

## Calorie Control Council Response to Nothlings, et.al. “Dietary Glycemic load, added sugars, and carbohydrates as risk factors for pancreatic cancer: the Multiethnic Cohort Study”

Nothlings U<sup>1,3</sup>, Murphy SP<sup>1</sup>, Wilkens LR<sup>1</sup>, Henderson BE<sup>2</sup>, Kolonel LN<sup>1</sup>. Dietary glycemic load, added sugars, and carbohydrates as risk factors for pancreatic cancer: the Multiethnic Cohort Study. *Am J Clin Nutr* 2007;86:1495-1501

### **Background**

This article is yet another published in AJCN seeking to establish a link between dietary fructose and increased risk for some metabolic perturbation: pancreatic cancer, in this instance. The authors are from the University of Hawaii<sup>1</sup> (Honolulu), the University of Southern California<sup>2</sup> (Los Angeles) and the German Institute of Human Nutrition Potsdam-Rehbruecke<sup>3</sup> (Nuthetal). They are active cancer researchers and appear to be seeking causative factors for pancreatic cancer.

### **Hypothesis**

The authors begin with the hypothesis that a high dietary glycemic load (GL) is positively associated with the risk of pancreatic cancer. GL is the product of [the experimentally measured serum glucose response after consumption of a specific food or ingredient (glycemic index, GI)] x [the carbohydrate content of the food or ingredient]. GL is now thought by nutritionists to be a better predictor of serum insulin response than GI alone.

The authors justify their hypothesis by citing previous studies suggesting that glucose metabolism plays a role in the development of pancreatic cancer. In this study, GL and carbohydrate intakes were mathematically derived from the amounts and types of foods consumed by participants as reported in an extensive self-administered questionnaire.

### **Author Conclusions**

1. High sugar intake — fructose intake, specifically — was associated with a greater risk of pancreatic cancer.
  - a. GL and added sugars were not significantly associated with pancreatic cancer risk.
  - b. Pancreatic cancer risk increased with higher intakes of total sugars, fructose and sucrose.
  - c. The association between fructose and increased pancreatic cancer risk became significant when the highest and lowest fructose consumers were compared.
  - d. The association between fruit and juice intakes and pancreatic cancer risk was significant.
  - e. The association between caloric soda intake and pancreatic cancer risk was not significant.

2. Sucrose (sugar) intake was associated with increased BMI (body mass index) for overweight and obese, but not normal-weight, subjects when the highest and lowest consumers were compared.

### Critique

- It seems rather implausible that fructose, but not added sugars (half fructose), would be associated with increased risk of pancreatic cancer. The solution to this inconsistency may be the unconventional use of terminology by the authors: 'added sugars' is here applied to spoonfuls of sugar added to foods, while the term is commonly used in nutrition circles to mean all dietary nutritive sweeteners not intrinsically present in foods and beverages.
- It seems even more implausible that fruits and juices, but not caloric sodas (half fructose), would be associated with increased risk of pancreatic cancer, since both share similar compositions. The solution to this inconsistency may lie in the amounts consumed: the authors claim that study participants derived more fructose from fruits and juices than from other dietary sources, including caloric soft drinks. Since the data are inexplicably absent, we are forced to accept their explanation. Would the authors advise that the public cut back on fruit consumption? Surely such advice is counterintuitive and ill-considered.
- Though the authors hypothesize that high dietary GL is associated with the risk of pancreatic cancer, they do not report dietary glucose intakes. This seems a glaring oversight since glucose is accepted to be the most insulinogenic component in the diet and is accordingly given a GI value of 100, the standard against which others compounds are compared. Pure glucose also has the highest GL. By comparison, fructose has a GI of about 20.
  - Since glucose and fructose are equally present and track together in nutritive sweeteners (except pure fructose, pure glucose and corn syrups), fruits/juices and caloric soft drinks, any calculation of fructose intake from dietary questionnaires should yield roughly equivalent intake figures for glucose.
  - When glucose from other dietary sources is added (cereal grains; starch, maltodextrin, corn syrup and glucose ingredients), the intake of glucose is clearly higher than fructose. Forshee et.al. (1) estimated the ratio of fructose-to-glucose at 0.7, a ratio that did not change with the advent of high fructose corn syrup (HFCS).
  - Despite the authors' conclusion that GL is not associated with increased risk of pancreatic cancer, parallel glucose-fructose tracking must cast doubt on the uniqueness of the conclusion that fructose intake is associated with greater risk of pancreatic cancer — this conclusion can and should be extended to glucose as well.
- Fructose intakes calculated for participants in the Multiethnic Cohort Study were 4-6% of calories (Table 1, p.1497). These intakes are considerably lower than previous estimates for the general population: Park & Yetley in 1993 estimated fructose intakes at 8% of calories for the whole population (2). More recent estimates have placed fructose intake as high as 12 to nearly 20% of calories. The solution to this inconsistency may also lie with the terminology used: Park &

Yetley summed fructose from all dietary sources — both free fructose and that from sucrose — while these authors seem to be reporting free fructose separately from sucrose and added sugars (tabletop). Clearly, Park & Yetley's approach is the correct one.

In summary, the authors failed to prove the original hypothesis that GL is positively associated with increased risk of pancreatic cancer. They appear to have turned to fructose as an alternative in an effort to salvage a result from their rather disjointed, inconsistent and incomprehensible data.

### **References**

1. Forshee R, Storey M, Allison D, et al. A critical examination of the evidence relating high fructose corn syrup and weight gain. *Critical Reviews in Food Science and Nutrition* 2007;47:561-582.
2. Park YK, Yetley EA. Intakes and food sources of fructose in the United States. *Am J Clin Nutr* 1993;58:737S-747S.