

Citation:

Larsson SC, Bergkvist L, Wolk A. Glycemic load, glycemic index and carbohydrate intake in relation to risk of stomach cancer: a prospective study. *Int J Cancer*. 2006 June 15;118(12):3167-9.

PubMed ID: [16395707](#)

Study Design:

Prospective Cohort Study

Class:

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

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To prospectively investigate dietary glycemic load, overall glycemic index and total carbohydrate intake in relation to the incidence of stomach cancer among 61,433 women in the Swedish Mammography Cohort with 18 years of follow-up and repeated measures of diet.

Inclusion Criteria:

- Swedish Mammography Cohort
- All women who were born between 1914 and 1948
- Residents of Uppsala or Vastmanland County in central Sweden from 1987 to 1990

Exclusion Criteria:

- Women with incorrect or missing national registration number
- Women with implausible values for total energy intake
- Women with a cancer diagnosis (except nonmelanoma skin cancer) prior to baseline

Description of Study Protocol:**Recruitment**

Participants from the Swedish Mammography Cohort, a prospective population-based cohort study established between 1987 and 1990.

Design: Prospective cohort study.

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- Follow-up until the date of diagnosis of stomach or any other cancer, death, migration, or December 31, 2004, whichever came first
- Cox proportional hazards models were used to estimate hazard ratios with 95% confidence intervals according to quintiles of dietary glycemic load, glycemic index and total carbohydrate intake
- All models were stratified by age in month and year of entry into the cohort
- Proportional hazards assumption was examined by using the likelihood ratio test and by plotting the log of the cumulative hazards function
- Tests of trend were conducted by assigning the median value to each quintile and modeling this value as a continuous variable

Data Collection Summary:

Timing of Measurements

- Diet was assessed at baseline (1987-1990) and again in 1997.
- Information on age, height and weight was obtained on baseline and 1997 questionnaires
- Information on smoking was reported in the 1997 questionnaire

Dependent Variables

- Stomach cancer ascertained by linkage to the practically 100% complete national and regional Swedish Cancer registers
- Information on the dates of death and dates of migration through linkage to the Swedish Death and Population registers at Statistics Sweden

Independent Variables

- Dietary glycemic load, glycemic index and carbohydrate intake
- At baseline, dietary intake assessed with 67-item food frequency questionnaire, and in 1997, assessed with 96-item food frequency questionnaire
- Glycemic index values of foods were obtained from international tables

Control Variables

- Education
- BMI
- Total energy intake
- Alcohol intake

Description of Actual Data Sample:

Initial N: 90,303 eligible women. 66,651 (74%) returned initial questionnaire.

Attrition (final N): After exclusion criteria, 61,433 women remained in the analysis

Age: born between 1914 and 1948, mean age ~54 years

Ethnicity: assumed Caucasian

Other relevant demographics:

Anthropometrics

Location: Sweden

Summary of Results:

Key Findings

- During 903,586 person-years of follow-up, a total of 156 incident cases of stomach cancer were ascertained
- The crude incidence rate of stomach cancer was 17 cases per 100,000 person-years
- There were no observed material associations of dietary glycemic load, overall glycemic index and total carbohydrate intake with the risk of stomach cancer
- The multivariate hazard ratios for the highest versus the lowest quintile were 0.76 (95% confidence interval: 0.46 - 1.25) for glycemic load, 0.77 (95% confidence interval: 0.46 - 1.30) for overall glycemic index and 0.85 (95% confidence interval: 0.50 - 1.43) for carbohydrate intake.
- The associations did not vary according to BMI
- Lack of information on *Helicobacter pylori* infection status did not allow stratification by this potential effect modifier

Author Conclusion:

In summary, our findings from a large prospective cohort study with long-term follow-up and repeated dietary measures do not support the hypothesis that diets with high glycemic load and glycemic index increase the risk of stomach cancer in middle-aged and elderly women. We cannot exclude the possibility that high glycemic load/index diets increase the risk of stomach cancer in specific subgroups of the population, such as those infected by *H. pylori*.

Reviewer Comments:

Repeated dietary measures over 18-year follow-up. Authors note the following limitations:

- *Dietary data are assessed with error; the glycemic index values of some foods are currently based on results reported in only 1 or 2 studies and those studies often had small sample sizes*
- *Inability to examine risk by *H. pylori* infection status*

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

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?	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
3.	Were study groups comparable?	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
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?	Yes
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?	Yes
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.)	Yes
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
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?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A

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?	N/A
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?	No
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?	No
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	N/A
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?	Yes
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

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