1. **Full Title:** The relationship of neighborhood and individual socioeconomic characteristics to insulin resistance, impaired glucose regulation, and diabetes in the ARIC cohort

2. **Abbreviated Title (Length 26 characters):** Neighborhoods and diabetes

3. **Writing Group (list individual with lead responsibility first):**
   
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4. **Rationale:**
   Numerous studies have shown that neighborhood socioeconomic environment is related to health status and mortality. Some studies have concluded that the association between neighborhood level factors and health outcomes is independent of the influence of individual socioeconomic position on health status. Living in deprived neighborhoods has been associated with a greater prevalence and incidence of cardiovascular diseases and a high prevalence of risk factors for disease (Diez-Roux, 1997; 2001). There is an inverse relationship between individual socioeconomic status and the prevalence of type 2 diabetes in the United States and other industrialized countries (Knowler 1993; Robbins 2000). However, the cross-sectional nature of most previous studies does not permit the exclusion of potential reverse causality, with socioeconomic status being a function of health status, rather than health status being a function of socioeconomic status. The prospective nature of the ARIC study provides the opportunity to investigate the
relationship between neighborhood environments and the development of insulin resistance, impaired glucose regulation, and type 2 diabetes with consideration of individual-level socioeconomic status. With varied results previously observed based on the criteria utilized for type 2 diabetes, definitions based on both the World Health Organization (WHO) and American Diabetes Association (ADA) criteria for classification of diabetes and impaired glucose regulation will be used.

Given the racial/ethnic differences in socioeconomic status in the US and the higher prevalence of type 2 diabetes and its sequelae in African Americans, this proposal will address the main study questions separately in African Americans and Caucasians.

4. **Main Hypothesis/Study Questions:**

a. **Cross-sectional**

Neighborhood level and individual level socioeconomic characteristics are inversely related to prevalence of insulin resistance (indexed by fasting insulin), impaired glucose regulation, and type 2 diabetes.

The associations of individual level socioeconomic characteristics with insulin resistance, impaired glucose regulation, and type 2 diabetes are modified by neighborhood level characteristics.

The association of neighborhood level socioeconomic characteristics with insulin resistance, impaired glucose regulation, and type 2 diabetes is of greater magnitude in African American women than men, controlling for individual level socioeconomic characteristics.

b. **Prospective**

The cumulative incidence of insulin resistance (indexed by fasting insulin) and of type 2 diabetes is inversely related to neighborhood level and individual level socioeconomic characteristics.

The associations of individual level socioeconomic characteristics with incident insulin resistance and type 2 diabetes are modified by neighborhood level characteristics.

The association of neighborhood level socioeconomic characteristics with incident insulin resistance and type 2 diabetes is of greater magnitude in African American women than men, controlling for individual level socioeconomic characteristics.

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

Census tracts will be used as proxies for neighborhoods. Neighborhood indicators on education, occupation, income, and wealth will be obtained from the 1990 and 2000 US censuses for ARIC visits 1 and 4, respectively.
Baseline and follow-up visits for the ARIC cohort will be used to obtain information on individual-level factors such as age, race, gender, education, occupation, income, and cardiovascular risk factors.

Analyses will include diabetes risk factors such as body mass index, waist-to-hip ratio, physical activity, and smoking.

At baseline impaired glucose regulation will be assessed from fasting plasma glucose levels. At Visit 4 impaired glucose regulation based on glucose levels from the oral glucose tolerance test will be compared to impaired glucose regulation based on fasting plasma glucose levels to investigate the agreement of subjects identified and to re-assess the association of SES and impaired glucose regulation if necessary. Insulin resistance estimated from fasting insulin levels will be defined based on a percentile cutpoint (i.e. upper 20th percentile). Diabetes will be defined based on the World Health Organization and the American Diabetes Association criteria.

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

8.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/cscs/ARIC/stdy/studymem.html](http://bios.unc.edu/units/cscs/ARIC/stdy/studymem.html)

____X__ Yes  ______ No