

**Citation:**

Strayer L, Jacobs DR Jr, Schairer C, Schatzkin A, Flood A. Dietary carbohydrate, glycemic index, and glycemic load and the risk of colorectal cancer in the BCDDP cohort. *Cancer Causes Control*. 2007 Oct; 18(8): 853-863. Epub 2007 Jun 29.

**PubMed ID:** [17605083](#)

**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 examine the relationships of dietary carbohydrate intake, glycemic index (GI) and glycemic load (GL) to incident colorectal cancer in the prospective Breast Cancer Detection Demonstration Project (BCDDP) cohort of older women.

**Inclusion Criteria:**

Women enrolled in the National Cancer Institute (NCI) prospective cohort study based on the breast cancer-screening status of subjects enrolled in the larger Breast Cancer Detection Demonstration Project from 1973 to 1980 (N=283,222) jointly sponsored by NCI and the American Cancer Society.

**Exclusion Criteria:**

- Women who did not complete the baseline questionnaire (N=2,751) or the 1987 to 1989 questionnaire (N=9,738)
- Women with a diagnosis of colorectal cancer at the 1987 to 1989 questionnaire or earlier (N=479)
- Women whose reported entry date occurred after their exit date (N=2)
- Women who skipped more than 30 items on their food-frequency questionnaires (FFQ) or who had a reported total energy intake more than 3,800 or less than 400kcal per day (N=5,647)
- After these exclusions, 45,561 women remained in the analytic cohort.

**Description of Study Protocol:****Recruitment**

Women enrolled in the National Cancer Institute (NCI) prospective cohort study based on the breast cancer-screening status of subjects enrolled in the larger Breast Cancer Detection Demonstration Project from 1973 to 1980 (N=283,222) jointly sponsored by NCI and the American Cancer Society.

## Design

- The original BCDDP was a breast cancer-screening program conducted under the joint sponsorship of the National Cancer Institute and the American Cancer Society. It ran from 1973 to 1980 and enrolled 283,222 women at 29 screening centers in 27 cities across the United States
- In 1979, the National Cancer Institute established a prospective cohort based on the breast cancer-screening status of subjects in the larger BCDDP study. This included all 4,275 women who had been diagnosed with breast cancer, all 25,114 women who had been diagnosed with benign breast disease and all 9,628 who had been recommended for biopsy or breast surgery but did not have a surgical procedure. An additional 25,165 women who did not undergo or were recommended to have a biopsy during the screening program were matched with the above-listed subjects on age, time of entry into the screening program, ethnicity, screening center and length of participation in the BCDDP, for a total of 64,182 women
- Women completed a baseline questionnaire between 1979 and 1981. In addition, the cohort participants were mailed questionnaires during three separate follow-up periods (1987 to 1989, 1992 to 1995 and 1995 to 1998)
- For the purposes of the current analysis, entry into the analytic cohort took place at the time of the dietary assessment (1987 to 1989) and person-time accrued through the final follow-up period (1995 to 1998).

## Dietary Intake/Dietary Assessment Methodology

- For the 1987 to 1989 questionnaires, respondents completed a 62-item National Cancer Institute/Block FFQ to assess usual dietary intake over the previous year
- Software designed for this questionnaire yielded estimates of daily intakes for total energy, macronutrients and micronutrients
- A separate series of questions in the 1987 to 1989 questionnaire assessed intake of nutrients from supplements.

## Statistical Analysis

- Cox proportional hazards regression (PROC PHREG in SAS version 8) with age as the underlying time metric to generate rate ratios and 95% CI for quintiles of carbohydrate intake, GI, and GL as risk factors for incident colorectal cancer
- All P-values were two-sided.

## Data Collection Summary:

### Timing of Measurements

- Women completed a baseline questionnaire between 1979 and 1981. In addition, the cohort participants were mailed questionnaires during three separate follow-up periods: 1987 to 1989, 1992 to 1995 and 1995 to 1998
- For the purposes of the current analysis, entry into the analytic cohort took place at the time of the dietary assessment (1987 to 1989) and person-time accrued through the final

follow-up period (1995 to 1998).

### Dependent Variables

Colorectal cancer risk.

### Independent Variables

- Glycemic index
- Glycemic load
- Carbohydrate intake.

### Description of Actual Data Sample:

- *Initial N*: 64,182
- *Attrition (final N)*: 45,561
- *Location*: United States.

### Summary of Results:

#### Key Findings

- We found reductions in colorectal cancer risk for diets high in carbohydrate (RR for Q5 vs. Q1=0.70, 95% CI: 0.50 to 0.97) and GI (0.75, 95% CI: 0.56 to 1.00), and no significant association for GL (0.91, 95% CI: 0.70 to 1.20)
- Inverse associations were weakest in normal-weight, active persons
- The inverse association for GI was strongest for the portion from dairy food.

### Author Conclusion:

These results do not support an association between diets high in carbohydrate, glycemic index or glycemic load and colorectal cancer.

### Reviewer Comments:

*None.*

### 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) | Yes |
| 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)	Yes

### Validity Questions

<b>1.</b>	<b>Was the research question clearly stated?</b>	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
<b>2.</b>	<b>Was the selection of study subjects/patients free from bias?</b>	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?	Yes
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
<b>3.</b>	<b>Were study groups comparable?</b>	Yes
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
<b>4.</b>	<b>Was method of handling withdrawals described?</b>	<b>Yes</b>
4.1.	Were follow-up methods described and the same for all groups?	N/A
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%.)	N/A
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	N/A
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
<b>5.</b>	<b>Was blinding used to prevent introduction of bias?</b>	<b>Yes</b>
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?	Yes
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
<b>6.</b>	<b>Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?</b>	<b>Yes</b>
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?	Yes
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
<b>7.</b>	<b>Were outcomes clearly defined and the measurements valid and reliable?</b>	<b>Yes</b>
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?	N/A
7.7.	Were the measurements conducted consistently across groups?	N/A
<b>8.</b>	<b>Was the statistical analysis appropriate for the study design and type of outcome indicators?</b>	<b>Yes</b>
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
<b>9.</b>	<b>Are conclusions supported by results with biases and limitations taken into consideration?</b>	<b>Yes</b>
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
<b>10.</b>	<b>Is bias due to study's funding or sponsorship unlikely?</b>	<b>Yes</b>

10.1.	Were sources of funding and investigators' affiliations described?	No
10.2.	Was the study free from apparent conflict of interest?	???