1.a. Full Title: Heart rate variability and arrhythmia

1.b. Abbreviated Title (Length 26): HRV and PVC

2. Writing Group (list individual with lead responsibility first):
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3. Timeline:
   Analysis March 2000
   Draft manuscript June 2000
   Manuscript for ARIC Review August 2000
   Submission to Journal November 2000

4. Rationale:
   During the past 10 years, assessment of HRV has emerged as one of the noninvasive methods of estimating the cardiac parasympathetic and sympathetic balance. As a result of the interaction between sympathetic and parasympathetic activity, beat-to-beat heart rate shows periodicities over time. These periodicities can be identified through spectral analysis. For heart rate/time data re-expressed in this mathematical form, it is well accepted that cycles with a frequency of 0.04-0.15 Hz (low frequency power, LF) are under the influence of both the sympathetic and parasympathetic nervous system. Cycles with a frequency 0.15-0.40 Hz (high frequency power, HF) are under the influence of the parasympathetic system only and regarded as a marker of cardiac parasympathetic control. The LF/HF ratio is considered as a measurement of the parasympathetic-sympathetic balance. Simple statistics summarizing the variation of R-R intervals over a short period of time, named time domain HRV indices, provide a comprehensive estimation of cardiac sympathetic and parasympathetic contribution to the R-R variation.

   It is well known that the imbalance of autonomic system is associated with decreased threshold of arrhythmia, which in turn is associated with higher risk of cardiac events, particularly sudden death.

   In the literature, various types of supine, short-term, or uncontrolled 24-hour HRV indices have related lower HRV with clinical events (CHD, MI, mortality). We all cited the pathophysiology of impaired autonomic function lead decreased arrhythmia threshold, and thus lead to increased risk of events. Several clinical studies examining HRV prior to the onset of arrhythmic segments on 24 hour monitoring data found significant decreases of HRV, and increases of HR prior to the arrhythmic episodes. However, there are
no published data assessing population based association between arrhythmia and HRV. An investigation in this association from our population based data would provide supporting evidence for the mechanisms linking HRV to CVD, sudden death, and mortality, as well as linking HRV to arrhythmia as another relevant clinical event.

In ARIC Visit 1, two-minute resting, beat-to-beat heart rate data were collected according to a standard protocol. Utilizing a special heart rate variability system, time and frequency domain indices of heart rate variability have been calculated for the entire ARIC cohort members, supported as an ancillary study.

5. Main Study Objective:
To investigate the cross-sectional relationship between Visit 1 HRV and arrhythmia.

Main Study Hypotheses:
1. Lower levels of HRV, indicative of impaired cardiac autonomic control, is associated with high prevalence of arrhythmia detected from 2-minute ECG rhythm strip.
2. The above association is independent of age, ethnicity, sex, and major CVD risk factors.
3. The above association is consistent across ethnicity, gender, and major CVD-related co-morbidity stratum.

6. Data (variables, source, inclusion/exclusion):
This paper is cross-sectional. The following Visit 1 variables are needed for this analysis: HRV data, 2minut ECG rhythm strip data, and the major co-morbidity data in the derived variable data set.