TITLE: Molecular linkages between adipose tissue and breast cancer subtypes by race

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RESEARCH PROJECT DESCRIPTION (brief overview of background, hypothesis, methods, role of medical student, funding and relevant publications)

The overarching goal of this research is to understand associations of adipose tissue distribution and its biological influence in breast cancer etiology and outcomes in African American and white women. Each year, over 100 thousand breast cancers worldwide are attributable to obesity (body mass index [BMI] ≥30 kg/m^2). Of these, one in five has a relatively invasive type of tumors that express estrogen-receptor-negative (ER-), resulting in an increased likelihood of poor outcomes compared to ER+ breast cancer. The mechanism of obesity contributing to ER- breast cancer is not well understood. It has been postulated that adipose tissue, or body fat, stored in obese individuals promotes various oncogenic pathways, notably, the PI3K-AKT-mTOR (or mTOR) pathway. The mTOR pathway is activated by excess calories and growth factors produced by adipose tissue, such as insulin-like growth factor 1, and these factors have been associated with breast cancer. The hypothesized mechanism is supported by our preliminary data indicating stronger mTOR pathway activities in obese than non-obese women with breast cancer, especially those with ER- tumors (K07CA201334; PI: Cheng). While important, the finding is constrained by imprecise measurement of adiposity using anthropometric methods (i.e., BMI and waist circumference). Improving upon the previous study, this research proposes to directly quantify body fat and adipose depots – visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT). Medical students will participate in image analyses of adipose tissue and assessing molecular markers of the mTOR pathway in breast cancer. Funding for the project is provided by the National Cancer Institute.