ARIC MANUSCRIPT PROPOSAL FORM

Manuscript #270A

1. Title:
Postural change and blood pressure, variation due to gender and race: The ARIC study

2. Writing Group:
(lead) Christopher Nardo, Wayne Rosamond, Ingar Holme, A. Richey Sharrett, Kathleen C. Light, Grethe Tell, Moyses Szklo, Gerardo Heiss, and other interested ARIC investigators to be determined

3. Timeline:
The data for this analysis are currently available. Analysis and writing will take place over the next year.

4. Rationale:
As early as 1936 (Cannon), large cardiovascular and neuroendocrine responses to psychological and behavioral stressors have been reported in the medical literature. Cardiovascular reactivity to these stressors has been associated with the development of atherosclerosis and hypertension (Krantz and Manuck, 1984), as well as coronary heart disease (Keys et al, 1971). The mechanism of this effect is thought to be mediated by the release of neurotransmitters during stress. The chemical and physiologic activity of neurotransmitters, such as catecholamines and Neuropeptide Y (NPY), has been demonstrated to damage endothelium (Scheniderman, 1982), activate platelets (Glass, 1977), mobilize lipid stores (Heindel, Orci, & Jeanrenaud, 1975), and induce vasoconstriction (Marturi, et al., 1989).

Lake, Ziegler, and Kopin (1976) demonstrated that plasma catecholamine levels double in response to the stress of standing. Sparrow, Tifft, Rosner, and Weiss (1986) discovered that a greater than or equal to 10 mmHg change in diastolic blood pressure on standing modifies the effect of seated systolic and diastolic blood pressure on the incidence of myocardial infarction after 8.7 years of follow-up.

5. Main Hypothesis:
The purpose of this manuscript is to focus on the descriptive epidemiology of the response of blood pressure to change in posture. The primary covariates of interest are race, gender, and age. Additional covariates of interest will include: use of anti-hypertensives (with particular focus on beta-blockers), diabetic status, hypertension status, seated blood pressure, smoking history.

6. Design:

The study population is drawn from the baseline survey of the Atherosclerosis Risk in Communities (ARIC) Study. During the ultrasound examination in Visit 1 of the ARIC study, blood pressure was measured for five minute intervals by the Dinamap 1846 SX. The study participant was instructed at the end of the examination period that a two-minute resting and two-minute standing blood pressure study would begin. The Dinamap 1846 was then placed in "STAT" mode and blood pressure is determined every 30 seconds (on the average) for two minutes with the study participant supine. The sonographer then instructed the participant to stand and blood pressure was determined for another two minutes. A detailed description of the procedure can be found in manual 11 of the ARIC study protocol (Atherosclerosis Risk in Communities Study Protocol).

The proposed study will examine the cross-sectional association between the response of blood pressure to a change in body position with age, race, and gender. To investigate this relationship the blood pressure response to postural change will be measured in several ways. The mean systolic and diastolic blood pressures will be calculated before and after standing and the difference between the two means will be calculated. A mean difference score will be calculated, after excluding the first standing blood pressure measurement. A categorical measure of change in diastolic and systolic blood pressure induced by postural change will be calculated dividing the mean change in blood pressure into deciles.

All measures of postural change will be adjusted for age and compared letween race and gender groups. Measures of postural change will be compared between covariate groups within race and gender sub-groups using univariate statisitics. Race and gender specific multivariable models, appropriate for the dependent variable, will be calculated using the guidelines in Chapter 16 of Kleinbaum, Kupper, and Muller (1988).

7. Data Requirements:
Data analysis will be performed by Chris Nardo at the Department of Epidemiology, University of North Carolina at Chapel Hill. The closed Visit 1 data tape is available from the ARIC collaborative studies coordinating center (CSCC).

REFERENCES

Atherosclerosis Risk in Communities Study Protocol - Manual 11. Sitting blood pressure and postural change in blood pressure and heart rate. Collaborative Studies Coordinating Center, Department of Biostatistics, University of North Carolina, Chapel Hill, NC.

Cannon, W.B. (1936). Bodily changes in pain, hunger, fear, and rage (2nd ed.). New York: Appleton-Century-Crofts.

Glass, D.C. (1977). Behavior Patterns, Stress, and Coronary Heart Disease. Hillsdale, New Jersey: Lawrence Erlbaum.

Heindel, J.J., Orci, L., & Jeanrenaud, B. (1975). Fat mobilization and its regulation by hormones and drugs in white adipose tissue. In Masoro, E.J. (Ed.), International Encyelopedia of Pharmacology and Therapeutics. Pharmacology of Lipid Transport and Atherosclerotic Processes, 24, (pp. 175-373). Oxford: Pergamon Press.

Keys, A., Taylor, H.L., Blackburn, H., Brozek, J., Anderson, J.T., & Somonsen, E. (1971). Mortality and coronary heart disease among men studied for 23 years. Archives of Internal Medicine, 128, 201-214.

Kleinbaum, D.G., Kupper, L.L., & Muller, K.E. (1988). Applied Regression Analysis and Other Multivariable Methods. PWS-Kent Publishing Co., Boston.

Krantz, D.S., & Manuck, S.B. (1984). Acute psychophysiologic reactivity and risk of cardiovascular disease: A review and methodologic critique. Psychological Bulletin, 96, 453-464.

Lake, C.R., Ziegler, M.G., & Kopin, I.J. (1976). Use of plasma norepinephrine for evaluation of sympathetic neuronal function in man. Life Sciences, 18, 1315-1326.

Marturi, M.F., Greene, R, Speir, E., Burrus, C., Dorsey, L.M.A., Markie, D.R., Maxwell, M., Schmist, W., Goldstein, S.R., and Patterson, R.E. (1989). Neuropeptide Y: A peptide found in human coronary arteries constricts primary small coronary arteries to produce myocardial ischemia in dogs. Journal of Clinical Investigation, 83, 1217-1224.

Scheniderman, N. (1982). Animal behanor models of coronary heart disease. In D.S. Krantz, A. Baum, and J.E. Singer (Eds.), Handbook of Psychology and Health (Volume III): Cardiovascular Disorders and Behavior. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Sparrow, D., Tifft, C.P., Rosner, B., & Weiss, S.T. (1984). Postural changes in diastolic blood pressure and the risk of myocardial infarction: The Normative Aging Study. Circulation, 70, 533-537.