Multi-Level Approaches to Targeting Health Disparities in The United States

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Age-Adjusted Mortality Rates by Race/Ethnicity and Gender, 2001

Life Expectancy at Birth for Black and White Males and Females in the US, 1900-2000

Source: National Center for Health Statistics, 2003, tab. 27
International Comparisons of Female and Male Life Expectancies, United States and Other Countries

Source: National Center for Health Statistics, 2003, tabs. 26 & 27
What do we know about determinants of health disparities?
A Framework for Understanding Health Disparities: The Impacts of Various Domains on Early Deaths in the United States

Source: McGinnis et al., 2002
Treated Separately Do Not Explain Disparities

**Behavioral patterns** (40%) - Smoking, diet, adherence, etc.

**Genetics** (30%) - Heritability and genetic propensity

**Social circumstances** (15%) - Discrimination, availability of services, etc. The least studied determinant, and perhaps most significant.

**Shortfalls in medical care** (10%) - Physician bias, access to care

**Environmental exposures** (5%) - Toxins, pollution, secondhand smoke, etc.
Treated Separately Do Not Explain Disparities

- We have focused on behavioral patterns (which can blame the victim) and genetics to the exclusion of social circumstances.

- And, we have neglected interactions between determinants.
Effect of the Civil Rights Act: Change in Life Expectancy at Age 35 Before and Afterwards

Source: Kaplan, Ranjit, & Burgard, 2008, p. 156
Change in Life Expectancy at Age 25 by Race, Gender, and Education: 1990-2000.

Source, Meara et al., 2008, p. 354
The Federal Response

Recognizing the complexity of diseases such as cancer and our lack of success to date in conquering them, the National Institutes of Health (NIH) in 2002 launched a new approach...
Roadmap for 21st-Century Medical Research

“The NIH Roadmap... lays out a vision for a more efficient and productive system of medical research. It identifies the most compelling opportunities in three main areas:

1. new pathways to discovery,
2. research teams of the future, and
3. re-engineering the clinical research enterprise.”
Roadmap for 21st Century Medical Research

Research teams of the future

- new organizational models for team science
- novel partnerships of molecular, social, and behavioral scientists
- because, solving the problem of complex diseases like cancer requires a holistic understanding of the complex interplay between factors such as genetics, diet, environment, behavior, and social structures
Centers for Population Health and Health Disparities Initiative

- first implementation of the NIH Roadmap
- directed at group differences in health
- established 8 centers in the US, each with at least 3 interdependent research projects addressing biological, behavioral, and social aspects of health and partnering with community stakeholders
Research Teams of the Future

- Separate bodies of knowledge
- Different “languages”
Research Teams of the Future

MULTIDISCIPLINARY

- Separate bodies of knowledge
- Different “languages”

INTERDISCIPLINARY

- Shared bodies of knowledge
- Shared “vocabulary”
Research Teams of the Future

- **MULTIDISCIPLINARY**
  - Separate bodies of knowledge
  - Different "languages"

- **INTERDISCIPLINARY**
  - Shared bodies of knowledge
  - Shared "vocabulary"

- **TRANSDISCIPLINARY**
  - Shared language
  - Pooled bodies of knowledge and theory
  - Jointly-developed new methods
Disciplinary Network Ties Prior to (T1) and After (T2) NIH Funding

Increase in density within centers 24% (UT) to 418% (UC)
Institute for Mind and Biology

Cancer Risk Clinic

Center for Interdisciplinary Health Disparities Research

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Funmi Olopade, M.D.
Thomas Krausz, M.D.

Social Service Administration
Department of Psychology
Department of Medicine
Department of Pathology

University of Ibadan
CIHDR Central Research Questions

Why do African American women develop an earlier form of breast cancer that is more lethal and aggressive than that experienced by white women?

How does this contribute to the African American and white disparity in breast cancer mortality in the U.S.?
The level of disparity between African Americans and whites between 1990 and 1998

<table>
<thead>
<tr>
<th>Indicator</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>all-case mortality</td>
<td>narrowed</td>
</tr>
<tr>
<td>heart disease mort.</td>
<td>widened</td>
</tr>
<tr>
<td>stroke mortality</td>
<td>narrowed</td>
</tr>
<tr>
<td>lung cancer mort.</td>
<td>narrowed</td>
</tr>
<tr>
<td>br. cancer mort.</td>
<td>widened</td>
</tr>
<tr>
<td>infant mortality</td>
<td>narrowed</td>
</tr>
<tr>
<td>suicide mortality</td>
<td>widened</td>
</tr>
</tbody>
</table>

Source: Kessler, et al, 2002
Race Differences in Breast Cancer Mortality

African Americans 37% Higher

FIGURE 6 Female Breast Cancer Death Rates* by Race and Ethnicity, United States, 1975 to 2002.
*Rates are age-adjusted to the 2000 US Standard Population.
†Information is included for all states except Connecticut, Maine, Maryland, Minnesota, New Hampshire, New York, North Dakota, Oklahoma, and Vermont.
Source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2005.

Why the Worse Outcome?

Clearly much of the African American and white difference in mortality from breast cancer is due to differences in access to care.
SEER Patient Cohort

Yet, 30% of Health Disparities Persist Even After Controlling for Access to Care……..


“The survival of Black women compared to White women demonstrated an increasing ratio with calendar period”

“Thus, inequalities in access…most likely are not solely responsible for the widening disparities in outcome… (Jatoi, et al, 2003)”
Black Versus White Differences in Breast Cancer

Among White women:
- the incidence of breast cancer increases with age after menopause

Among Women in West Africa:
- breast cancer is known as a disease of young women (av. age = 43 yrs)
- 74% of cases are pre-menopausal; 12% before age 30 yrs (14% before the age of 65 yrs. in White women; only 1% occurs before age 30 yrs.)
- it is almost always fatal
Breast Cancer Is Not One Disease

ER- & HER2-

ER- & HER2+

“Normal”

ER+ B

ER+ A

"Intrinsic" gene set on 78 single tumor samples

31.8% AA
17.7% Hispanic
10.1% Asian
10.1% White

Source: Sorlie, et al., 2001
# Molecular Characterization of Breast Cancer

<table>
<thead>
<tr>
<th>Hormone status</th>
<th>ER+</th>
<th>ER-</th>
<th>ER-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age affected</td>
<td>Older Age</td>
<td>Younger Age</td>
<td>Younger Age</td>
</tr>
<tr>
<td>Molecular Character</td>
<td>Well-differentiated</td>
<td>High Grade</td>
<td>High Grade</td>
</tr>
<tr>
<td>Speed of growth</td>
<td>Indolent</td>
<td>Aggressive</td>
<td>Aggressive</td>
</tr>
<tr>
<td>HER2 Status</td>
<td>HER2-</td>
<td>HER2+</td>
<td>HER2-</td>
</tr>
<tr>
<td>Treatment</td>
<td>Tamoxifen</td>
<td>Herceptin</td>
<td>?</td>
</tr>
</tbody>
</table>
How Much of Breast Cancer is Hereditary?

- 70%-80%
- 15%-20%
- 5%-10%

Legend:
- Sporadic
- Family clusters
- Hereditary Mutation
Mutually Informative
Multi-Level and Multi-Modal Approach

Projects 2 and 3
Olopade
Gehlert

Projects 1 and 4
McClintock
Conzen

community/neighborhood
(housing, (crime, collective efficacy, social ecology)

social circumstances
(social isolation, social support)

environmental exposure

behavior patterns

psychological state

hormones

genes

housing

environ-mental exposure

 Mutually Informative Multi-Level and Multi-Modal Approach

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Olopade Gehlert

Projects 1 and 4
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Mutually Informative Multi-Level and Multi-Modal Approach

Projects 1 and 4
McClintock Conzen

- Mutually Informative
- Multi-Level and Multi-Modal Approach

- Genes
- Hormones
- Psychological state
- Behavior patterns
- Social circumstances
- Environmental exposure
- Housing
- Community/neighborhood

(genome, hormones, psychological state, behavior patterns, social circumstances, environmental exposure, housing, community/neighborhood)

(crime, collective efficacy, social ecology)
Project #1: Mammary Cancer Risk: Social Isolation and Acquired Vigilance (Martha McClintock, Ph.D.)
Acquired Vigilance
20 days of age
Total Tumor Burden

17 Months of Age

- *Isolated Females*
- *Group Females*

$p \leq 0.0001$
Litter Mates at 790 Days of Age

Social Group

Isolated
Corticosterone Dynamics 15 Months of Age

Stress Response at 15 Months of Age

- Group
- Isolate

Restraint

Change in Corticosterone (µg/dl)

Minutes After Stress

Baseline  Rise  Recovery Time
Mutually Informative Multi-Level and Multi-Modal Approach

Projects 2 and 3
Gehlert
Olopade

genes
hormones
behavior patterns
psychological state

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(social isolation, social support)

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Project #3: Multi-Level Sources of Psychosocial and Hormonal Data from the Same Newly Diagnosed Women

Two-day visits every 6 months for 1.5 years (10 visits/woman with >18 hours of face-to-face contact).

*Home*: (women interviewed in home) psychosocial functioning, social network, health behaviors, and salivary cortisol.

*Neighborhood*: (four block radius around home; Built Environment Team) opportunities for social interaction (vacant lots, traffic in neighborhood, vacant buildings).

*Community*: (geocoded data) violent crime, collective efficacy, dilapidation of housing, SES, trust, health indicators.

Olopade lab collects and analyses tumors from same women.
Community: Robberies per ¼ Mile Buffer Around Participants’ Homes

Range = 0-95
Mean = 32.1
(SD = 20.1)

Red circles = high
White circles = low

Count of Robberies 2004
Quarter Mile Radius Buffer
Focus Group Participants’ Home
Salient Psychological States: Vigilance in Environment

Isolated

Grouped

Neighborhood’s Built Environment
African American Women Newly Diagnosed With Breast Cancer

- **Dislocation**
  67% moved in past 10 years

- **Felt Loneliness**
  Sample 5.1 ± 1.5 (SD)
  Cook County 4.2 ± 1.3 (SD)

- **Depression**
  22% clinically depressed

- **Sexual Assault**
  34% suffered an assault

\[
\begin{align*}
\text{Lonely} & \quad +.49^* \\
\text{Assaulted} & \quad +.35^* \\
\text{Depressed} & \quad +.70^{**}
\end{align*}
\]

\*p=0.00, \**p=0.01
**Stress Reactivity**

**African-American Women**

Awakening to Life Stressors

$r = 0.48, p = 0.007$

**Sprague-Dawley Rats**

30 minute Restraint Stressor

$p = 0.02$
CIHDR Model of Health Disparities in Breast Cancer

Race = Poverty, Neighborhood Crime, & Frequent Moves

Isolation, Acquired Vigilance & Depression

$GR, Pten$, inflammatory gene function

Failure of Apoptosis & Tumorigenesis
African-American Women (Chicago)

Breast Cancer

Inflammatory Process

Cortisol Dynamics

Sexual Assault

Fractured Community

Crime

Dilapidated Housing

Rise

Night time

2-factor psychosocial suite:
1. depression and loneliness
2. anomie

Downregulation
Pten, Axl
Inflammatory genes

GR
Glucocorticoid Receptors

P = .03

P = .05
The Message for Social Work

- We have taken a holistic approach to social work practice, but not to social work research.

- Realizing how intervening at one level impacts levels downstream has important implications.

- That upstream and downstream determinants are linked to one another helps us to target interventions to maximize resources and predict their effects.
CIHDR Transdisciplinary Team

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M Tretiakova, PhD, MD, Surg. Path.
M McClintock, PhD, Psychology
C Masi, MD, PhD, Gen. Int. Med.
Absent: S Conzen, MD, Hem/Oncology

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