Post-Project Grant Report
Research, Education, Advocacy, and Direct Service (READS Grants Program)
American Association for Cancer Education (AACE)

Project Title: Association of neighborhood disadvantage and chronic stress with clinical outcomes and racial disparity in breast cancer

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Narrative Section

1. We confirm that the tangible output and project goals have been completed. Specifically, the AACE READS Grant supported the completion of a mixed-method study exploring the associations of neighborhood disadvantage and chronic stress (CS), using allostatic load (AL) as a CS biomarker, with clinical outcomes and racial disparity in breast cancer (BC). In addition to meeting our primary objectives, we also assess the association between AL and BC risk, and the potential underlying molecular mechanisms of CS/AL biological embedding.

2. Summary of the project: The design was an exploratory, mixed method study aimed at to exploring/assessing the associations of neighborhood disadvantage and CS, using allostatic load (AL) as CS indicator, with outcomes and racial disparities among women with BC. Project goals were met successfully, although with some delays and project modifications due to the transfer from one institute to another institute. The modifications were made to overcome the challenges of moving. The main modifications include: 1) The population included in our project. Besides the population proposed in our proposal, we also plan to include the new population in the new institute. We have successfully extracted clinical and socio-demographics from Epic in the new institute. Specifically, factors to construct AL, neighborhood characteristics and race/outcome information have been obtained. We also utilized public database to test our hypotheses. 2) Besides investigating the link between AL and BC outcomes, we also assess the association between AL and BC risk. 3) We also assess the potential underlying molecular mechanisms of how CS/elevated AL may promote breast tumorigenesis, contribute to worse outcomes and racial disparities among BC patients at the molecular level.

3. Summary of findings: Despite the challenges of transferring, we produced the following tangible outcomes: 1)Gene expression profiles and biological pathways associated with AL and race identified in our study shed light on the process of CS/AL biological embedding, and how CS/elevated AL may promote breast tumorigenesis, contribute to worse outcomes and racial disparities among TNBC patients at the molecular level. 2)Elevated AL was associated with worse treatment responses to neoadjuvant chemotherapy, and shorter survival among TNBC patients. CS may reduce the response to cancer treatment and consequently lead to worse mortality among TNBC patients. 3) Elevated AL was significantly associated with BC risk in women. 4) Living in disadvantaged neighborhood was associated with more aggressive breast tumor characteristics, and probably associated with CS and biological aging. Specifically, living in disadvantaged neighborhood was associated with increased odds of having elevated AL. A biological aging-related biomarker may partially mediate the link between neighborhood disadvantage and aggressive breast tumor phenotypes.

4. Lessons learned: Overall, we learned that: A) Exploration of novel pathways linking social contexts, biology, to cancer outcomes is an important way forward to reduce cancer disparities in the field of public health. Additional research is needed to elucidate the pathways linking social

adversity, CS, and BC outcomes among BC survivors. Longitudinal studies with diverse samples (e.g. more black populations) are needed to validate and further explore these associations. B) Neighborhood environments are potentially modifiable. Future efforts directed towards improving deleterious local environments will be useful to reduce cancer disparities, and improve overall health as well. Policies and interventions that focus on neighborhood health may improve the outcomes of individual-level health interventions among women who reside in disadvantaged communities. Improving neighborhood environments is also another meaningful way to target the cause of CS.

5. Preliminary findings were given as an oral presentation at the 2023 Commonwealth of Virginia Cancer Research Conference. A manuscript is currently under preparation. The results from this study will set a solid foundation for a future RO1 type of grant application (DOD, ACS, Breast Cancer Alliance, etc.). We also plan to validate results in this pilot study in a larger BC population with more Black women, which will also be included in the new application.