ARIC MANUSCRIPT PROPOSAL FORM

Manuscript #195

1. Title (length 26):
Gender and Body Fat Distribution
Full title: Gender differences in body fat distribution assessed by magnetic resonance imaging

2. Writing Group:
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3. Timeline:
Analyses to begin during Spring 1993

4. Rationale:
Anthropometric measures such as subscapular-to-triceps skinfold ratio, waist-to-hip ratio, and subscapular skinfold thickness alone are markers of regional body fat distribution. Others, such as weight-to-height ratio, % ideal body weight, and body mass index, are measures of overall adiposity. Although central fat patterning ("android") has been implicated as a risk factor for cardiovascular disease when compared with peripheral fat patterning ("gynoid"), regional measures that include subcutaneous fat may not capture the metabolic consequences of visceral fat deposition that can occur differentially by gender, menopausal status, overall adiposity, and/or increasing age. Therefore, we propose to examine abdominal adiposity by MRI, and to approximate intra-abdominal fat content by sagittal diameter at the umbilicus from the supine position. This measure will first be compared with other indices of adiposity by gender. Then sagittal diameter will be examined with respect to its association with cardiovascular risk factors such as diabetes, HDL-cholesterol concentrations, hypertension, uric acid and fibrinogen levels, as well as with carotid atherosclerosis.

5. Main Hypotheses:
a) Abdominal body fat measured by MRI is comparable to more conventional indices of adiposity, such as waist circumference, BMI, subcutaneous skinfold thickness, and abdominal height measured externally by instrument. These associations are invariate by gender.
b) Sagittal diameter is a more valid index of cardiovascular risk factors (eg., non-insulin-dependent diabetes mellitus, HDL-cholesterol levels) and of carotid atherosclerosis than measures that are unable to assess visceral fat deposition.
c) Sagittal diameter measured by MRI is a marker of intra-abdominal/visceral fat—assessed by pixel density measurement calibrated against perirenal fat—for both genders.

6. Data:
Visit 2 (extant) data set for the subsample of Forsyth County ultrasound cases and controls with MRI readings (264 maximum possible observations; 64% male, 36% female, 8% black, 92% white). MRIs were performed by Dr. Crouse at the Bowman-Gray School of Medicine; abdominal height by instrument was measured at the time of the MRI exam. Data analysis is to be conducted by the lead author. Variables to be used in these analyses include: sagittal diameter, gender, race, age, lipoproteins, glucose/insulin/diabetic

status, uric acid, fibrinogen, anthropometric measures, amount of cigarette smoking/smoking status, alcohol consumption, menopausal status in females, carotid atherosclerosis defined by the grand imputed mean intima-media wall thickness or by case/control status, hypertension status/blood pressure, and medication use that may affect body fat distribution (e.g., post-menopausal hormone replacement therapy, ß-blocker use, and diabetic medications). For both comparisons of sagittal diameter with other indices of adiposity and for risk factor assessment, gender-specific Spearman correlations will be used. In addition, regression strategies will be employed to assess potential nonlinear (quadratic, logarithmic) associations. When assessing the contribution of sagittal diameter to risk factor prediction, the risk factor in question will be considered the dependent variable.

Associations of sagittal diameter with carotid atherosclerosis will be assessed on the matched case/control pairs, either by conditional logistic regression or by linear regression with the grand imputed mean far wall thickness. However, because MRI measurements were obtained from these ultrasound cases and controls, but the remainder of the research hypotheses do not consider atherosclerosis as an outcome, subsequent analyses will consider case/control status as a potential effect modifier to the association between sagittal diameter and risk factors. In addition, estimated weights will be generated to accommodate the sampling scheme.