ARIC Manuscript Proposal # 989

PC Reviewed: 02/13/04       Status: A         Priority: 2
SC Reviewed: 02/13/04       Status: A         Priority: 2

1.a. Full Title: Associations of plant- and animal-based food consumption with risk of developing type 2 diabetes: the Atherosclerosis Risk in Communities (ARIC) Study

b. Abbreviated Title (Length 26 characters):

Food groups and incident type 2 diabetes

2. Writing Group (list individual with lead responsibility first):

   Lead: Lyn M. Steffen

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   Writing group members: Christine Ashley, Lyn Steffen, June Stevens, and others

3. Timeline: Upon approval, the expected completion time is 6 months
   1. Approval of proposal
   2. Literature Review           2 weeks
   3. Outline                    1 week
   4. Data analysis              8 weeks
   5. Write manuscript           5 weeks
   6. Review and edit paper      8 weeks

Rationale:
Epidemiologic studies of the relation of diet and incidence of type 2 diabetes often focus on the intake of isolated constituents of foods. These dietary factors alone may not completely explain the effect of dietary intake on glucose metabolism. Examination of the association between food group intake and risk of developing type 2 diabetes may be an important approach because it may account for the interaction between nutrients and other components within foods. We propose to explore the relationships of plant- and animal-based food group intake with the risk of developing type 2 diabetes in African American and white adults.

Whole and refined grain consumption and incidence of type 2 diabetes

An inverse association between whole-grain intake and risk of type 2 diabetes was found in US adults enrolled in the Health Professionals Follow-Up Study, the Nurses’ Health Study, and the Iowa Women’s Health Study (Fung 2002, Liu 2002, Meyer 2000). These study results showed that whole-grain should be differentiated from refined-grain products to predict the development
of disease (Liu 2002, Fung 2002, Montonen 2003). In the proposed study, we will explore the same relation in an ethnically diverse population.

Fruit and vegetable consumption and incidence of type 2 diabetes
The consumption of fruits and vegetables is recommended for the prevention of type 2 diabetes by the American Diabetes Association (ADA). One study has shown that fruit and vegetable intake was inversely associated with the risk of developing diabetes, particularly among women (Ford and Mokdad 2001). This association will be examined in African American and white men and women.

Dairy consumption and incidence of type 2 diabetes
Study results from the Coronary Artery Risk Development in Young Adults (CARDIA) have shown a strong inverse association between dairy food intake and insulin resistance syndrome among overweight adults (Pereira et al. 2002). The proposed study will investigate the relation between dairy food intake and risk of developing type 2 diabetes among African American and white adults.

Meat consumption and incidence of type 2 diabetes
Frequent consumption of processed meats was associated with a higher risk for type 2 diabetes in male participants enrolled in the Health Professionals Follow-Up Study (van Dam 2002). The ADA recommends limited consumption of all meats. The association between meat intake and risk of developing type 2 diabetes will be examined in African American and white adults.

This is the first study exploring the relation between intake of different food groups and risk of developing type 2 diabetes in African Americans.

4. Study Questions:

- Is the consumption of dairy products (including milk, yogurt, cheese, and ice cream) associated with risk of developing type 2 diabetes in African Americans and whites?
- Is the consumption of meat products (including red meat, processed meat, poultry, and eggs) associated with risk of developing type 2 diabetes in African Americans and whites?
- Is the consumption of whole-grain foods associated with risk of developing type 2 diabetes in African Americans and whites?
- Is the consumption of refined-grain foods associated with risk of developing type 2 diabetes in African Americans and whites?
- Is the consumption of fruits and vegetables associated with risk of developing type 2 diabetes in African Americans and whites?
- Is the consumption of a plant-based diet pattern or an animal-based diet pattern associated with risk of developing type 2 diabetes in African Americans and whites?
Proportional hazard regression analysis and discrete proportional hazards regression models will be used to examine food groups as predictors of type 2 diabetes. Plant-based and animal-based diet patterns will be derived using principal components analysis. Sex and ethnic group specific models will be compared. Covariates will include age, center, education levels, smoking status and pack years of smoking, level of physical activity, BMI, family history of diabetes, and hypertension.

6. **Data (variables, time window, source, inclusions/exclusions):**

**Exposure variables:**
- Food group amounts consumed at baseline and visit 3 (food groups have been developed previously, including whole grains, refined grains, dairy, meat, fruit, and vegetables);
- Plant-based and animal-based diet patterns will be derived

**Outcome variable:**
- Incidence of type 2 diabetes determined with one fasting glucose of ≥126 mg/dL or one non-fasting glucose ≥200 mg/dL at visit 2, 3, or 4.

**Other variables:**
- ID, age, center, education, smoking, physical activity, BMI, waist circumference, family history of diabetes, and hypertension.

**Exclusion:**
- Race not African American or White
- Upper and lower 1% of the distribution for total energy intake
- Missing food intake data, missing glucose values
- Diabetic at baseline

7.a. Will the data be used for non-CVD analysis in this manuscript?  ____ Yes  __X_ No

b. If Yes, is the author aware that the file ICTDER02 must be used to exclude persons with a value RES_OTH = “CVD Research” for non-DNA analysis, and for DNA analysis RES_DNA = “CVD Research” would be used?  ____ Yes  ____ No
(This file ICTDER02 has been distributed to ARIC PIs, and contains the responses to consent updates related to stored sample use for research.)

8.a. Will the DNA data be used in this manuscript?  ____ Yes  __X_ No

b. If yes, is the author aware that either DNA data distributed by the Coordinating Center must be used, or the file ICTDER02 must be used to exclude those with value RES_DNA = “No use/storage DNA”?  ____ Yes  ____ No

9. The lead author of this manuscript proposal has reviewed the list of existing ARIC Study manuscript proposals and has found no overlap between this proposal and previously approved manuscript proposals either published or still in active status. ARIC Investigators have access to the publications lists under the Study Members Area of the web site at:  [http://bios.unc.edu/units/cscc/ARIC/stdy/studymem.html](http://bios.unc.edu/units/cscc/ARIC/stdy/studymem.html)
__X__ Yes ______ No

10. What are the most related manuscript proposals in ARIC (authors are encouraged to contact lead authors of these proposals for comments on the new proposal or collaboration)?


Steffen et al. Associations of whole-grain, refined grain, and fruit and vegetable consumption with risks of all-cause mortality and incident coronary artery disease and ischemic stroke: the Atherosclerosis Risk in Communities Study.

11. Manuscript preparation is expected to be completed in one to three years. If a manuscript is not submitted for ARIC review at the end of the 3-years from the date of the approval, the manuscript proposal will expire.

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<th>Study</th>
<th># of population/ethnicity &amp; gender</th>
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<th>Follow-up period</th>
<th># of cases</th>
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<td>42898 US men</td>
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<td>Montonen et al. 2003</td>
<td>2286 US men 2030 US women</td>
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<td>Liu et al. 2000 The Nurses’ Health Study</td>
<td>75,521 US women</td>
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<td>Pereira 2002 CARDIA</td>
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