Underrepresentation of minorities in GEP research and disparities in breast cancer outcomes

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Black-White Disparities in Breast Cancer

Second leading cause of cancer-related deaths for women in the U.S.

http://www.cdc.gov/cancer/dcpc/data/women.htm

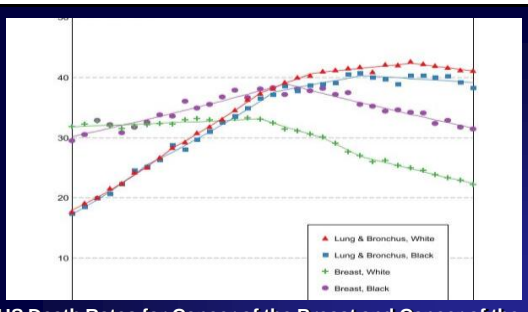
Compared to white women, black women have

- Lower incidence rates
- Higher mortality rates

Racial/Ethnic Group	Incidence	Death
All	127.8	25.5
African American/Black	118.3	**33.8**
White	**132.5**	25.0

Female Breast Cancer Incidence and Death Rates, 2000-2004

NCI Cancer Health Disparities Factsheet
http://www.cancer.gov/cancertopics/factsheet/disparities/cancer-health-disparities



US Death Rates for Cancer of the Breast and Cancer of the Lung and Bronchus. White vs. Black Females, 1975-2007

National Cancer Institute. The SEER Cancer Statistics Review 1975–2007
http://seer.cancer.gov/csr/1975_2007/ browse_csr.php?section=4&page=sect_04_ zfig.09.html

Biomedical & sociomedical factors in black–white patient BC disparities

Breast Cancer Biology

- Black women
  - Have Higher rates of ER-, triple-negative BC
  - Earlier age at incidence
  - Diagnosis at later stages?
  - Higher mortality, regardless of ER status
- Genetic factors?
- Racial identity/lived experience

Social Determinants

Social disadvantage is associated w/

- **poor health outcomes**
- **more aggressive cancers**
- **less access to care/new technologies**
- **toxic exposure, poor nutrition, chronic stress, generalized vulnerability, etc.**
- **Epigenetics**

- **Social disadvantage + race**

Gene Expression Profiling (GEP) of breast tumors

- Personalized medicine technique
- Identifies the expression of a set of genes in a biologic sample using microarray technology

  - Marchionni et al 2008, Sotiriou et al 2009
- Used to predict risk of recurrence and guide chemotherapy treatment

GEP Prognostic Tests for Recurrence and Tx response

- Oncotype *DX: ER+, node-negative disease; adjuvant chemotherapy.*
- *H/I Ratio Signature and Breast Cancer Profiling Test: ER+ disease; endocrine therapy.*
- *MammaPrint: Early-stage ER+ and ER- node-negative disease, adjuvant chemotherapy. Fresh or frozen tissue only*

Gene Expression Profiling (GEP) of breast tumors

- GEP uptake is rapidly growing
- New start for diffusion of technology?

Methods

- 20 studies (2004-7) from *Evaluation of Genomic Applications in Practice and Prevention Program (EGAPP) report* "Impact of GEP tests on breast cancer outcomes." --AHRQ 2008
- Two additional studies (2008, 2010)
- Abstracted race/ethnicity, ER status

Results: Race/Ethnicity

22 studies, 6500+ participants

- 6 studies reported race/ethnicity
  - 471 (23%) participants coded nonwhite (6% of total participants)
  - 127 (6%) participants coded black/AA (2% of total participants)
- 1 study looked at race and outcomes

Results: ER +/- Status

22 studies

- 12 studies reported ER status
  - 918 ER- cases (14% of total)
- 2 stratified by ER status (H/I ratio)
  - No association found ER- and outcome

Exclusion from benefits of GEP research?

- Race
- ER +/- Status

Exclusion from GEP Technology?

- Racial differences in genomic testing? ---Lund et al., 2011
- Oncotype Dx
  - Most commonly-used test in US
  - Not approved for ER-
- Only MammaPrint is approved for ER-
  - Requires fresh/frozen tissue
  - Not tested in nonwhite populations
  - May not be predictive in triple-negative BC

Future Perspectives in Personalized Medicine

- Need more information about the utility of GEP in diverse populations
- Lack of well-validated evidence base could exacerbate growing disparities
- Studies should adequately enroll and analyze diverse populations
- Policy-makers should explore social and health system policies to ensure universal access and benefit

Future Perspectives

- Truly personalized medicine
  - Genetic, social, environmental factors, emerging technologies
  - Potential to improve population health and reduce disparities
- Let's get it right!

Thanks

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