DIETARY SODIUM RESTRICTION ALTERS POSTPRANDIAL GHERLIN: IMPLICATIONS FOR RACE DIFFERENCES IN OBESITY

Objectives: To examine the effect of sodium restriction on the appetite-stimulating hormone, ghrelin, as a function of race, salt sensitivity, and obesity.

Design: Participants completed two 4-day outpatient dietary interventions (moderate vs low sodium), and blood samples were drawn two hours after a controlled test meal under both conditions.

Setting: A university research laboratory and affiliated General Clinical Research Center. Participants: 37 women (18 Black, 19 White) and 18 men (9 Black, 9 White), aged 36–63 years.

Measures: Cardiovascular function (blood pressure, heart rate, impedance-derived indices of cardiac output and peripheral resistance) was measured after a 20-minute rest before each test meal. Blood was drawn by intravenous forearm catheter two hours after each test meal and later assayed for ghrelin, leptin, and norepinephrine.

Results: After four days of sodium restriction, postprandial ghrelin increased in White men and women and Black men but decreased in Black women. Salt sensitivity, but not obesity, was also related to ghrelin response during sodium restriction; postprandial ghrelin tended to increase among salt-sensitive subjects during salt restriction but decrease among salt-resistant subjects during salt restriction.

Conclusions: Satiety hormone dysregulation may play a role in: 1) the heightened obesity-related morbidity among Black women, in particular; 2) adherence to sodium-restricted diets; and 3) race differences in behavioral weight-loss interventions that include sodium restriction (Ethn Dis. 2006;16:844–851)

Key Words: Appetite, Gender, Ghrelin, Obesity, Race, Salt

INTRODUCTION

In the previous decade, obesity increased 61% among US adults,1 and non-Hispanic Blacks bore the largest burden of that increase. In the United States, Blacks are nearly two times more likely to be obese than Whites, and Black women experience the highest rates of obesity (49%) overall. Compared to their White counterparts, Black women are also especially vulnerable to obesity-related cardiovascular and metabolic complications such as hypertension and diabetes.2 Reasons for these ethnic disparities in obesity and its comorbid conditions are not fully understood; however, recent work suggests differences in short-term appetite regulation may play a role.

Ghrelin is a peptide hormone with appetite-stimulating and adipogenic properties.3,4 In contrast to leptin, which modulates energy intake on a longer-term basis by responding to fluctuations in adipose stores, ghrelin provides a short-term “need to eat” signal and has been referred to as the “hunger hormone.”5,6 Ghrelin appears to be involved in meal initiation, as plasma ghrelin levels increase shortly before and decrease precipitously after food intake.7–9 The plasma ghrelin level typically remains suppressed for several hours during the postprandial period of satiation. Failure to maintain postprandial ghrelin suppression after meal intake may render an individual more susceptible to eating again soon.10 Previously, we observed higher postprandial ghrelin in Black compared to White women, and obese Black women had the highest postprandial ghrelin levels overall.11

In addition to its role in appetite regulation, ghrelin has direct vasodilatory properties and modulates cardiovascular functioning.12–16 Thus, interest is growing in articulating ghrelin’s role in the cardiovascular complications of obesity-related diseases. In our previous report, higher postprandial ghrelin in Black women was associated with higher 24-hour cortisol, which is a common finding in obesity.17,18

Obesity often co-occurs with hypertension, and both are hallmarks of the constellation of overlapping disorders known as the metabolic syndrome. Obesity hypertension is linked to various metabolic and endocrine abnormalities, including sodium sensitivity.19,20 Thus, weight reduction and salt restriction are the first two treatment options considered by many practi-