

ARIC Manuscript Proposal # 1256r

PC Reviewed:   6/ 5 /07    
SC Reviewed:                   

Status:  A    
Status:           

Priority:  2    
Priority:           

1.a. Full Title: **Prospective analysis of traffic exposure as a risk factor for coronary artery disease and all-cause mortality: the Atherosclerosis Risk in Communities (ARIC) study**

b. Abbreviated Title (Length 26 characters): **traffic and risk of CAD and death**

2. **Writing Group:**

Writing group members: **Haidong Kan, Gerardo Heiss, Kathryn M. Rose, Eric Whitsel, Fred Lurmann, Stephanie London**

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

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3. **Timeline:** A first manuscript should be available for circulation to the ARIC investigators before Dec. 1, 2007.

4. **Rationale:**

There are six (four in the North America and two in Europe) prospective cohort studies investigating the long-term exposure to outdoor air pollution and increased

mortality from cardiovascular and respiratory diseases<sup>1-6</sup>. Among them, only two studies in the Netherlands and Canada focused the traffic-related air pollution<sup>5-6</sup>. We are unaware of any population-based prospective study on the relation between traffic air pollution and incident cardiovascular disease such as coronary heart disease and stroke. The ARIC study (visits 1-4 and the annual follow-up) provides a good opportunity to study the relation between cardiovascular diseases, mortality and long-term traffic exposure.

## **5. Main Hypothesis/Study Questions:**

Subjects with higher exposure to traffic-related air pollution have higher risk of incident cardiovascular diseases and death.

## **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).**

In the proposed study, we will prospectively examine the association of residential exposure to traffic with incident coronary artery disease (CAD) and all-cause mortality among the ARIC participants. The endpoints of interest are incident CAD and all-cause mortality; therefore, participants will be excluded if they had prevalent CAD at the baseline. We will also exclude persons who meet the following criteria: ethnicity other than African-American or white, African-Americans from Minnesota and Maryland field centers, missing geocoding information.

We will collect the information of incident CAD and all-cause mortality until December, 2002. Small-scale spatial variations of traffic exposure will be quantified by two measurements: geographical information system (GIS)-mapped traffic density assignments at residences, and the distance of residences to nearest roadways of various types. Generally, traffic density values give a relative indication of which residence locations are likely to be most exposed to traffic activity. These two measurements have been successfully applied in assessing the association of traffic exposure and lung function in the ARIC participants<sup>11</sup>. Data on the background ambient air pollution will be acquired from the Environmental Protection Agency (EPA) air quality data retrieval system.

Cox proportional hazards regression analyses will be used to assess the relations of traffic exposure with the risk of incident CAD and all-cause mortality. Our basic models will adjust for age, sex, center and ethnicity. In the adjusted models, we will include factors that we hypothesized *a priori* could be potential confounders, including age, sex, study center, ethnicity, BMI, education, occupation, census tract socio-economic factors, physical activity, smoking status (current smoker, former smoker with ETS, former smoker without ETS, never smoker with ETS, never smoker without smoker), age at starting to smoke, years smoked, cigarettes per day, alcohol intake (never, former and current drinker), hypertension, diabetes status, HDL, LDL, total cholesterol, and background air pollution level (PM<sub>10</sub>, NO<sub>2</sub> and O<sub>3</sub>). We will conduct stratified analyses by sex, ethnicity, smoking status, and education, to examine potential modifiers of traffic

exposure. Our previous analysis suggested potential geocoding error in Washington County which may reflect a renaming of streets that occurred there<sup>7</sup>; therefore, we will also conduct sensitivity analysis excluding Washington County from our analysis.

**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.csc.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)?**

# 450, 760, 782, 860, 861, 907

**11. a. Is this manuscript proposal associated with any ARIC ancillary studies or use any ancillary study data?**    \_\_\_ X \_\_\_ Yes    \_\_\_ No

**11.b. If yes, is the proposal**

\_\_\_ X \_\_\_ **A. primarily the result of an ancillary study (list number\* AS#2003.03)**

\_\_\_ **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/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.**

**Reference:**

1. Dockery DW, Pope CA 3rd, Xu X et al. An association between air pollution and mortality in six U.S. cities. *N Engl J Med.* 1993 Dec 9;329(24):1753-9.
2. Abbey DE, Nishino N, McDonnell WF et al. Long-term inhalable particles and other air pollutants related to mortality in nonsmokers. *Am J Respir Crit Care Med.* 1999; 159(2): 373-82.
3. Pope CA 3rd, Burnett RT, Thun MJ et al. Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution. *JAMA.* 2002; 287(9):1132-41.
4. Filleul L, Rondeau V, Vandentorren S et al. Twenty five year mortality and air pollution: results from the French PAARC survey. *Occup Environ Med.* 2005; 62(7): 453-60.
5. Hoek G, Brunekreef B, Goldbohm S et al. Association between mortality and indicators of traffic-related air pollution in the Netherlands: a cohort study. *Lancet.* 2002;360(9341):1203-9.
6. Finkelstein MM, Jerrett M, Sears MR. Traffic air pollution and mortality rate advancement periods. *Am J Epidemiol.* 2004;160(2):173-177.
7. Kan H, Heiss G, Rose KM, Whitsel E, Lurmann F, London SJ (2007). Traffic exposure and lung function in adults: the Atherosclerosis Risk in Communities study. *Thorax*, doi: 10.1136 / thx.2006.073015.