

ARIC Manuscript Proposal #2166

PC Reviewed: 7/9/13

Status: A

Priority: 2

SC Reviewed: _____

Status: _____

Priority: _____

1.a. Full Title: Habitual physical activity and arterial stiffening

b. Abbreviated Title (Length 26 characters): Physical activity and PWV

2. Writing Group:

Hirofumi Tanaka, David Aguilar, Kunihiro Matsushita, Natalia Goukova, Gerardo Heiss, others welcome

I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. _HT_

First author: Hirofumi Tanaka
Address: University of Texas at Austin
1 University Station, D3700
Austin, TX, USA 78712

Phone: 512-232-4801 Fax: 512-471-0946
E-mail: htanaka@austin.utexas.edu

ARIC author to be contacted if there are questions about the manuscript and the first author does not respond or cannot be located (this must be an ARIC investigator).

Name: Gerardo Heiss
Address: University of North Carolina at Chapel Hill
Bank of America Center
137 E. Franklin St., Suite 306
Chapel Hill, NC, USA 27514

Phone: 919-962-3253 Fax: 919-966-980
E-mail: gerardo_heiss@unc.edu

3. Timeline: Analysis is to begin when the final ARIC dataset from the visit 5 becomes available. We plan to complete the manuscript within one year from release of the data.

4. Rationale:

Arterial stiffness exerts a number of adverse effects on cardiovascular function and is associated with mortality in patients with end-stage renal disease and essential hypertension^{1,2}. Increased arterial stiffness can contribute to the development and progression of hypertension, left ventricular hypertrophy, ischemic heart disease, and congestive heart failure. The pathogenesis of arterial stiffening includes functional and

structural changes in the arterial wall, modulated in part by traditional risk factors for atherosclerotic vascular disease^{3,4}.

A first-line approach for prevention and delayed progression of cardiovascular disease is lifestyle modification including regular physical activity. A number of observational and interventional studies indicate that habitual exercise can prevent and reverse arterial stiffening⁵⁻⁷, with the notable exception of the ARIC study that found no association between regular physical activity and arterial stiffness in community-dwelling adults⁸. The reasons for the discrepant results, in addition to publication bias, may be related to the use of arterial distensibility in ARIC that does not account for local pulsatile pressure changes and/or the use of a questionnaire to estimate physical activity levels in a sample of mostly sedentary adults.

It is well established that habitual exercise is associated with improvements in conventional risk factors for cardiovascular disease in older adults⁹. However, more than 40% of the risk reduction associated with habitual exercise is unexplained by its effects on traditional risk factors¹⁰. It is conceivable that some of the beneficial effects of habitual exercise may be through mitigation of age-related vascular dysfunction or arterial stiffening in the presence of traditional risk factors. It is not known, however, whether arterial stiffness is lower in older adults with multiple risk factors who regularly engage in physical activity and/or possess high functional fitness.

The ARIC visit 5 examination provides an excellent opportunity to examine the association between regular physical activity/functional fitness and arterial stiffness in a community-based cohort of older adults, for several reasons. The best established measure of arterial stiffness, pulse wave velocity, was assessed as well as the short physical performance battery (SPPB), which can be considered, with or without physical activity levels estimated by the ARIC physical activity questionnaire, to provide objective measures of functional fitness.

5. Main Hypothesis/Study Questions:

1. We posit that carotid-femoral PWV (cfPWV) is inversely associated with habitual physical activity, and with functional fitness in men and women examined by the ARIC study as part of Visit 5. These associations will be linear and monotonic (without detectable thresholds).
2. The habitual physical activity and functional fitness are additive in their associations with cfPWV with those estimated for the history of hypertension, diabetes, and cigarette smoking.

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 methodological limitations or challenges if present).

(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 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.csc.unc.edu/ARIC/search.php>
 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)?

#003A The relationship between CVD risk factors and carotid artery distensibility in middle-aged adults (Burke G)

#511 Physical activity and arterial stiffness (Folsom A)

11.a. Is this manuscript proposal associated with any ARIC ancillary studies or use any ancillary study data? Yes 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.csc.unc.edu/anic/forms/>

12a. 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.

12b. The NIH instituted a Public Access Policy in April, 2008 which ensures that the public has access to the published results of NIH funded research. It is your responsibility to upload manuscripts to PUBMED Central whenever the journal does not and be in compliance with this policy. Four files about the public access policy from <http://publicaccess.nih.gov/> are posted in <http://www.csc.unc.edu/anic/index.php>, under

Publications, Policies & Forms. http://publicaccess.nih.gov/submit_process_journals.htm shows you which journals automatically upload articles to Pubmed central.

References

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