

Albumin Excretion Rate is Higher with Intake of Meat and Lower with Whole Grain: the CARDIA study

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Microalbuminuria is a powerful predictor of CHD

- Albumin excretion, even within the high normal range, is associated with increased risk of fatal and nonfatal CHD.
- This relationship holds in diabetic and non-diabetic patients.
- Intervention and observational studies show that lower dietary protein intake is associated with reduced albumin excretion

Research Objectives

- Examine the association of dietary protein intake to albumin excretion rate 3 years later.
- Determine the relationships of animal and plant protein and the foods that contribute these proteins to albumin excretion rate.
- Examine other dietary relationships to albumin excretion rate.

Methods

- CARDIA (Coronary Artery Risk Development in Young Adults) study
- 2972 participants (non-pregnant, free of kidney disease) examined at year 7 and 10
- Dietary intake (nutrients and foods) at Year 7
- Albumin (A) and creatinine (C) excretion, blood pressure, glucose tolerance status at year 10

Definition of Dependent Variables

- Albumin excretion rate estimated from a “spot” urine as A/kC , where k adjusts creatinine excretion for race and sex differences Jacobs et al, Am J Epidemiol, in press
- Continuous Variable
 - A/kC , log transformed
- Dichotomous Variable
 - Micro- (25-249 mg/g) and clinical grade albuminuria (> 250 mg/g)

Statistical Methods

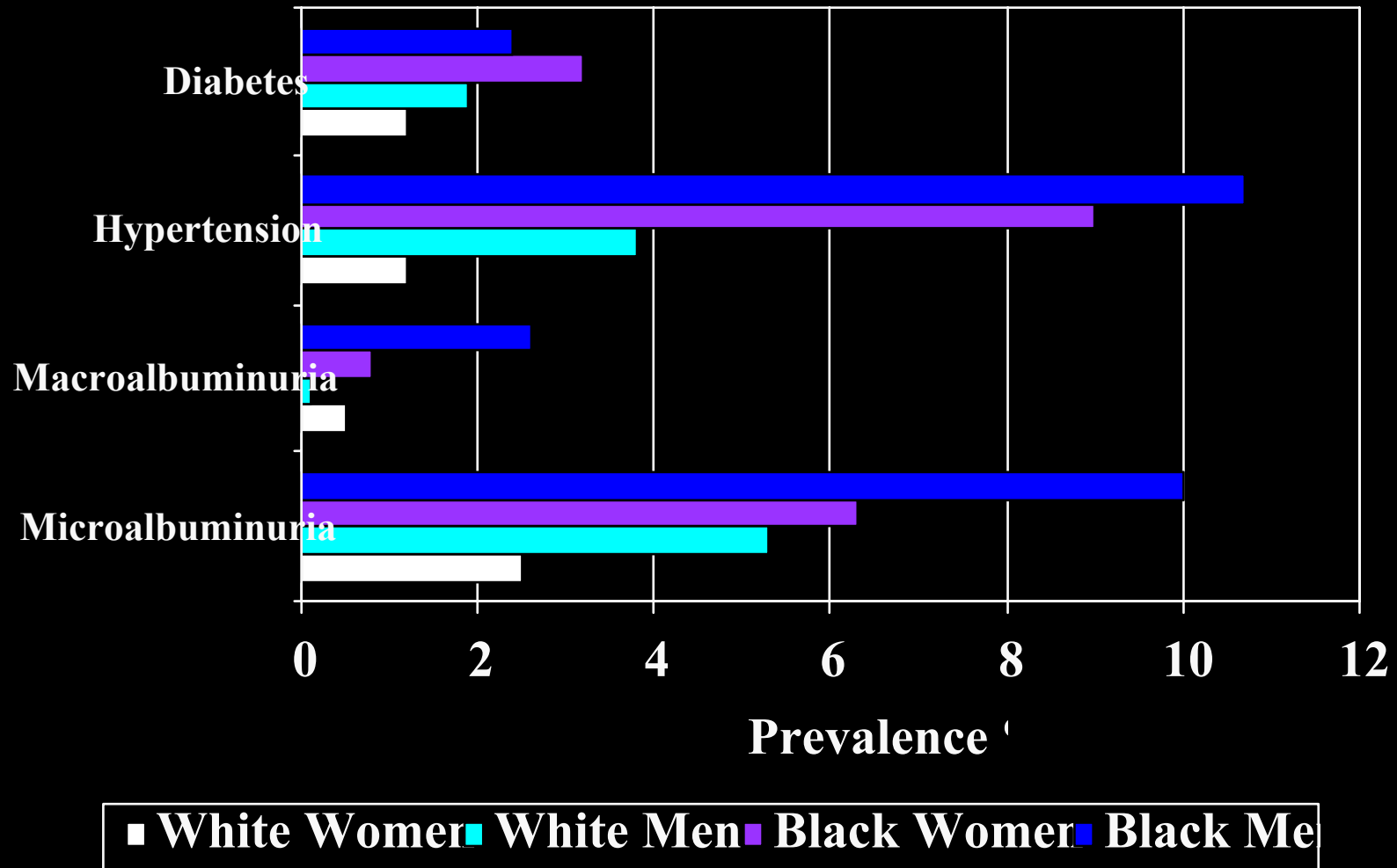
Linear regression was used to examine multivariate associations of dependent variables with nutrients and intake of foods

All models were adjusted for race, sex, center, and energy intake

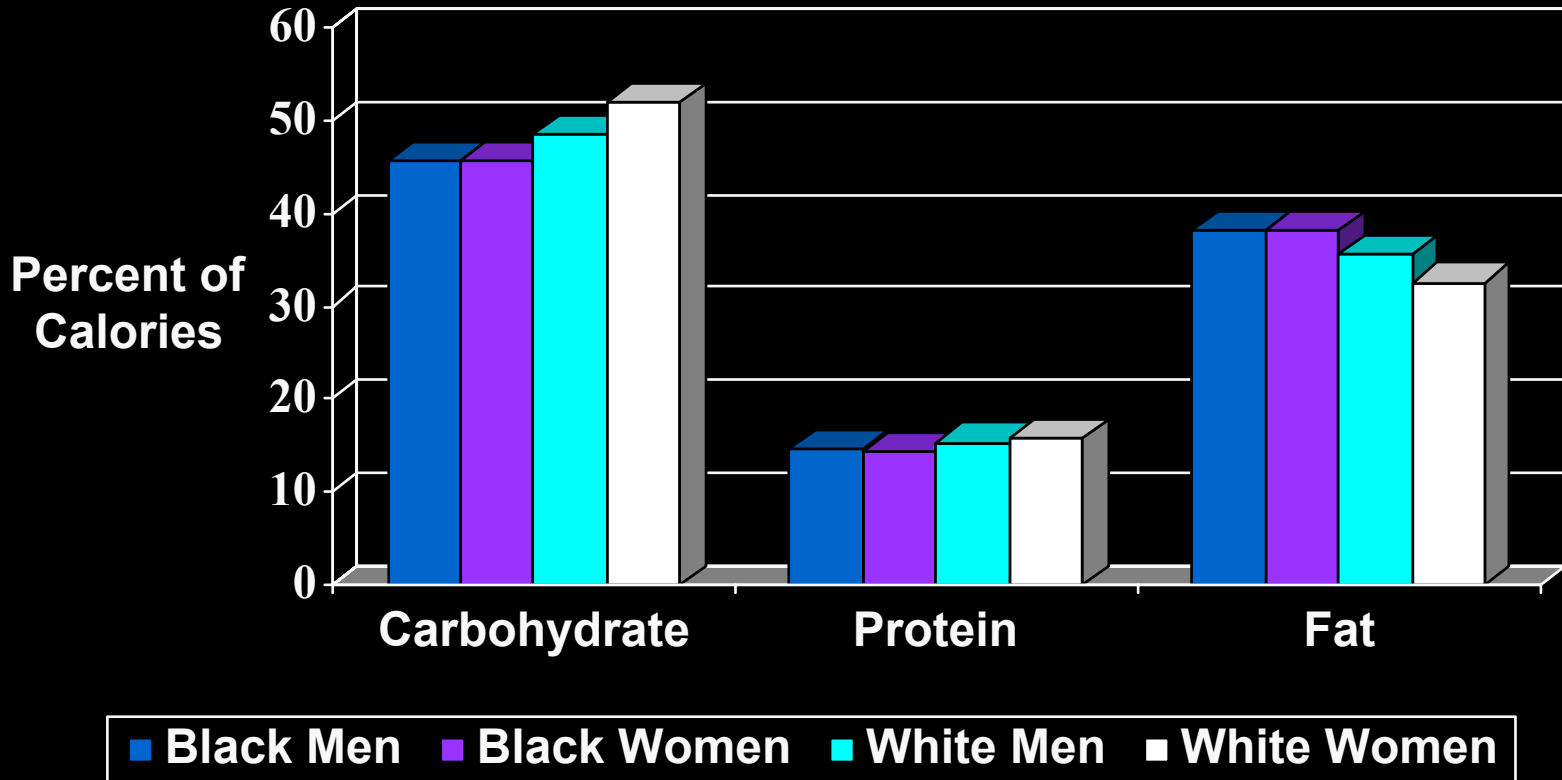
Participant Characteristics

	Black men (n=573)	Black women (n=752)	White men (n=833)	White women (n=809)
<u>Year 10</u>				
Age (years)	343	346	355	356
BMI (kg/m ²)	27.9	30.0	26.5	25.5
Alc mg/g	8.9(4-10)	6.4(4-9)	6.2(4-8)	5.0(3-7)
<u>Year 7</u>				
Energy Intake (kcal/d)	3600	2400	3100	2200

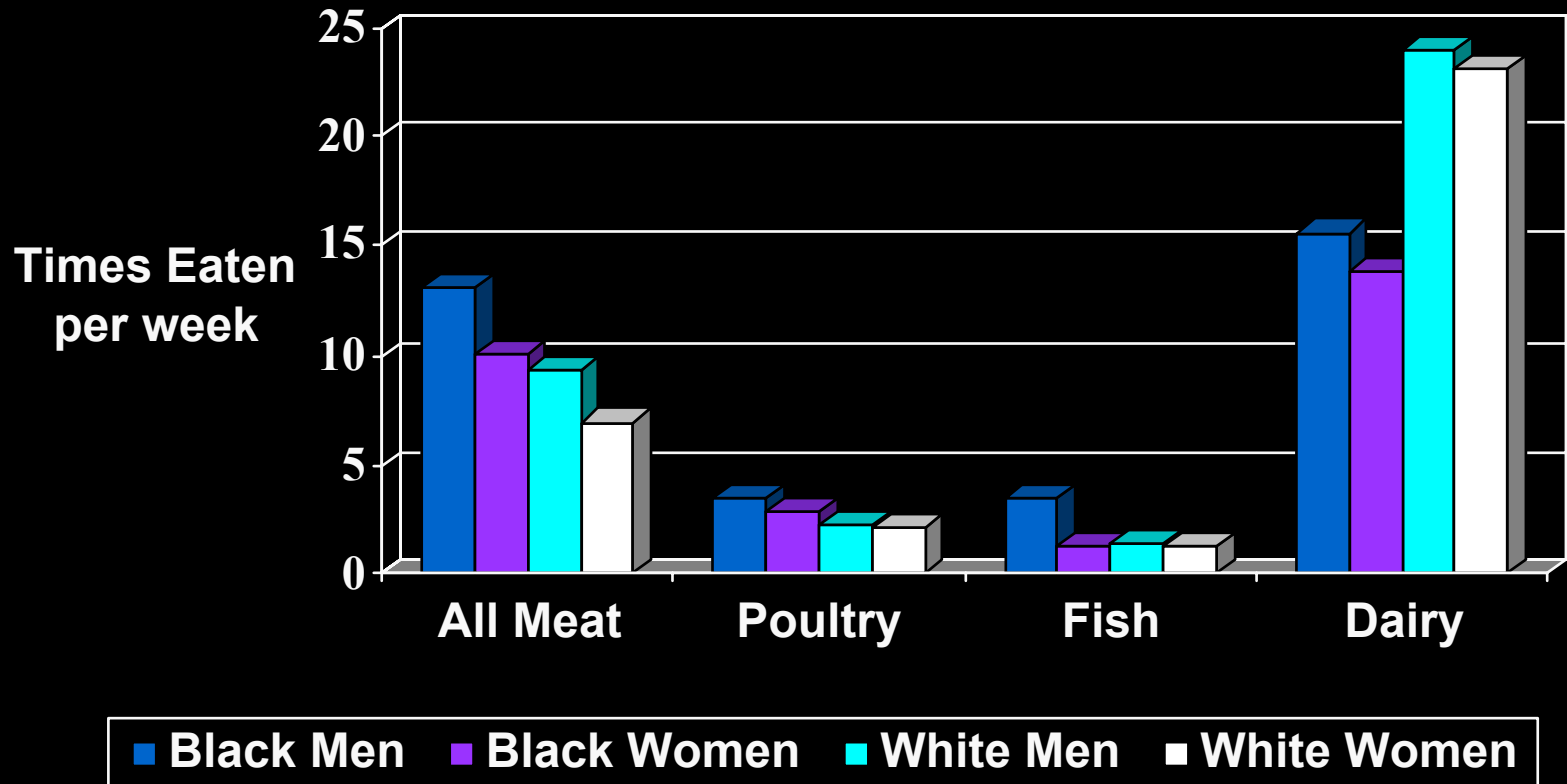
Clinical Conditions



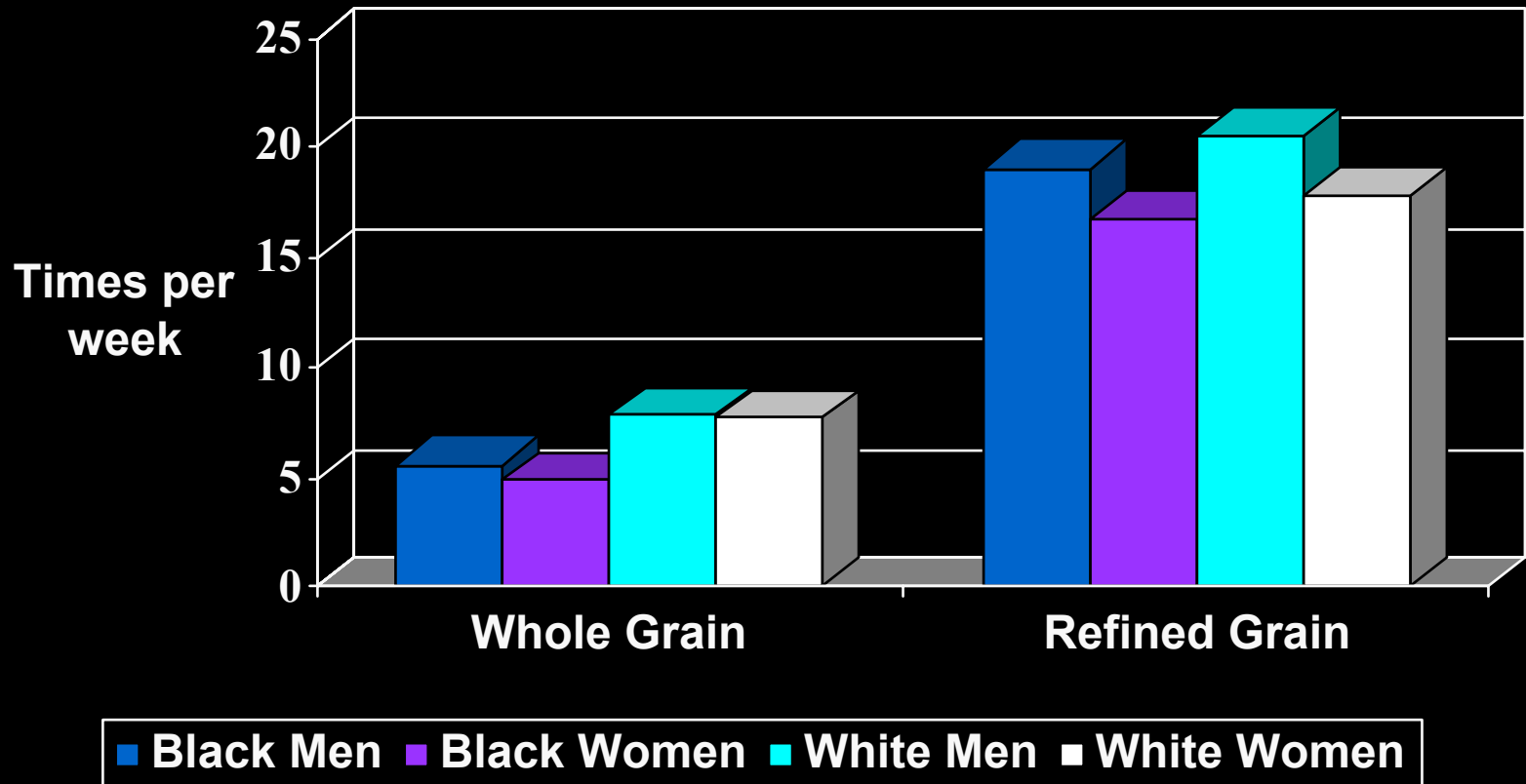
Macronutrient Intake



Animal Foods



Grain Intake

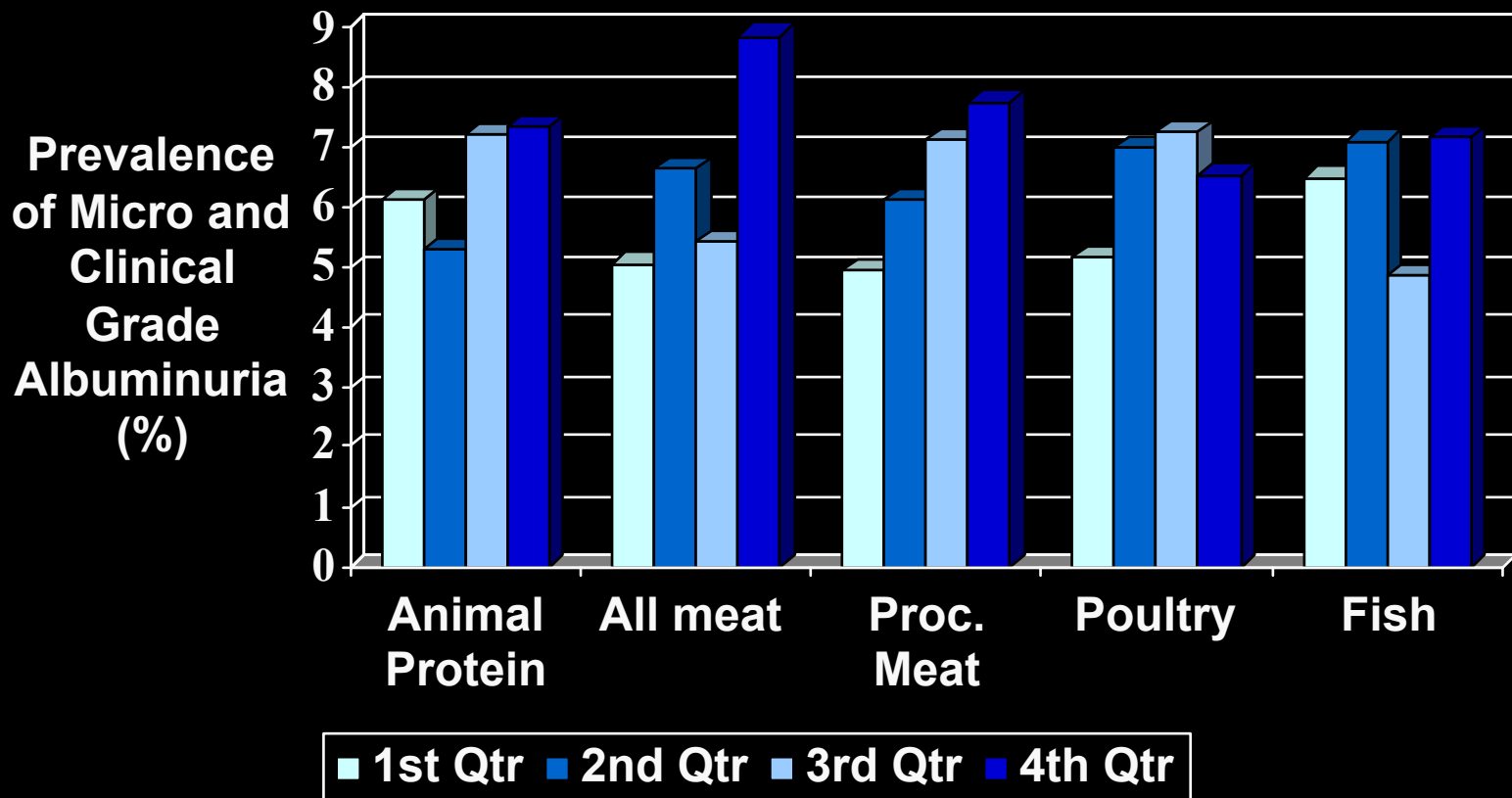


CARDIA Year 7 Nutrient Intake Regressed on Year 10 Albuminuria

Nutrient	% Change in Albuminuria	Standard Error	P-value
Energy Intake (100 kcal)	0.10	0.04	0.01
Carbohydrate (15 g)	-0.34	0.11	0.001
Fat (5 g)	0.08	0.09	0.37
Protein (28.5 g)	1.2	0.68	0.08
Animal Protein (28.5 g)	1.52	0.63	0.02
Plant Protein (28.5 g)	-2.49	1.28	0.05

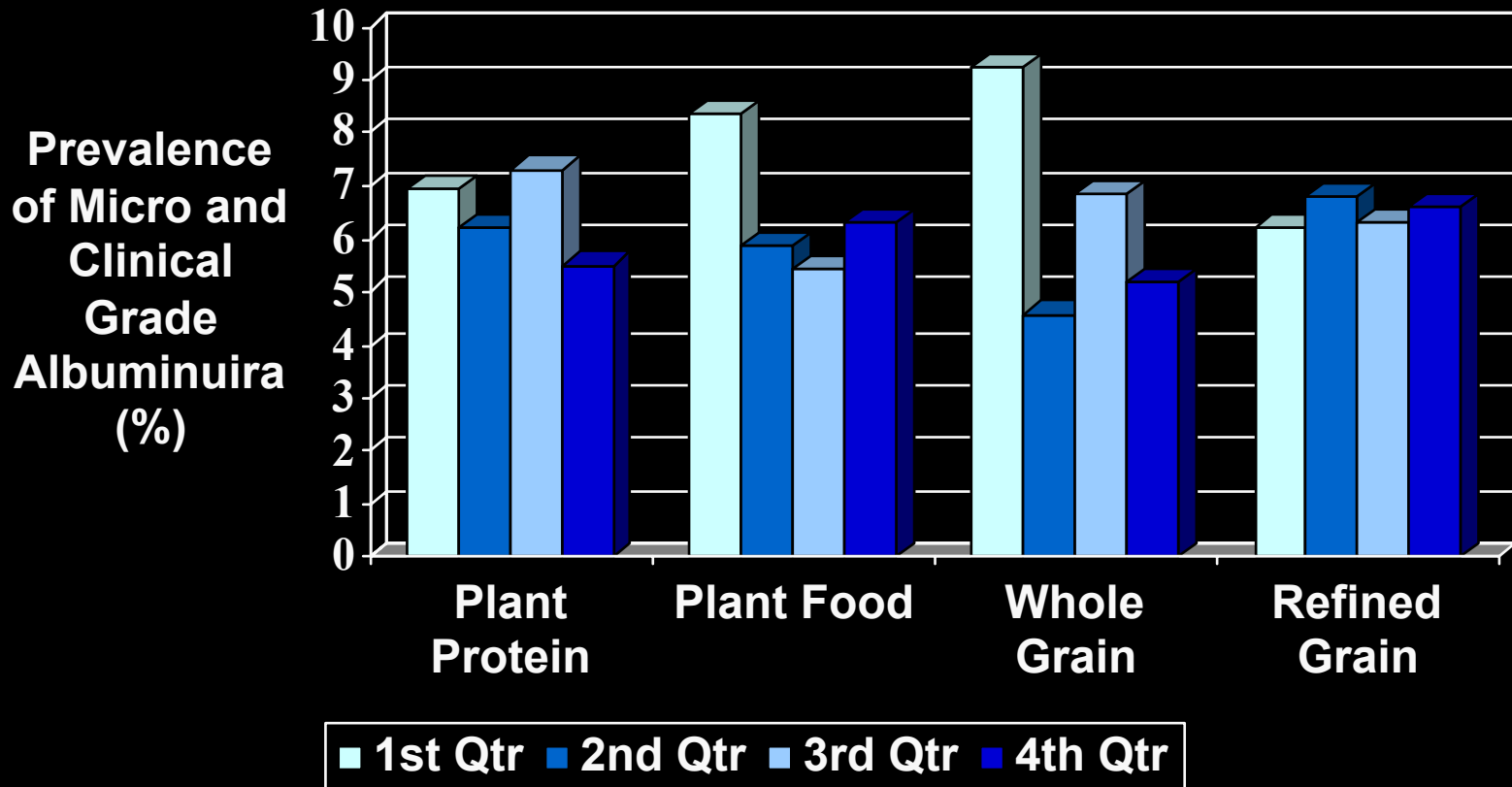
Separate models, each adjusted for race, sex, center and energy intake.

High Meat Intake Increases Albuminuria



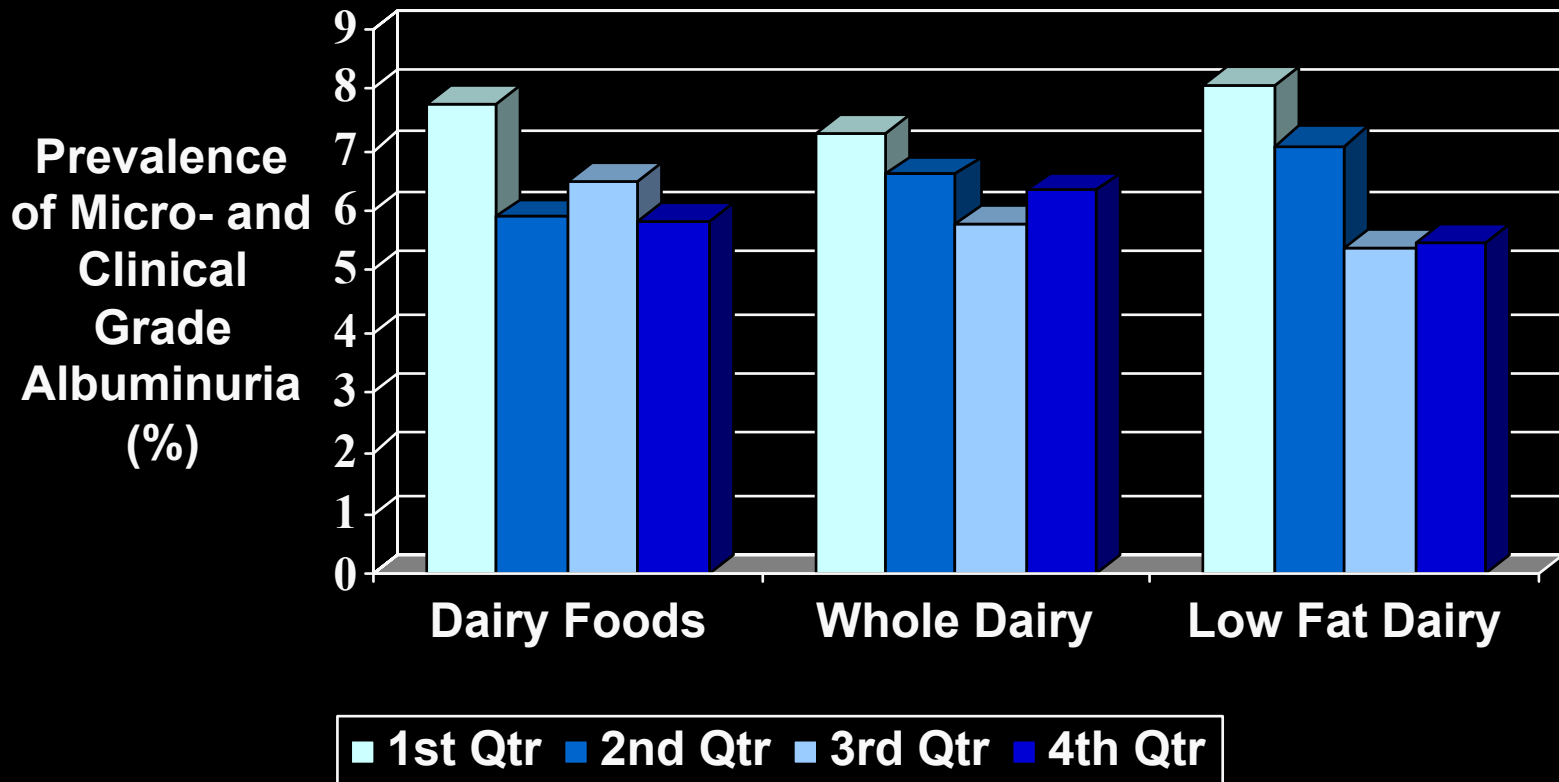
Separate regressions, adjusted for race, sex, center and calories

Albuminuria is Lower with Higher Intake of Whole Grain



Separate regressions, adjusted for race, sex, center and calories

Albuminuria is Lower with Higher Intake of Low-fat Dairy Foods



Separate regressions, adjusted for race, sex, center and calories

Simultaneous Regression of Food Groups and Nutrients

	% change in $\ln(A/kC)$	P- value
Whole Grain (1 time per day)	-5.3	0.01
Meat and Fish Intake (1 time/day)	7.3	0.007
Animal Protein (28.5 g)	3.0	0.26
Plant Protein (28.5 g)	0.64	0.90

Also adjusted for race, sex, center and energy intake

Summary

High intake of meat is associated with higher A/kC and micro- and clinical grade albuminuria.

Animal and plant protein have opposite associations with A/kC micro- and clinical grade albuminuria.

Higher intakes of whole grain and low fat dairy products are associated with lower A/kC and micro- and clinical grade albuminuria.

Mechanisms

- Quality of protein: amino acid patterns could influence the prostaglandin cascade and renal hemodynamics
- Mineral content of meat
- Phytochemicals in grains
- Influence on endothelial function
- Marker for dietary pattern
- Insulin Resistance

Implications of the Research

- Extension of clinical trials showing an influence of diet on albuminuria.
- The quality of protein (animal vs. plant) may be important to albumin excretion.
- Synergistic effects of protein, other nutrients, and non-nutrients may be responsible for the protective effect.