

Glenn D. Braunstein*, C. Noel Bairey Merz, B. Delia Johnson, Frank Z. Stanczyk, Vera Bittner, Sarah L Berga, Leslee Shaw, T. Keta Hodgson, Maura Paul-Labrador, and Ricardo Azziz

Cedars-Sinai Medical Center, Los Angeles, CA; University of Pittsburgh, Pittsburgh, PA; University of Southern California, Los Angeles, CA; University of Alabama at Birmingham, Birmingham, AL; Emory University School of Medicine, Atlanta, GA

* To whom correspondence should be addressed. E-mail: braunstein@cshs.org

Context: Since androgens are obligatory precursors of estrogens, it is reasonable to assume that their serum concentrations would exhibit positive correlations. If so, then epidemiologic studies that examine the association between androgens and pathologic processes should adjust the results for the independent effect of estrogens.

Objective: To examine the interrelationships among testosterone (T), androstenedione (A), estradiol (E2), estrone (E1), and sex hormone-binding globulin (SHBG) in postmenopausal women.

Design: Cross-sectional study of women participating in the NHBLI-sponsored Women's Ischemia Syndrome Evaluation (WISE) study.

Setting: Four academic medical centers.

Patients: A total of 284 postmenopausal women with chest pain symptoms or suspected myocardial ischemia.

Main Outcome Measures: Post-hoc analysis of the relationships among sex steroid hormones with insulin resistance, body mass index (BMI) and presence or absence of coronary artery disease as determined by coronary angiography.

Results: BMI was significantly associated with insulin resistance, total E2, free E2, bioavailable E2, and free T. Highly significant correlations were found for total T, free T, and A with total E2, free E2, bioavailable E2 and E1, and persisted after adjustment for BMI and insulin resistance. A significant relationship was present between total and free T and the presence of coronary artery disease after adjustment for the effect of E2.

Conclusions: Serum levels of androgens and estrogens track closely in postmenopausal women referred for coronary angiography for suspected myocardial ischemia. Epidemiologic studies that relate sex steroid hormones to physiological or pathological processes need to control for the independent effect of both estrogens and androgens.

Key words: Androgens • testosterone • estrogens • estradiol • estrone • androstenedione • sex hormone-binding globulin • postmenopausal women