

Self-Reported Cancer-Related Cognitive Impairment in Patients With Breast Cancer Is Associated With Potassium Channel Gene Polymorphisms

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OBJECTIVES: To evaluate for associations of polymorphisms for potassium channel genes in patients with breast cancer who were classified as having high or low-moderate levels of cancer-related cognitive impairment (CRCI).

SAMPLE & SETTING: 397 women who were scheduled to undergo surgery for breast cancer on one breast were recruited from breast care centers located in a comprehensive cancer center, two public hospitals, and four community practices.

METHODS & VARIABLES: CRCI was assessed using the Attentional Function Index prior to and for six months after surgery. The attentional function classes were identified using growth mixture modeling.

RESULTS: Differences between patients in the high versus low-moderate attentional function classes were evaluated. Six single nucleotide polymorphisms for potassium channel genes were associated with low-moderate class membership.

IMPLICATIONS FOR NURSING: The results contribute to knowledge of the mechanisms for CRCI. These findings may lead to the identification of high-risk patients and the development of novel therapeutics.

KEYWORDS attentional function; breast cancer; cancer-related cognitive impairment

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Cancer-related cognitive impairment (CRCI) is reported by 57% of patients with breast cancer (Schmidt et al., 2016). CRCI can include difficulties with attention and concentration, decrements in motivation, an inability to recall names of familiar objects or people, and memory loss (Mayo et al., 2021). The molecular mechanisms that underlie CRCI are complex and not fully understood (Oppegaard et al., 2022). Therefore, progress in the development of prevention and mitigation strategies remains limited (Onzi et al., 2022).

As noted in a previously published scoping review (Oppegaard et al., 2022), limited information is available on associations between CRCI and a variety of molecular markers. Inflammatory biomarkers (e.g., circulating cytokines, inflammatory genes) have been the most frequently studied. This line of inquiry is logical because cancer can induce inflammatory processes through multiple pathways, including tumor-related factors (Singh et al., 2019), psychological stress (Han et al., 2016), and as a consequence of treatment(s) (Bagnall-Moreau et al., 2019). Given that inflammation occurs in response to and/or in concert with other biologic processes (Medzhitov, 2008), an evaluation of additional molecular mechanisms may provide new insights into the causes of CRCI.

Although not studied in relationship to CRCI, potassium channels are ion channels that are distributed throughout the central nervous system (e.g., frontal cortex, basal ganglia) (Alam et al., 2023). Evidence suggests that potassium channels are important mediators of inflammation (Di et al.,