

## **Consumption of artificial sweetener– and sugar-containing soda and risk of lymphoma and leukemia in men and women**

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Eva S Schernhammer, Kimberly A Bertrand, Brenda M Birmann, Laura Sampson, Walter C Willett, and Diane Feskanich

### KEY POINTS FROM THIS STUDY:

- 1) These authors prospectively evaluated whether the consumption of aspartame- and sugar-containing soda is associated with the risk of hematopoietic cancers. The assessment was based upon an analysis of the data from the Nurses' Health Study (NHS) and Health Professionals Follow-Up Study (HPFS) over a period of 22 years.
- 2) Aspartame is an artificial sweetener used in many low-calorie, low-carbohydrate, sugar-free products.
- 3) Aspartame was approved for use in dry foods in 1981, first used in carbonated beverages in 1983, and approved for general purposes in 1996. "Today, aspartame is used as a sweetener and flavor enhancer in >6000 foods worldwide."
- 4) Aspartame was approved for use in the United States in 1981. It became most broadly used in sodas in 1992 when its patent expired and the price dropped significantly.
- 5) "The annual amount of aspartame currently used in diet soda in the United States is 4500 tons." Diet soda accounts for the largest majority (86%) of all aspartame in foods.
- 6) Previous evidence of long-term carcinogenicity studies in rats suggests that aspartame may be carcinogenic (specifically, that it may cause brain tumors).
- 7) "Aspartame, especially in liquids, quickly breaks down into its 3 main ingredients (methanol, aspartic acid, and phenylalanine) if stored near or above room temperature, and the formaldehyde metabolized from methanol is a documented human carcinogen." **[Key Point]**
- 8) In this study:
  - A total of 47,810 men contributed 784,461 person-years to this analysis.
  - A total of 77,218 women contributed 1,493,935 person-years to this analysis.

- 55% of men were consumers of diet sodas, averaging 6 12-oz. servings/week.
- 62% of women were consumers of diet sodas, averaging 6.5 12-oz. servings/week.

Relative Increased Risk of Cancers in Men Drinking Diet Sodas with Aspartame

	<b>non-Hodgkin lymphomas</b>	<b>Multiple Myeloma</b>	<b>Leukemia</b>
<b>1 Soda/day</b>	31%	102%	42%
<b>2 Sodas/day</b>	69%		
<b>Highest Quintile of Sodas</b>	64%	236%	56%

- 9) "In men, risk of NHL was significantly elevated for subjects who consumed  $\geq 1$  serving diet soda/d (31%) compared with subjects who reported no consumption."
- 10) For men, the consumption of  $\geq 1$  servings diet soda/d, increased risk for multiple myeloma 102%, "significantly elevated."
- 11) For leukemia, risk was elevated in the higher intake categories of diet soda in both men and women, with a pooled relative risk of increase by 42% from consumption of  $\geq 1$  serving diet soda/d.
- 12) In men in the highest quintile of aspartame intake, relative increased risks were 64% for NHL, 236% for multiple myeloma, and 56% for leukemia.
- 13) "A higher consumption of regular sugar-sweetened soda was associated with higher risk of NHL and multiple myeloma in men." (by 66%)
- 14) "The potential carcinogenicity of aspartame is biologically plausible. Aspartame is the methyl ester of a dipeptide of phenylalanine and aspartic acid, and it is broken down on ingestion into these amino acids as well as methanol, which are then absorbed into the systemic circulation."
- 15) The methanol from aspartame is metabolized into formaldehyde. In humans, formaldehyde is a "definite carcinogen." "It has also been speculated that methanol, through its metabolization to formaldehyde, may cause an increase in lymphomas and leukemias."
- 16) These authors "hypothesized that the sex differences we observed may have been due to the recognized higher enzymatic activity of alcohol dehydrogenase type-1 (ADH) in men, which possibly induced higher conversion rates from methanol to the carcinogenic substrate formaldehyde."

17) These authors “effectively captured lifetime exposure to aspartame because we have been assessing diet soda consumption intake since aspartame was first allowed into the food supply.”

18) “In the most comprehensive long-term epidemiologic study, to our knowledge, to evaluate the association between aspartame intake and cancer risk in humans, we observed a positive association between diet soda and total aspartame intake and risks of NHL and multiple myeloma in men and leukemia in both men and women.”

19) “In conclusion, these observational data provide some support for findings from a recent animal experiment that suggested positive associations between aspartame intake and NHL, multiple myeloma, and leukemia, particularly in men.”

#### COMMENTS FROM DAN MURPHY

This study presents more evidence that aspartame is carcinogenic, especially in men. Other studies we have reviewed on the topic of diet soda consumption and health include:

##### **Article Review 16-05:**

Aspartame induces lymphomas and leukaemias in rats;  
Aspartame, a leukaemogenic compound

##### **Article Review 14-08:**

Life-Span Exposure to Low Doses of Aspartame Beginning during Prenatal Life  
Increases Cancer Effects in Rats

##### **Article Review 04-13:**

Diet Soft Drink Consumption is Associated with an Increased Risk of Vascular  
Events in the Northern Manhattan Study

##### **Article Review 15-13:**

Fueling the Obesity Epidemic?  
Artificially Sweetened Beverage Use and Long-term Weight Gain