

# Inflammatory Cytokine Levels and Breast Cancer Risk Factors: Racial Differences of Healthy Caucasian and African American Women

Na-Jin Park, PhD, RN, and Duck-Hee Kang, PhD, RN, FAAN

**P**rominent racial differences have been noted in the incidence of and mortality from breast cancer (BC) between African American and Caucasian women in the United States (American Cancer Society [ACS], 2011). African American women have a lower overall lifetime incidence of BC but worse age-adjusted mortality rates than Caucasian women, resulting in a disproportionately higher (greater than 65%) risk of death (Joslyn & West, 2000). Earlier onset and more aggressive (e.g., triple-negative, inflammatory tumors) and more advanced forms of BC in African American women partially explain these mortality differences (Shavers, Harlan, & Stevens, 2003; Stead et al., 2009). Other potential sources of racial differences in BC outcomes include socioeconomic (e.g., income, health insurance coverage), healthcare system (e.g., screening, high-quality healthcare access), and tumor (e.g., tumor biology) factors (Amend, Hicks, & Ambrosone, 2006; Gerend & Pai, 2008). However, even after controlling for all these factors, racial differences in BC persist (Albain, Unger, Crowley, Coltman, & Hershman, 2009), suggesting that other contributors, such as biologic factors, may exist.

Chronic inflammation has been implicated as one of the biologic mechanisms underlying several types of cancer, including BC (Goswami, Rajappa, Sharma, & Sharma, 2008). Proinflammatory cytokines, such as interleukin (IL)-6, interferon-gamma (IFN- $\gamma$ ), and C-reactive protein (CRP), play a central role in sustaining chronic inflammation and have been reported to facilitate tumor growth and metastasis (Cole, 2009). Although the exact causality of inflammation has not been confirmed, higher levels of inflammatory cytokines are regarded as susceptibility or prognostic factors for BC incidence and mortality (Pierce et al., 2009). In addition, previous genetic studies have shown that polymorphisms of inflammatory cytokine genes (e.g.,  $-174G/C$  for IL-6 and  $874T/A$  for IFN- $\gamma$ ) differ between African American and Caucasian women (Govan et al., 2003; Hassan, Aschner, Manning, Xu, & Aschner, 2003; Ness, Haggerty, Harger,

**Purpose/Objectives:** To examine racial differences in inflammatory cytokine levels (interleukin [IL]-6 and interferon-gamma [IFN- $\gamma$ ]) and breast cancer (BC) risk factors between healthy Caucasian and African American women; to examine differences in relationships of inflammatory cytokine levels with BC risk factors between these groups of women; and to determine the independent contribution of race to IL-6 and IFN- $\gamma$  after controlling for relevant covariates.

**Design:** Cross-sectional and correlational descriptive design.

**Setting:** Community surrounding a state university health system in the southeastern United States.

**Sample:** 113 healthy women (65 Caucasians and 48 African Americans) aged 20 years or older and not pregnant.

**Methods:** Secondary analysis of data collected from self-report questionnaires and blood samples.

**Main Research Variables:** Inflammatory cytokine levels, BC risk factors (age, age at menarche, age at first live birth, family history of BC, breast biopsy, breastfeeding history and duration, body mass index, and physical activity), and race.

**Findings:** Significant racial differences were noted in IL-6 and IFN- $\gamma$  levels, reproductive or hormonal and lifestyle BC risk factors, and relationships between African American and Caucasian women. Controlling for all other effects, race appeared to be a significant predictor for IL-6 and IFN- $\gamma$ .

**Conclusions:** Racial differences in inflammatory cytokines and BC risk factors may provide partial evidence for existing racial disparities in BC for African American and Caucasian women. Additional studies are needed to confirm that potential.

**Implications for Nursing:** Additional biobehavioral research in racial disparities in BC may help to inform nurses to target race-specific modifications of lifestyle and behavioral factors to reduce BC health disparity between African American and Caucasian women.

**Knowledge Translation:** Being an African American woman predicted a higher level of inflammatory cytokine production after controlling for selected BC risk factors. Great potential exists for inflammatory responses as one of the underlying biologic mechanisms for existing BC disparity and for culturally tailored lifestyle or behavioral modification interventions for reducing BC risk and racial disparity.