Manuscript # 496

1a. Full Title Modification of the Association of SES with Cardiovascular Disease and its Risk Factors by the Social Environment of Earlier Life
   b. Abbreviated Title (Length 26): SES at birth predicts CHD

2. Writing Group (list individual with lead responsibility first):
   Lead:  H.A. Tyroler. M.D.
   Address:  137 E. Franklin Street
            NationsBank Plaza Suite 306
            Chapel Hill, NC 27514
   Phone:  (919) 966-1967
   Fax:  (919) 966-9800
   Email: al_tyroler@unc.edu

Catherine Paton
Ana Diez-Roux
Marsha Eigenbrodt

3. Timeline:
Preliminary analyses can begin immediately, with SES data collected to date on Visit 4 to develop and refine participant/parent SES constructs, and test the study hypothesis on extant Visit 1 data.

4. Rationale:
An extensive body of empirical evidence, both within the ARIC study and numerous other studies, has demonstrated strong associations between the socioeconomic status (SES) of adults and pre-clinical atherosclerosis, cardiovascular disease risk factors, and clinical manifestations of coronary disease. Similar associations have been reported by Barker, et al, between cardiovascular disease manifestations and the early environment, including the intrauterine, early infancy, and early childhood. More recently, Barker, et al, have identified associations between early derivational environments and the intervening cardiovascular disease risk factors of high blood pressure, dyslipidemia, and altered glucose and hemostatic metabolism Combining these lines of research, it should be feasible using the Visit 4 examination data, which includes information on the educational level of parent and caretaker at the time of the ARIC participants' birth through age 5, to develop an index of the social environment during the phases of intrauterine life, infancy, and early childhood. An SES profile of the ARIC participants, which includes measures of educational achievement, occupational level, and income has already been assembled and has been found associated with each of the components of cardiovascular disease previously mentioned. Most of the empirical work reported to date
testing the Barker hypothesis has relied on birth weight, often as a surrogate measure of intrauterine deprivation. Although there is a self-reported index of birth weight in Visit 4, it has not been validated and will not be used for this study.

5. Main Hypothesis:
The individual associations of clinically manifest cardiovascular disease, the major CVD risk factors, and pre-clinical atherosclerosis with the participants' educational level will be modified by the educational level of their parents and/or caretakers in their early life: The lower the education level of the parents or caretakers, the higher the level of CVD risk factors, preclinical atherosclerosis and clinical CVD at all levels of the participants' SES at Visit 1.

6. Data (variables, time window, source, inclusions/exclusions):
The marked increase in years of education achievement over time requires different criteria for categorizing levels of achievement in the two cohorts of participants and their parents/caretakers. A joint classification of parent (caretaker) and participants' SES will be based on their respective educational attainment levels as follows:

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Low Years of Schooling</th>
<th>Medium Years of Schooling</th>
<th>High Years of Schooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent (caretaker) at the time of the participant’s birth</td>
<td>0 – 6</td>
<td>7 – 11</td>
<td>&gt; 12 years</td>
</tr>
<tr>
<td>Participant at Visit 1</td>
<td>&lt; 12</td>
<td>12 – 14</td>
<td>&gt; 14 years</td>
</tr>
</tbody>
</table>

Thus, there will be nine strata of parent-participant education levels. The strata of major interest will be those with evidence of low education levels of parent (caretaker) and higher educational levels in the participants. There will probably be relatively few instances of high parental - low participant educational achievement. Analysis of covariance models of the center- and age-adjusted continuous outcome variables measured at Visit 1 will be tested across parent-participant education strata for each of the four race-gender groups. The continuous outcome variables will be Visit 1 IMT, SBP, DBP, fasting, serum glucose, insulin, total cholesterol, LDL-C, HDL-C, triglycerides, fibrinogen, and factor VII. Logistic regression analysis will be used for categorical outcome variables for prevalent CHD, hypertension, and diabetes at Visit 1.