many fruits and vegetables as possible."

Walter Willet, MD, PhD, a leading expert on diet and cancer from the Harvard School of Public Health in Boston, Massachusetts, agrees.

"Recommendations and actions to increase intake of fruits and vegetables have a sound basis," he writes in an accompanying editorial. Even as the evidence of a benefit against cancer has been waning, the data supporting a

cardiovascular benefit have been accumulating, he notes.

The EPIC trial "strongly confirms the findings from other prospective studies . . . that any association of intake of fruits and vegetables with risk of cancer is weak at best," Dr. Willet writes.

"A broad effort to increase consumption of fruits and vegetables will not have a major effect on cancer incidence," he continues. However, "such efforts are still worthwhile because they will reduce the risk of cardiovascular disease, and a small benefit for cancer remains possible."

But for the prevention of cancer, the primary focus should be heightened efforts to reduce smoking and obesity, Dr. Willet concludes.

Specific Foods, Specific Times

The wide scope of the question addressed in many studies in this field — i.e., the effect of eating fruits and vegetables on the risk of developing any cancer — might dilute benefits from specific foods, Dr. Willet suggests in his editorial. Dr. Boffetta told *Medscape Oncology* that he wholeheartedly agrees with this.

It might be that a small group of fruits and vegetables, or some specific substance in some of these foods, has a protective effect, Dr. Willet writes. As an example, he cites the "considerable evidence" suggesting that lycopene and tomato products reduce the risk for prostate cancer.

In addition, there might be an element of timing that has been missed. Multiple lines of evidence indicate that ionizing radiation and some other risk factors for cancer operate primarily in childhood and early adulthood, Dr. Willet points out. Thus, antioxidants and other protective constituents of fruits and vegetables might need to be present at that time to be effective.

Unfortunately, EPIC and almost all studies of diet and cancer would have missed such effects because they start decades later in life, he points out.

The researchers have disclosed no relevant financial relationships.

J Natl Cancer Inst. Published online April 6, 2010. Abstract

Clinical Context

It is widely believed that cancer can be prevented by high intake of fruits and vegetables. In 1990, the World Health Organization recommended that people's diet consist of at least 5 portions of fruits and vegetables a day to prevent cancer and other chronic diseases. It is thought that fruits and vegetables have cancer-specific mechanisms, including antioxidant activity, modulation of detoxification enzymes, stimulation of immunologic response, modulation of hormonal levels, and antiproliferative activities. However, the compounds responsible for the anticarcinogenic activities are not known. Additionally, inconsistent results from many studies have not been able to conclusively establish an inverse association between fruit and vegetable intake and overall cancer risk.

The aim of this study was to assess the association between fruit and vegetable intake and overall cancer risk.

Study Highlights

- The investigators conducted a prospective analysis of the EPIC cohort to assess relationships between intake of total fruits, total vegetables, and total fruits and vegetables combined and cancer risk from 1992 through

2000.

- The cohort consisted of patients recruited from 10 Western European countries.
- Detailed information on the dietary habit and lifestyle variables of the cohort was obtained.
- Cancer incidence and mortality data were ascertained, and hazard ratios (HRs) and 95% confidence intervals (CIs) were estimated with use of multivariable Cox regression models.
- The researchers also conducted analyses for cancers associated with tobacco and alcohol after stratification for tobacco smoking and alcohol drinking.
- Results demonstrated that the overall median intake of total fruits was 170 g/day and that of total vegetables was 134 g/day.
- High intake of fruits and vegetables was also associated with female sex, higher education, physical activity, low alcohol intake, and never-smoking status.
- Of the initial 142,605 men and 335,873 women included in the study, 9604 men and 21,000 women were identified with cancer after a median follow-up of 8.7 years.
- The crude cancer incidence rates were 7.9 per 1000 person-years in men and 7.1 per 1000 person-years in women.
- Associations between reduced cancer risk and increased intake of total fruits and vegetables combined and total vegetables for the entire cohort were similar. A 200-g/day increased intake of fruits and vegetables combined yielded an HR of 0.97 (95% CI, 0.96 - 0.99), and for an 100-g/day increased intake of total vegetables, the HR was 0.98 (95% CI, 0.97 - 0.99). An 100-g/day increased intake of total fruits showed a weaker inverse association (HR, 0.99; 95% CI, 0.98 - 1.00).
- The reduced risk for cancer associated with high vegetable intake was restricted to women (HR, 0.98; 95% CI, 0.97 - 0.99).
- Stratification by alcohol intake suggested a stronger reduction in risk in heavy drinkers and was confined to cancers caused by smoking and alcohol.
- Limitations of this study included errors inherent to self-reported dietary habits possibly resulting in bias, limited follow-up duration, and the lack of information on dietary habits earlier in life.

Clinical Implications

- Fruits and vegetables are believed to have cancer-specific mechanisms, including antioxidant activity, modulation of detoxification enzymes, stimulation of immunologic response, modulation of hormonal levels, and antiproliferative activities.
- Results of the current study demonstrate a very small inverse association between intake of total fruits and vegetables and overall cancer risk.

CME Test

According to this study by Boffetta and colleagues, all of the following cancer-specific mechanisms are found in fruits and vegetables *except*:

- ○ Antioxidant activity
- ○ Stimulation of immunologic response
- ○ Known anticarcinogenic compounds
- ○ Antiproliferative activities

According to this study by Boffetta and colleagues, which of the following statements regarding fruit and vegetable intake and overall cancer risk is *not* correct?

- ○ Associations between reduced cancer risk and increased intake of total fruits and vegetables

combined and total vegetables for the entire cohort were similar

- Intake of fruits showed a greater inverse association vs total vegetable intake
- The reduced risk for cancer associated with high vegetable intake was restricted to women
- There was a stronger reduction in risk in heavy drinkers vs weak drinkers

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Target Audience

This article is intended for primary care clinicians, oncologists, and other specialists who care for patients with cancer.

Goal

The goal of this activity is to provide medical news to primary care clinicians and other healthcare professionals in order to enhance patient care.

Learning Objectives

Upon completion of this activity, participants will be able to:

1. Describe the cancer-specific mechanisms postulated in fruits and vegetables.
2. Evaluate an association between fruit and vegetable intake and overall cancer risk.

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