

Citation:

Rohrman S, Platz EA, Kavanaugh CJ, Thuita L, Hoffman SC, Helzlsouer KJ. Meat and dairy consumption and subsequent risk of prostate cancer in a US cohort study. *Cancer Causes Control*. 2007 Feb; 18 (1): 41-50.

PubMed ID: [17315319](#)

Study Design:

Prospective cohort study

Class:

B - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To evaluate the association of the intake of total meat, specific types of meat, dairy foods and others rich in calcium, and total dietary supplemental calcium intake with prostate cancer.

Inclusion Criteria:

Male participant of the prospective CLUE II cohort of Washington County, Maryland, which began in 1989.

Exclusion Criteria:

Original cohort participants who were <35 years of age in 1989, had a diagnosis of cancer prior to the baseline survey, or who had incomplete or implausible food-frequency questionnaire (FFQ) data.

Description of Study Protocol:**Recruitment**

Residents of Washington County, Maryland were recruited into the original study cohort.

Design

Prospective cohort study.

Dietary Intake/Dietary Assessment Methodology

An abbreviated version of the Block FFQ was administered by mail to assess the frequency and portion size of consumption of 60 food items.

Blinding Used

Not applicable.

Intervention

Not applicable.

Statistical Analysis

- Cox proportional hazards regression was used to calculate hazard ratios (HR) of prostate cancer overall and by stage of cancer (high or low) comparing meat, dairy and calcium consumption across categories
- Trend tests were performed by assigning to each subject the median intake of that third or category and modeling this term as a continuous variable
- Participants were censored at their date of death, at their date of cancer diagnosis, or at the end of the study period in October 2004, whichever came first. Persons without information on prostate cancer or death were assumed to be alive and free of prostate cancer through the end of the study period.

Data Collection Summary:

Timing of Measurements

- At baseline (1989), participants completed the FFQ
- Prostate cancer diagnosis was determined in October 2004.

Dependent Variables

Prostate cancer (and high- and low-stage at diagnosis separately) was assessed using the Washington County Cancer Registry and Maryland Cancer Registry.

Independent Variables

- Consumption of meat (total meat, beef, processed meat, red meat, poultry, fish)
- Consumption of dairy foods (and cheese and milk separately).

Control Variables

- Age
- Energy intake
- Consumption of tomato products
- Intake of saturated fat
- Body mass index (BMI) at age 21 years.

Description of Actual Data Sample:

- *Initial N*: 6,818 eligible men from the original cohort
- *Attrition (final N)*: 3,892
- *Age*: Mean age at baseline, 53.8 years
- *Ethnicity*: Not reported

- *Other relevant demographics:* None
- *Anthropometrics:* Mean BMI of 26.5kg/m²
- *Location:* Washington County, Maryland.

Summary of Results:

From 1989 through October 2004, 199 incident prostate cancer cases were ascertained.

Key Finding

There was no positive association of total meat, red meat, fish and poultry intake with total, low-stage or high-stage prostate cancer observed.

Other Findings

- Processed meat consumption was associated with a non-statistically significant higher risk of total (5+ vs. less than one serving per week: HR=1.53, 95% CI 0.98-2.39) and advanced (HR=2.24; 95% CI 0.90-5.59) prostate cancer
- There was no association across tertiles of dairy or calcium with total prostate cancer, although compared to those who consumed dairy foods no more than once per week, those consuming at least five times per week were at increased risk of prostate cancer (HR=1.65, 95% CI 1.02, 2.66)
- Men who consumed cheese at least five times per week had an increased risk of total (HR=1.43; 95% CI 1.01-2.03) and high-stage prostate cancer (HR=1.71; 95% CI 0.88-3.32, but not low-stage prostate cancer.

Author Conclusion:

There was no positive association of total meat, red meat, fish and poultry intake with total, low-stage or high-stage prostate cancer observed.

Reviewer Comments:

Study strengths

- *Examined exposure by both broad and narrow food groups*
- *Examined outcome by both low- and high-stage cancer at diagnosis.*

Study limitations

- *Only 50% of men returned a FFQ that was considered valid, which was not considered likely to affect the internal study validity but it would reduce the power to detect associations*
- *Positive associations seen for subgroup analyses may not be valid because multiple hypotheses were tested and there were small numbers of advanced prostate cancer cases*
- *There was also a small number of cases in the comparison group for dairy food consumption*
- *The level of calcium intake in the cohort was lower than in previous studies that have seen a positive association, and this may have limited the ability to observe an association.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	Was the research question clearly stated?	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	Was the selection of study subjects/patients free from bias?	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	N/A
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	Were study groups comparable?	N/A
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A

3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	Was method of handling withdrawals described?	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	Was blinding used to prevent introduction of bias?	N/A
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes

6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	???
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	Were outcomes clearly defined and the measurements valid and reliable?	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	Was the statistical analysis appropriate for the study design and type of outcome indicators?	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	N/A

8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	Are conclusions supported by results with biases and limitations taken into consideration?	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	Is bias due to study's funding or sponsorship unlikely?	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes