1. Title: 
Population distribution of QT, QT_p, and QTI

2. Writing Group: 
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3. Timeline: 
Preliminary analysis to begin November, 1993.

4. Rationale: 
Bazett’s formula (QT_c = QT/RR^{0.5}) commonly is used to calculate the heart rate-corrected QT interval (QT_c, Bazett 1920). In turn, QT_c has been used as a predictor of cardiovascular and all-cause mortality in healthy subjects (Goldberg et al 1991; Schouten et al 1991) and patients following MI (Algra et al 1991; Pohjola-Sintonen 1986; Wheelan et al 1986; Ahnve et al 1984). However, Bazett’s exponential formula overcorrects the QT interval at slow heart rates and undercorrects it at fast heart rates (Rautaharju et al 1991). Linear formulas (e.g. Sagie et al 1992) also fail to accurately predict QT at the extremes of the heart rate distribution. To demonstrate this inaccuracy, most of the available QT prediction formulas were recently compared. The comparison also demonstrated an equation, QT_p = 656/(1 + 0.01HR), that accurately predicts QT (QT_p) over a wide range of measured heart rates and another equation, QTI = (QT/QT_p)100, that defines an objective index of QT prolongation (QTI, Rautaharju et al 1993). These equations permit evaluation of clinically observed relationships between the QT interval and demographic variables (age; sex; race), electrolyte levels (K^+; Ca^{++}; Mg^{++}), disease states associated with cardiovascular autonomic dysfunction (diabetes; hypertension; obesity; smoking; chronic renal failure; alcoholism; stroke), and use of cardioactive medication (antiarrhythmics; polycyclic antidepressants; phenothiazines; lithium salts; probucol; beta-blockers; centrally-acting antihypertensives; sulfonylureas). However, only those relationships between age, sex, and QTI have been addressed by prior epidemiologic investigation (Rautaharju et al 1992).

5. Main Hypotheses: 
Electrolyte deficits, disease states associated with cardiovascular autonomic dysfunction, and use of specific cardioactive medications are associated with QT prolongation.

6. Analysis: 
Analysis will be based on the Visit I 12-lead ECG. Exclusion criteria will include ECG abnormalities known to influence QT intervals (premature beats; atrioventricular and ventricular conduction defects; Minnesota Codes 1, 4, and 5). Subjects will be stratified by prevalent CHD. QT_p and QTI will be calculated from the best estimate of QT available in the Edmonton full ECG record using the identified formulas. Associations between QT, QT_p, QTI, and the subject attributes identified above will be examined.
7. Data:
For Visit 1, demographic, ECG composite (including QT; U wave codes), clinical chemistry, medication survey, and sitting blood pressure variables. Derived variables including disease prevalence, blood glucose level, hypertension, medication use, alcohol use, obesity, TIA/stroke, and smoking.