

## ARIC Manuscript Proposal # 825

PC Reviewed: 09/18/01

Status: A

Priority: 2

SC Reviewed: 09/18/01

Status: A

Priority: 2

**1.a. Full Title:** Pulmonary Function and Type 2 Diabetes Mellitus

**b. Abbreviated Title (Length 26 characters):** Lung Function and Type II DM

**2. Writing Group (list individual with lead responsibility first):**

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Others welcome

**3. Timeline:** Begin immediately

**4. Rationale:**

It is well established that diabetic complications stem, in part, from protein glycosylation related to persistent hyperglycemia (Cohen 1986). The wide capillary network and profuse connective tissue in lung suggest the possibility that the lung may be a “target organ” for clinically significant glycosylation (Sandler 1990). In fact, reduced total lung capacity and reduced elastic recoil have been reported in several studies among type I diabetic patients. Most of these studies, however, were based on cross-sectional design, with small and selected patients, or did not consider smoking status.

To our knowledge, only three studies with larger number of patients have assessed pulmonary function in adults with type 2 diabetes. The Copenhagen City Heart Study (Lange, 1989) reported impaired lung function (FEV1 and FVC) in all age groups (type 1 and type 2) in a cross-sectional design. The reduction was more significant in patients treated with insulin than in patients treated with hypoglycemic agents and/or diet. Also, a significant relationship between raised levels of plasma glucose and reduction of lung function was observed among non-diabetics. The Fremantle Diabetes Study in Australia (Davis, 2000) found significant cross-sectional relationship between diabetes duration and FEV1%pred, PEF%pred, FVC%pred and VC%pred. In the same study, no association was noticed between levels of HbA1c and any measure of lung function. The Rancho Bernardo Study (Barrett-Connor, 1996) examined the association prospectively and found pulmonary function was not associated with newly diagnosed type II diabetes. FEV1 and FVC were reduced in men with diabetes of 10 or more years. In non-diabetic men, fasting plasma glucose levels were correlated with FEV1 and FVC. No association was detected in women. Since the study population was old (average age at baseline, 72), the possibility of survival bias could not be ruled out.

Although these 3 studies generally support the notion that diabetes may lead to alterations in pulmonary function, they have two important limitations: none had sequential measures of lung function over time, and none included non-white individuals in the study sample. Thus, no study has compared changes in lung function in adults with diabetes vs those without, and none has investigated whether such effects might be modified by socio-demographic characteristics.

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

We hypothesize that diabetes is an independent predictor of lung function decline in middle aged whites and blacks.

To test this hypothesis, we propose to conduct analyses to answer the following questions:

1. What is the cross-sectional relationship between pulmonary function and diabetic status? Does the relationship differ by demographic characteristics such as race and sex?
2. Does difference of change in lung function between those with and without diabetes vary by race, sex, smoking status, BMI, and exercise in the bi-racial cohort?
3. What are the influences of duration of diabetes on the progression of pulmonary function?
4. What is the relationship between plasma glucose levels and lung function in non-diabetic individuals by sex, race, and other demographic and lifestyle variables?

If our hypothesis is correct, then this paper should stimulate further research on the pathophysiology of pulmonary complications in diabetes, and should alert clinicians and researchers to the possible need for monitoring lung function in adults with diabetes.

## **6. Data (variables, time window, source, inclusions/exclusions):**

We propose to analyze data on all ARIC participants with complete data on diabetes status and pulmonary function at visits 1 and 2. Participants with pre-existing, clinically evident cardiopulmonary disease would be excluded. Key variables for the analyses would include: Diabetes status, Fasting glucose, Diabetes duration, Pulmonary function tests, Height, Weight, Smoking History, and Socio-demographic variables, Medical history at baseline (e.g. asthma, COPD).

**7.a. Will the data be used for non-CVD analysis in this manuscript?**    ☐ Yes    ☒ 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 ☒ 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://bios.unc.edu/units/csc/ARIC/stdy/studymem.html>

☒ Yes ☐ No

### **References:**

Barrett-Connor E, Frette C: NIDDM, impaired glucose tolerance, and pulmonary function in older adults. The Rancho Bernardo Study. Diabetes Care 19:1441 – 1444. 1996.

Cohen MP. Diabetes and protein glycosylation: measurement and biologic relevance. New York: Springer-Verlag. 1986.

Davis TME, Knuiman M, Kendall P et al: Reduced pulmonary function and its association in type 2 diabetes: the Fremantle Diabetes Study. Diabetes Research and Clinical Practice 50:153-159. 2000.

Lange P, Groth S, Kastrup J, et al: Diabetes mellitus, plasma glucose and lung function in a cross-sectional population study. Eur Respir J 2:14-19, 1989.

Sandler M: Is the lung a 'target organ' in diabetes mellitus? Arch Intern Med 150:1385-1388. 1990.