

## ARIC MANUSCRIPT PROPOSAL FORM

Manuscript #577

1. Title (length 26):

Epidemiology of Sympathetic Activity

2. Writing group (list individuals with lead responsibility first):

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3. Timeline:

Data records will be processed upon approval of the project. Retrieval of sympathetic activity from ARIC baseline records and repeatability studies will take place through January 1999, after which data analysis and manuscript preparation will begin and continue through December 2000.

4. Rationale:

Balance between sympathetic and parasympathetic components of the autonomic nervous system substantially impact cardiac regulation. When the sympathetic system predominates unattenuated by parasympathetic activity, the heart is susceptible to arrhythmias and ventricular fibrillation (3). Individuals demonstrating impaired autonomic nervous system function are at higher risk for cardiovascular events, including myocardial infarction (MI), sudden cardiac death, and congestive heart failure than those with more favorable heart rate variability (3,2). Important risk factors for CHD, specifically hypertension and diabetes mellitus, have demonstrated relationships with autonomic function in clinic populations. Patients with hypertension have higher low frequency heart rate variability (mostly indicative of sympathetic function) than high frequency variability (representing parasympathetic function)(3). Case-control studies in small clinic-based populations report elevated sympathetic activity in hypertensives when compared to normotensive controls (4). Insulin is known to stimulate sympathetic activity, but the temporal relationship between diabetes and sympathetic activity is unknown. Racial differences in sympathetic activation during postural stimulation suggest a possible mechanism for the increased prevalence of hypertension in American Blacks (6).

Using heart rate variability (HRV) measurements collected during the baseline examination of ARIC we have the opportunity to investigate temporal associations between cardiac autonomic function and the development of CHD at the population level (7). Descriptive epidemiology of sympathetic activation upon standing has not been studied in population samples. Earlier work by ARIC investigators identified impaired parasympathetic function as a risk factor for incident CHD and as a correlate of

hypertension and diabetes (9). The use of supine measurements as well as their short duration precluded the identification of the role of the sympathetic component of HRV.

The beat-to-beat data collected during Visit 1 in the ARIC study, processed by the methods employed in the HRV ancillary study, provides the opportunity to extend this earlier work by measuring the activation of sympathetic control during postural change. This manuscript will address whether sympathetic activation due to gravity stimulation (HRV-sympathetic activation; HRV-SA) is predictive of cardiovascular disease in a healthy population (free of CHD at baseline).

The inclusion of black and white men and women in the sample provides the opportunity for demographic comparisons of autonomic function and its association with cardiovascular events and risk factors.

#### 5. Main Hypothesis:

- 1) Participants with highest levels of sympathetic nervous system activity, as measured by a postural change during HRV recording, will have increased incidence of cardiovascular events when compared to those below the median HRV-SA.
- 2) Participants with the highest levels of HRV-SA will have increased incidence of hypertension and diabetes compared to those below the median HRV-SA.
- 3) Prevalent CHD, measured at the baseline exam, will be higher among participants with the highest levels of HRV-SA.
- 4) Prevalent hypertension and diabetes, measured at the baseline exam, will be higher among participants with the highest levels of HRV-SA.
- 5) Black ARIC participants will have the highest levels of HRV-SA.