1.a. Full Title

Relationship of periodontal disease to lower extremity artery disease (LEAD): the ARIC Study

b. Abbreviated Title

Periodontitis and lower extremity artery disease

2. Writing Group

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3. Time Line

Obtain data set: June 1999
Begin statistical analysis: June 1999
Complete statistical analysis: September 1999
Complete manuscript: October 1999

4. Rationale:

Numerous cross-sectional (1, 2), case-control (3-6), and longitudinal reports (7-11) have suggested that the chronic infection inherent in periodontitis may contribute to the formation of atherosclerotic plaques in medium-to-large elastic and large muscular arteries, and may accelerate progression of the atherosclerotic process toward clinically significant cardiovascular events. A mechanism has been proposed whereby the chronic
bacterial infection of periodontitis may promote and modify atherosclerosis (12). Ankle brachial index (ABI) is a sub-clinical measure of atherosclerosis in the lower extremity arteries, and is based on the pressure-flow relationship in the peripheral vascular bed (13). The principle is that lower values of ABI reflect decreased patency of the lower arterial artery system. Such sub-clinical measures of atherosclerosis present a unique opportunity to study atherosclerosis in a non-invasive manner. Lower extremity artery disease (LEAD) is a special case of peripheral vascular disease (PVD) that affects the lower extremities.

Zheng, et al (13) examined the relationship of ABI to a number of clinical and sub-clinical outcomes of atherosclerosis in the ARIC study. They demonstrated that ABI less than 0.90 was inversely associated with greater carotid intimal-wall thickness, and was positively associated with prevalent CHD, stroke/TIA, preclinical carotid plaque, and carotid plaque/shadowing. Mendez, et al (14) related periodontitis to incident peripheral vascular disease (PVD) in a longitudinal analysis of data from the VA Dental Longitudinal Study (DLS). Otherwise healthy men with periodontitis at baseline were 2.27 times more likely to develop PVD over up to 25 years of follow-up, while controlling for other cardiovascular risk factors. No sub-clinical measures of atherosclerosis were included, and lower extremity artery disease was not specifically examined.

Few studies have focused on the relationship of periodontitis to peripheral artery disease, and none have examined lower extremity artery disease in particular. In general, the relationship of periodontitis to sub-clinical measures of cardiovascular disease has been little studied.

We propose a cross-sectional study of data obtained from ARIC cohort members at Visit 4. Lower extremity artery disease (LEAD), as measured by ankle-brachial index < 0.90, will be compared between persons with and without periodontal disease.

5. **Main Hypotheses:**

1) People with periodontal disease are more likely to have LEAD than people without periodontal disease.

2) The prevalence of LEAD is associated with the extent and severity of periodontal disease (after adjustment for attributes presumed to be risk factors for both conditions).

3) ABI values below the population median are inversely, and monotonically associated with the extent and severity of periodontal disease (after adjustment for attributes presumed to be risk factors for both conditions).
6. **Data:**

**Outcome variables.** The outcomes are ABI on an interval scale and lower extremity artery disease (LEAD) as determined by ankle-brachial index (ABI) < 0.90. ABI will be obtained from ARIC visit 4 if available, visit 3 if visit 4 is not available, and from visit 1 if neither visit 3 or visit 4 are available.

**Main independent variable.** The main independent variable is prevalent periodontal disease as measured by having periodontal attachment loss at least 3 millimeters at 60% or more of measured sites.

**Covariables.** The covariables will be age in years at visit 4, sex, race, ARIC field center, 3 levels of education (to control for SES), body mass index at visit 4, hypertension, smoking (current, former, never), alcohol drinking (current, not current) diabetes (fasting blood glucose ≥ 126 mg/dl), and serum LDL level.

**Time window.** This study will be a cross-sectional study of the data obtained from ARIC cohort members at Visit 4 (or at visit 1 or 3 for ABI data).

**Inclusions/exclusions.** This study will include all ARIC cohort members for whom periodontal and ABI assessments were available. Approximately 6800 persons had periodontal examinations at Visit 4.

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**References:**


