Potential Causal Relationship Between High Meat Intake and Mortality

Sinha R, Cross AJ, Graubard BI, et al. Meat intake and mortality: a prospective study of over half a million people. Arch Intern Med 2009;169:562–71.

Study Overview

Objective. To determine whether higher consumption of meat is associated with an increased risk of death.

Design. Observational cohort study.

Setting and participants. Individuals aged 50 to 71 years from 6 U.S. states and 2 metropolitan cities who participated in the National Institutes of Health (NIH)-AARP (formerly known as the American Association of Retired Persons) Diet and Health Study and completed a mailed questionnaire in 1995.

Main outcome measures. Meat consumption levels and all-cause and cause-specific mortality.

Main results. 617,119 individuals completed the NIH-AARP questionnaire; of these, 322,263 men and 223,390 women were eligible for analysis. Based on consumption of red, white, and processed meats, the cohort was grouped into low-, medium-, and high-risk meat diet groups, with higher red and processed meat consumption representing a higher risk. After 10 years of annual follow-up, 47,976 men and 23,276 women died. Men in the highest quintile of red meat consumption had a 31% higher risk of death from any cause (95% confidence interval [CI], 27%–35%), and women had a comparably elevated risk. Similarly, men and women in the highest quintile of red meat consumption had a significantly elevated risk of death from cardiovascular disease (adjusted hazard ratio [HR] among men, 1.27 [95% CI, 1.20–1.35]; adjusted HR among women, 1.50 [95% CI, 1.37–1.65]; both $P < 0.001$) and from cancer (adjusted HR among men, 1.22 [95% CI, 1.16–1.29]; adjusted HR among women, 1.20 [95% CI, 1.12–1.30]; both $P < 0.001$).

Conclusion. Increased consumption of red and processed meats may be linked to an increased risk of all-cause mortality and mortality from cancer and cardiovascular disease.

Commentary

Until 2 decades ago, what people ate and whether they exercised were largely considered to be private issues and not an area of evaluation from medical or public health perspectives. However, in the past 20 years, there has been increasing attention to the public health impacts of diet and exercise. Given the recent explosion of obesity in the United States and the resultant higher costs of health care, clinicians and policy makers have become increasingly focused on how policies can encourage or discourage healthier behaviors. It is in this context that the study by Sinha and colleagues is particularly meaningful.

In a cohort of over 600,000 elderly, mostly white Americans who were followed for over 10 years, Sinha et al were able to carefully assess whether consumption of red, white, or processed meat was associated with an increased risk of death. Higher consumption of red meat and processed meats was associated with higher risk of all-cause mortality and death from cancer and cardiovascular disease, and this increased risk was comparable for men and women. Although the effects are described as "modest," the authors report that 11% and 16% of deaths in men and women, respectively, could be prevented if all Americans decreased their red meat consumption to that of those in the lowest quintile, which would have a very large public health impact.

There are 2 important limitations to the study that help contextualize these findings. The first limitation is that the cohort was a relatively healthy and socioeconomically better off than the general U.S. population. There were more whites, with a higher percentage with a college degree. Therefore, comparisons within this group may not apply more broadly to the U.S. population. Although this concern should temper the enthusiasm for the findings, it hardly negates them. The mechanisms that underlie the association between red meat and mortality may apply in other populations as well. The second limitation, which is a consistent problem in cohort studies such as this, is that of unmeasured confounders. Patients in the highest quartile of red meat consumption were clearly at higher risk due to other factors as well as health behaviors: they were less likely to be educated, more likely to smoke, and less likely to exercise. Although the authors attempt to adjust for these factors, there may be other contributors, such as mental health (rates of depression), stress, and other factors, that differ between

those who consumed more versus less red meat.

Applications for Clinical Practice

Sinha et al have produced the most convincing data to date to suggest that consuming red and processed meats increases the risk of heart disease, cancer, and overall death. Although the findings may be causal, the limitations of the study should provide some pause before physicians embark on a major effort to change patients' eating behaviors. Focusing on areas with more scientific evidence, such as smoking cessation and increased exercise, will likely yield greater fruits.

—Review by Ashish K. Jha, MD, MPH

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