ARIC Manuscript Proposal # 1115

PC Reviewed: _11/_22/05   **Status:** _____   **Priority:** ____
SC Reviewed: _____   **Status:** _____   **Priority:** ____

1.a. Full Title: An integrated automated analysis method for quantifying vessel stenosis and plaque burden from carotid MR images: combined post-processing of MRA and vessel wall MR

  b. Abbreviated Title (Length 26 characters): Integrated plaque MRA/ MRI

2. Writing Group:

Writing group members:
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I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. I.M.A **[please confirm with your initials electronically or in writing]**

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3.   Timeline: Software is almost fully developed. Upon approval of use of ARIC data, anticipate 2 weeks for testing. Expect completion of manuscript in November, 2005.

4.   Rationale: We designed an automated method for estimating carotid plaque burden using MRI data. We intend to use ARIC data for final development and testing of software.

5.   Main Hypothesis/Study Questions: In order to measure plaque burden from MRI images, contours of the lumen border and outer vessel wall must be delineated. Until now this is generally done manually by trained analysts. Although semiautomated software can facilitate this process, the time demand for manual tracing can be prohibitive particularly for large studies with numerous image slices through the vessel wall and plaque, and the reproducibility of these measurements is prone to the subjectivity of reader assessment. In order to better facilitate these estimates, an automated method was developed that uses data from contrast-enhanced magnetic resonance angiography (CEMRA) and T1-weighted MR images (T1W MRI) of the vessel wall.   This approach combines lumen contours generated from the CE-MRA data and wall contours generated from the T1W MRI to estimate stenosis and plaque burden. We propose using data from 22 ARIC participants with cardiovascular disease to test this technique.

6.   Data (variables, time window, source, inclusions/exclusions):
        CEMRA and T1-weighted axial black blood MRI images will be used. Minimum diameters will be measured at the point of greatest narrowing based on CEMRA and T1-W MRI images. The reference diameter will be measured immediately distal to the narrowing beyond any poststenotic dilatation based on CEMRA images. These measurements will be used to estimate stenosis using NASCET criteria. The diameter at the point of greatest narrowing will also be extrapolated to its estimated size before narrowing occurred by performing iterative linear regression on the diameter function based on the CEMRA data to estimate stenosis using ECST criteria. Wall thickness will be measured by determining the closest point along the outer wall contour from points along the lumen contour. The vessel wall will be divided into 6 segments and the average wall thickness will be computed for each segment. Vessel wall volume will also be estimated by multiplying the average wall thickness by the slice thickness. Plaque burden will be estimated based on vessel wall thickness and vessel wall volume measurements.

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 ICTDER02 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 ICTDER02 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 ICTDER02 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)? None applicable.

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. primiarly 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.