Novartis Exome and Transcriptome Project

Differences in breast cancer incidence and death rates between North American Caucasian and African American women are well-described and transcend socioeconomic issues. Black women are diagnosed with breast cancer at a younger median age, have more clinically aggressive disease and stage-for-stage, have higher mortality rates than age-matched Caucasian women. Black women in West Africa, the origin of the slave trade in the US in the 19th century and thus the founder population for most African Americans, have even higher rates of early-onset, poor-prognosis breast cancer than African American women.

These observations led to a study by Dr. Funmi Olopade (University of Chicago) to further characterize the medical and genetic epidemiology of breast cancer in Nigeria. This work confirmed the markedly earlier age of onset in Nigerian women (45 years vs. 64 years in the US), and dismal comparative 5-year survival rates (32% vs. 73% in the West). Further the work of Dr. Olopade demonstrated marked differences in the spectrum of genetic and biologic markers between tumors in African and Western women. Even after adjusting for age, the incidence of the poor-prognosis subgroup of “triple-negative” breast cancers (estrogen and progesterone receptor negative and HER2 negative) accounts for a significantly higher percentage of diagnoses in Nigeria than in the US. Finally, while the availability of anti-HER2 targeted therapy such as Herceptin have changed the HER2-amplified subgroup of breast cancer from poor to good prognoses, these therapies remain unavailable to African women, further adding to very poor outcomes in Nigerian breast cancer cases.

The study described here will further evaluate the genetic architecture of 100 Nigerian breast cancers during the Research Term using whole exome sequencing and transcriptome analysis. Protein-based pathway analysis may be implemented as sampling processing and analytic technologies make this approach feasible. The data obtained in this study will be compared with age-matched data sets from breast cancers in North American Caucasian women and will describe the incidence, frequency and racial/geographic differences between these datasets.

The study will support the recruitment of patients, sample acquisition and processing, patient care and patient education in Nigeria by Nigerian physicians, nurses, data managers and research students in partnership with the University of Chicago. In this way, the study will add to the infrastructure already put in place by Dr. Olopade and contribute to sustainable translational research and patient care in Nigeria.