ARIC Manuscript Proposal # 1755

PC Reviewed: 3/8/11	**Status: A**	**Priority: 2**
SC Reviewed: _____	**Status: _____**	**Priority: ____**

1.a. Full Title: Anger proneness, heart failure risk, and hospital use

b. Abbreviated Title (Length 26 characters): Anger and HF

2. Writing Group:

Writing group members: Anna Kucharska-Newton, Patricia Chang, Sally Stearns, Carla Dupree, Janice Williams, Tom Mosley, Kimberly Geissler, Saul Blecker, others welcome

I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. __AMK-N___ **[please confirm with your initials electronically or in writing]**

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3. Timeline: Analyses to begin immediately following approval of manuscript proposal.

4. Rationale:

Numerous studies have demonstrated the association of anger with the incidence of coronary heart disease and stroke[1, 2]. In a prospective analysis of normotensive individuals, angry temperament has been found to double the risk of fatal and non-fatal coronary heart disease [3]. Anger can affect the risk of cardiovascular disease at behavioral and biological levels. From the behavioral perspective, effective management of HF involves direct patient participation. Anger prone personality may lower the patient's self-esteem and limit his/her ability to engage in constructive activities aimed at health improvement [4]. On the biological level, sustained anger can lead to chronically increased catecholamine levels, which in turn can lead to progression of atherosclerosis and eventually to heart disease by causing endothelial injury, vascular lipid uptake, increased platelet activation and aggregation, and activation of macrophages.

Although the association of anger proneness with increased incidence of coronary heart disease and stroke has been documented, relatively little has been published concerning the association of anger with the incidence of heart failure. One prospective one year follow-up study of hospitalized HF patients found that anger was positively associated with length of stay but not with hospital readmissions [5].

Since most studies of the association of anger with heart failure have been either cross-sectional or based on a small number of participants and limited follow-up time, there is a need for a large prospective study examining the association of the anger prone personality with the incidence of heart failure. In this study we aim to build on ARIC studies which have examined the association of anger-proneness with the incidence of coronary heart disease and stroke to evaluate the association of proneness to anger, evaluated at ARIC Visit 2, with incidence of heart failure in follow-up through 2007and with the pattern of hospital admissions during the follow-up time.

5. Main Hypothesis/Study Questions:

1. Anger-proneness is associated with increased incidence of HF.

2. Anger-proneness is positively associated with increased utilization of health-care services.

6. Design and analysis (study design, inclusion/exclusion, outcome and other variables of interest with specific reference to the time of their collection, summary

of data analysis, and any anticipated methodologic limitations or challenges if present).

Study population: ARIC cohort participants with identified incident heart failure hospitalizations.

Exposure variables: Data concerning anger proneness will be collected from ARIC Visit 2 interview during which the Speilberger Trait Anger Scale[6] was used to assess anger temperament and anger reaction. The scale consists of 10 items with responses graded on a Likert-type scale: almost never=1, sometimes=2, often=3, almost always=4. The final score will represent the sum of responses for the two subclasses of the Spielberger's test (anger temperament and anger reaction).

Outcomes variables: Heart failure incidence based on medical records of hospital admissions through 2007.

Utilization of health care services will be evaluated on the basis of the following indicators: total number of days hospitalized and frequency of readmission within one year of index hospitalization for which HF was the main diagnosis within one year of index hospitalization. Total number of days hospitalized will be assessed from medical records using recorded date of admission and date of discharge. We are interested in evaluating all readmissions, not just those limited to heart-failure specific codes.

Covariates: age, gender, race, and hypertension will be evaluated as potential effect measure modifiers of the association of anger with incidence of heart failure. Hypertension has been found to be a significant effect measure modifier of the association of anger with the risk of coronary heart disease. Since hypertension is a strong risk factor for heart failure, we hypothesize that it may also modify the association of anger with the incidence of heart failure. Hypertension will be defined as systolic blood pressure equal to or greater than 140 and diastolic blood pressure equal to or greater than 90. HDL-cholesterol level, total cholesterol level, triglyceride level, diabetes, years of cigarette smoking, and use of alcohol will be evaluated as potential confounders of the examined associations.

Statistical analyses: We will use Cox proportional hazard regression models to examine the association of anger measured at Visit 2 with the incidence of heart failure in follow-up through 2007.

7.a. Will the data be used for non-CVD analysis in this manuscript? ____ Yes __x__ No

b. If Yes, is the author aware that the file ICTDER03 must be used to exclude persons with a value RES_OTH = "CVD Research" for non-DNA analysis, and for DNA analysis RES_DNA = "CVD Research" would be used? ____ Yes ____ No
(This file ICTDER03 has been distributed to ARIC PIs, and contains the responses to consent updates related to stored sample use for research.)

8.a. Will the DNA data be used in this manuscript? ____ Yes __x__ No

8.b. If yes, is the author aware that either DNA data distributed by the Coordinating Center must be used, or the file ICTDER03 must be used to

exclude those with value RES_DNA = "No use/storage DNA"?
____ Yes ____ No

9.The lead author of this manuscript proposal has reviewed the list of existing ARIC Study manuscript proposals and has found no overlap between this proposal and previously approved manuscript proposals either published or still in active status. ARIC Investigators have access to the publications lists under the Study Members Area of the web site at: http://www.cscc.unc.edu/ARIC/search.php

___x___ Yes _____ No

10. What are the most related manuscript proposals in ARIC (authors are encouraged to contact lead authors of these proposals for comments on the new proposal or collaboration)?
505, 516, 610, 626, 666, 724, 727, 774, 854

Janice Williams is the main author, or co-author of these proposals and she is the co-author of the proposed study.

11. a. Is this manuscript proposal associated with any ARIC ancillary studies or use any ancillary study data? ____ Yes ___x_ No

11.b. If yes, is the proposal
___ A. primarily the result of an ancillary study (list number* _____)
___ B. primarily based on ARIC data with ancillary data playing a minor role (usually control variables; list number(s)* _____ _____ _____)

*ancillary studies are listed by number at http://www.cscc.unc.edu/aric/forms/

12. Manuscript preparation is expected to be completed in one to three years. If a manuscript is not submitted for ARIC review at the end of the 3-years from the date of the approval, the manuscript proposal will expire.

References

1. Kawachi I, Sparrow D, Spiro A, III, Vokonas P, Weiss ST. A Prospective Study of Anger and Coronary Heart Disease: The Normative Aging Study. *Circulation.* November 1, 1996 1996;94(9):2090-2095.
2. Chang PP, Ford DE, Meoni LA, Wang NY, Klag MJ. Anger in young men and subsequent premature cardiovascular disease: the precursors study. *Arch Intern Med.* Apr 22 2002;162(8):901-906.
3. Williams JE, Paton CC, Siegler IC, Eigenbrodt ML, Nieto FJ, Tyroler HA. Anger proneness predicts coronary heart disease risk: prospective analysis from the atherosclerosis risk in communities (ARIC) study. *Circulation.* May 2 2000;101(17):2034-2039.
4. Doering LV, Dracup K, Caldwell MA, et al. Is coping style linked to emotional states in heart failure patients? *J Card Fail.* Aug 2004;10(4):344-349.
5. Jenner RC, Strodl ES, Schweitzer RD. Anger and depression predict hospital use among chronic heart failure patients. *Aust Health Rev.* Nov 2009;33(4):541-548.

6. Spielberger CD, Jacobs G, Russell S. Assessment of Anger: the State-Trait Anger Scale. In: Butcher JN, Spielberger CD, eds. *Advances in personality assessment.* Vol 2. Hillsdale, NJ: Lawrence Erlbaum Associates 1983:161-189.