

Racial disparity: tackling the links between African ancestry and breast cancer aggressiveness

Dr Tomi Akinyemiju is an associate professor in the Department of Epidemiology at The University of Kentucky and adjunct professor at the University of Alabama at Birmingham. Her research focuses on racial disparities in the risk of aggressive subtypes of breast cancer among African-American and African women. She is currently studying newly diagnosed breast cancer patients in Nigeria in order to improve understanding of the links between metabolic syndrome and breast cancer subtypes in these women.

by lifestyle changes in developing countries including Nigeria, may play a role in the increased rates of breast cancer.

In addition to rising breast cancer rates, scientific evidence shows that women of African descent are more likely to be diagnosed with aggressive sub-types of breast cancer, characterised by rapidly growing, hormone-receptor (HR) negative tumours. These tumour types are often less responsive to current front-line therapies, resulting in significantly lower breast cancer survival rates in African and African-American women, relative to other racial groups. The biological mechanism driving this pattern remains unclear. This is where the work of Dr Tomi Akinyemiju comes in. If rigorous scientific studies conclude that the association between MetS and breast cancer aggressiveness is causal, then intervention strategies to eliminate components of MetS (i.e., obesity, hypertension, diabetes) can be incorporated as part of comprehensive cancer control plans. Furthermore, if the biological mechanism underlying the causal association is elucidated, then public health (e.g., more frequent screenings) and clinical (pharmacological treatment targeting altered epigenetic pathways) strategies may be developed.

Incidence of breast cancer has increased significantly in the past several decades, especially in developing countries such as Nigeria, and the World Health Organization estimates that close to 80% of new cancer cases will occur in developing countries in the coming decades. Changes in the prevalence of lifestyle-related risk factors in these countries, for instance dietary

patterns and sedentary lifestyles, are often accompanied by increases in the rates of obesity, hypertension (high blood pressure), dyslipidemia and diabetes. Combined, this cluster of health conditions is referred to as "Metabolic Syndrome" (MetS), and has been shown in past studies to be associated with increased risk of breast cancer. This suggests that the higher rates of MetS, brought on

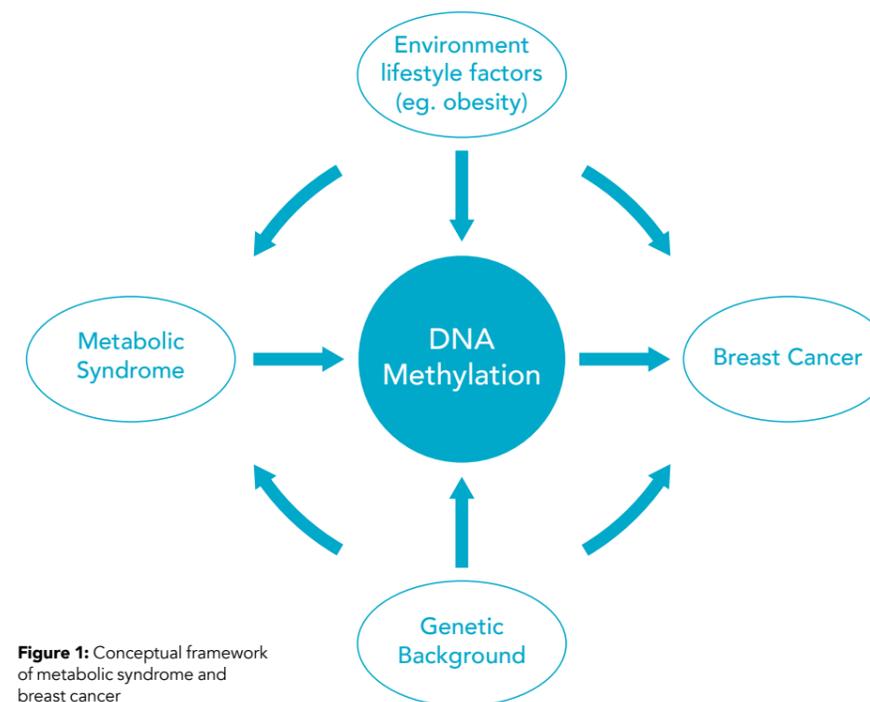


Figure 1: Conceptual framework of metabolic syndrome and breast cancer

SOCIO-ECONOMIC STATUS

Socio-economic status (SES) is a fundamental determinant of health, and the effects of SES on health outcomes are intergenerational and operate across the life-course. Specifically, higher socio-economic status (SES) has been shown consistently to increase breast cancer risk. This is because certain risk factors, including reduced number of pregnancies, higher alcohol consumption and higher intake of exogenous hormones (e.g., from hormone replacement therapy), are commonly related to high SES, and are shown to increase breast cancer incidence. In North America, African-American women are more likely to be in the lower SES group, and Dr Akinyemiju's research explores whether there is an independent

Few studies have identified factors associated with increased rates of breast cancer in Nigeria – this is where the work of Dr Tomi Akinyemiju comes in

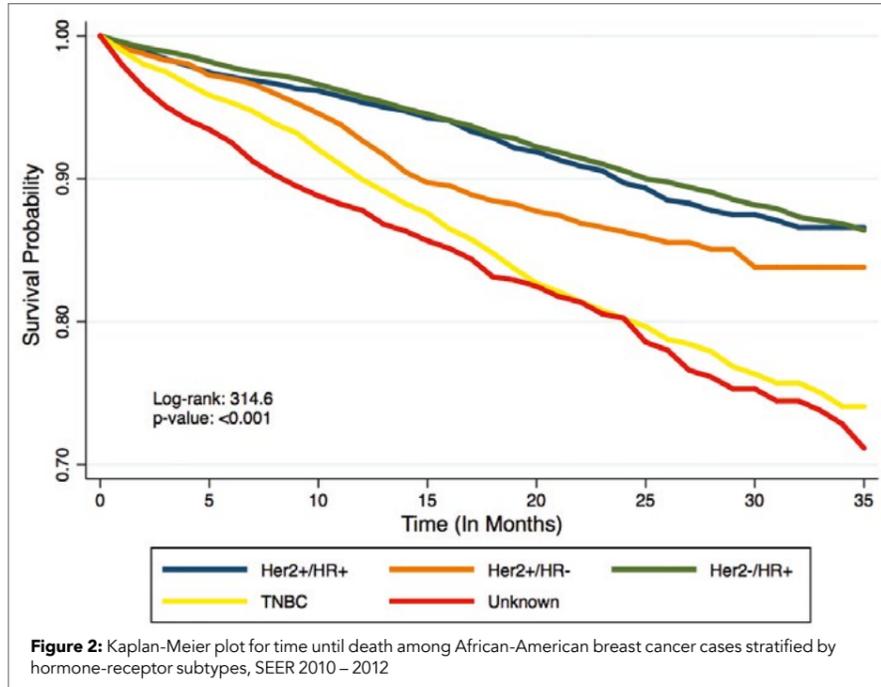
association between SES and breast cancer risk and aggressiveness.

In her study examining the prevalence of breast cancer subtypes by levels of SES among women of different races in the United States, Dr Akinyemiju observed higher incidence of the HR positive subtypes in higher SES groups, but also found that there was no association between SES and the HR negative subtype. This suggests that traditional breast cancer risk factors associated with SES may have little effect on the incidence of the aggressive forms of the cancer. Future studies in this area by Dr Akinyemiju and others aims to improve understanding of modifiable and non-modifiable risk factors for aggressive forms of breast cancer in order to provide data that will inform cancer prevention efforts. The ultimate goal is to treat each subtype of breast cancer as a separate disease, each with its own unique set of risk factors and biological pathways, further increasing the likelihood that prevention and treatment will be more targeted and effective.

LOOKING TO THE FUTURE

Dr Akinyemiju's current research aims to understand two key areas. Firstly, she aims to evaluate whether MetS and breast cancer are significantly associated in Nigerian women by studying breast cancer in general and the different subtypes. Secondly, her research will evaluate critical differences in the pattern of DNA methylation and other epigenetic mechanisms comparing tumour and normal breast tissue, and whether this is also related to MetS. Studying these factors could improve understanding of the persistent racial disparities in mortality from breast cancer, and also determine the influence of MetS as a risk factor. This could then help inform and develop preventative measures, ultimately contributing to an overall reduction in mortality from breast cancer.

There is still a long way to come in our understanding of breast cancer. There are socio-economic differences in breast cancer incidence – women of higher SES are more likely to be diagnosed with breast cancer due to a number of risk factors including reproductive factors, and while African and African-American women are less likely to have higher SES, they do suffer from more aggressive tumours and face a higher mortality. The direct causes of these associations are still relatively unknown, although it is clear that there is a complex interplay of factors involved, including



behavioural, clinical, genetic and epigenetic, as well as racial disparities in access to high quality healthcare which predicts timely and appropriate treatment. Unfortunately, there is a critical dearth of high-quality, prospective studies among African women, which is indispensable to proper understanding of true causal associations between risk factors and disease. This is a challenge that Dr Akinyemiju plans to take on in the near future. Currently, Dr Akinyemiju plans to continue

with her line of research focusing on the causes and determinants of racial disparities in breast cancer across the cancer continuum; evaluating novel risk factors for breast cancer subtypes, assessing barriers to timely and appropriate screening and treatment, and causes of reduced survival. Her ultimate goal is to contribute to improved understanding of the complex disease of breast cancer, information which will lead to effective prevention strategies.



Q&A

To what extent do you believe SES influences the development of more aggressive forms of breast cancer in African-American women?

SES incorporates individual income, education and employment and generally reflects access to resources. Many traditional breast cancer risk factors, such as hormonal therapy, parity and breastfeeding, are linked with SES, such that higher SES is associated with increased risk of breast cancer. However, in our recent publication we observed no association between SES and hormone-receptor negative subtypes (HR-), also the most aggressive forms. If replicated in other studies, this implies that HR- breast cancer may have a different aetiology, indicating that more research in this area is urgently needed.

What do you think are the primary causes of increased breast cancer diagnoses in Nigerian women?

Recent economic development in Nigeria has resulted in rapid urbanisation (about 50% of Nigerians now reside in urban areas), widespread availability of energy-dense, nutrition-poor food items, sedentary lifestyles and a rise in non-communicable diseases such as diabetes, overweight/obesity and hypertension. Previous studies have shown clear links between these risk factors and breast cancer incidence in other populations, and we hypothesise that this is likely to be the case in Nigerian women. However, the aetiology of breast cancer is multifactorial and complicated, and there are likely several risk factors concurrently involved.

Could it be a case that more women have access to healthcare, and as such are more likely to be diagnosed because of that?

It is true that there is more awareness generally about breast cancer and the need for routine screening. However, age-

appropriate screening rates in Nigeria are still far below recommended levels. Nevertheless, data from cancer registries in regions of Nigeria and other African countries show significant increases in breast cancer incidence, and projections from the World Health Organization also estimate that cancer incidence will continue to increase in the next few decades.

What are the implications of your current research for future healthcare?

The goal is to create a rigorous scientific evidence base for specific risk factors for breast cancer in general among Nigerian women, and for aggressive subtypes in particular, that has direct relevance for women of African descent globally. Better understanding of specific risk factors in this population may lead to targeted interventions that are specific and actionable and can reduce the current trajectory of current projections. Furthermore, our research focused on biological and epigenetic mechanisms underlying aggressive breast cancer may lead to clinical interventions to treat and/or prevent aggressive breast cancers

What was your main driver for wanting to study breast cancer in African and African-American women?

Despite well-established screening and treatment guidelines in one of the most affluent countries in the world, African-American breast cancer patients have about a 12% survival disadvantage compared with white breast cancer patients. African women also experience significantly worse survival. It is critical to understand if these differences are due to biological, behavioural or health systems issues so that effective interventions can be designed to improve breast cancer survival for all women, regardless of race.

The goal is to create a rigorous scientific evidence base for specific risk factors for breast cancer among Nigerian women

Detail

RESEARCH OBJECTIVES

Dr Akinyemiju's current study aims to provide critical information on the association between metabolic syndrome and breast cancer in Nigerian women. Through her work, she examines potential biological and epigenetic mechanisms through which metabolic syndrome influences breast cancer aggressiveness.

FUNDING

National Institutes of Health (NIH)

COLLABORATORS

- Lagos University Teaching Hospital
- Federal Medical Center, Abeokuta
- University College Hospital, Ibadan
- Obafemi Awolowo University, Ile-Ife.

BIO

Dr Tomi Akinyemiju earned her PhD in Epidemiology at the University of Michigan, Ann Arbor in 2012 and completed a post-doctoral fellowship at Columbia University in 2014. She is currently an Associate Professor in the Department of Epidemiology at the University of Kentucky College of Public Health.



CONTACT

Tomi Akinyemiju PhD
Associate Professor
University of Kentucky, Lexington
111 Washington Avenue
Lexington KY
USA

E: tomiakin@uky.edu

T: +1 (859) 323 1147

W: <http://www.uky.edu/publichealth/about/faculty-and-staff-directory/tomi-akinyemiju>