Cancer health disparities

The Causes and Consequences of Cancer Health Disparities

Bríd M. Ryan, PhD, MPH
Laboratory of Human Carcinogenesis, Center for Cancer Research, NCI
ryanb@mail.nih.gov

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Outline

- Background
- Disparities in cancer incidence
- Disparities in cancer outcomes

Race and Ethnicity

- **Race**
  - Biological differences between groups assumed to have different bio-geographical ancestries or genetic makeup
- **Ethnicity**
  - A multi-dimensional construct reflecting biological factors, geographical origins, historical influences, shared customs, beliefs and traditions among populations that may not have common genetic origin

USA Health Disparities

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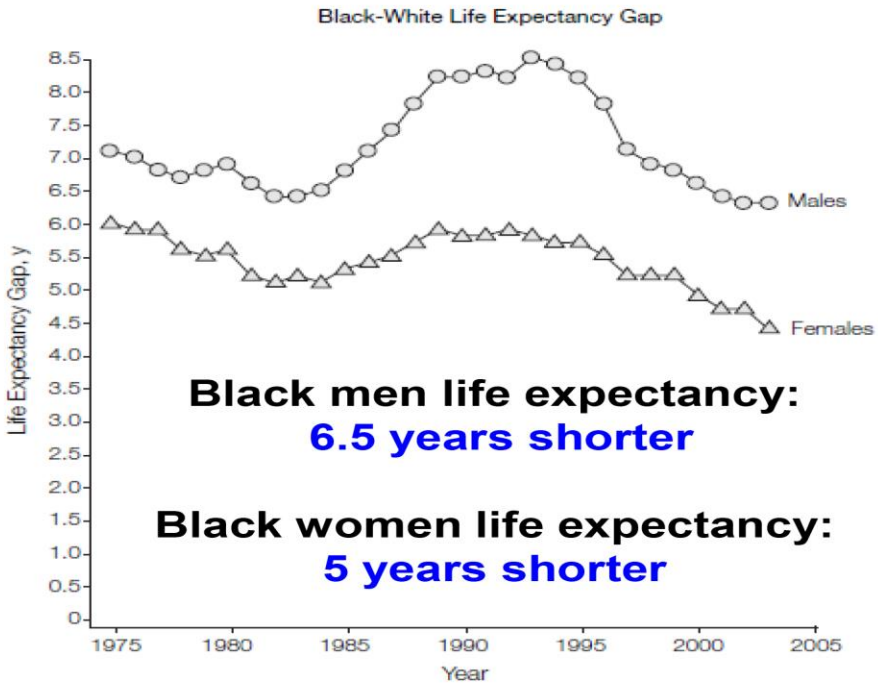
Health Disparities in the United States

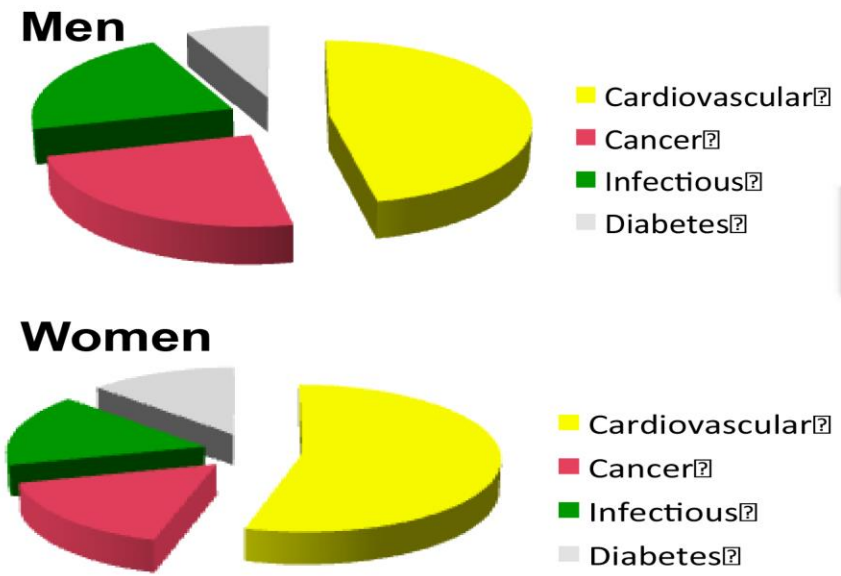
Race differences in life expectancy in the United States



Black men life expectancy:
6.5 years shorter

Black women life expectancy:
5 years shorter

Contributing Factors



Adapted from JAMA 2007 297:11 1227

Cancer Disparities: Definition

The NCI defines "cancer health disparities" as:

"differences in the incidence, prevalence, mortality, and burden of cancer and related adverse health conditions that exist among specific population groups in the United States."

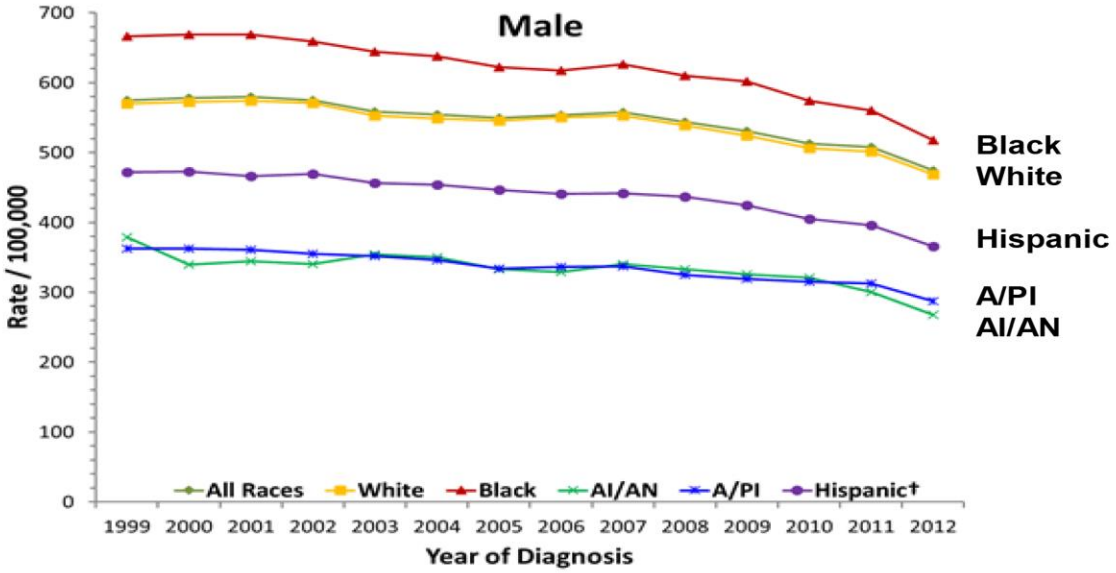
Cancer Disparities: Definition

Excess Burden of Cancer in the African-American Community

"African-Americans have the highest death rates from all cancer sites combined, and from malignancies of the lung, colon and rectum, breast, prostate, and the cervix of all racial groups in the United States"

Incidence rates

Incidence Rates by Race/Ethnicity and Sex, U.S., 1999–2012



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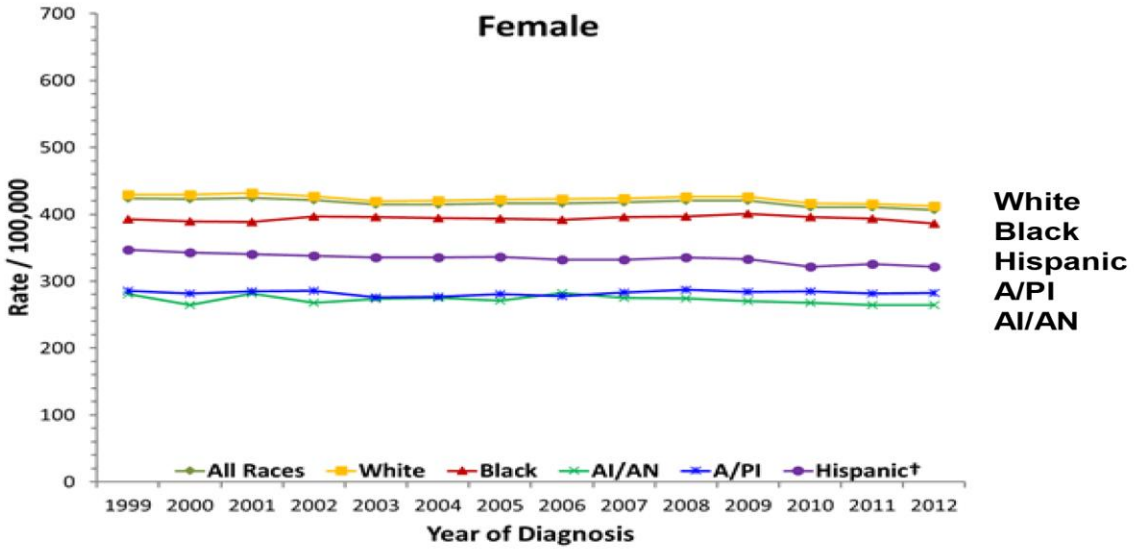
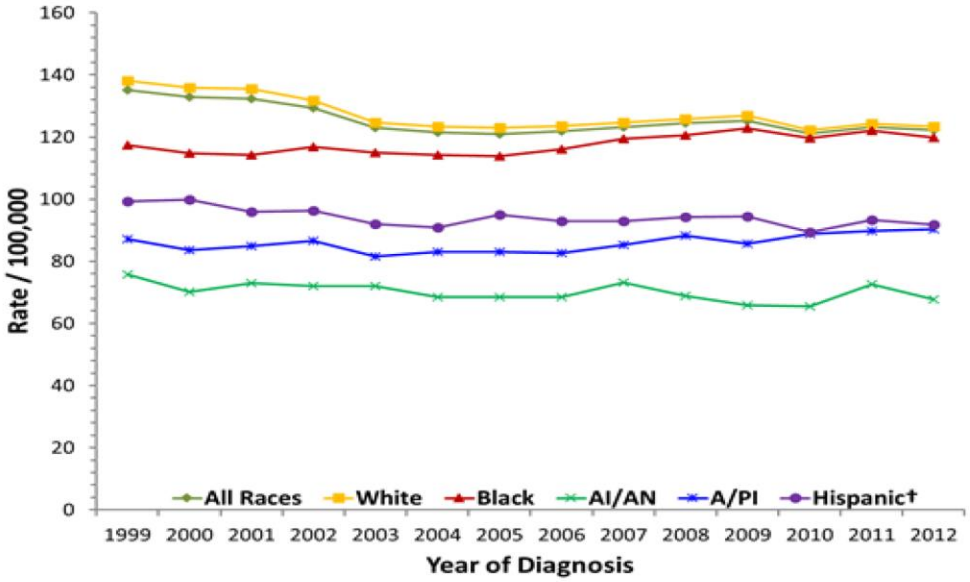


Breast cancer incidence

Breast cancer incidence is higher in Whites compared with Blacks

Female Breast Cancer
Incidence Rates* by Race and Ethnicity,
U.S., 1999–2012



Diagnosis age

Younger age at diagnosis for most cancers

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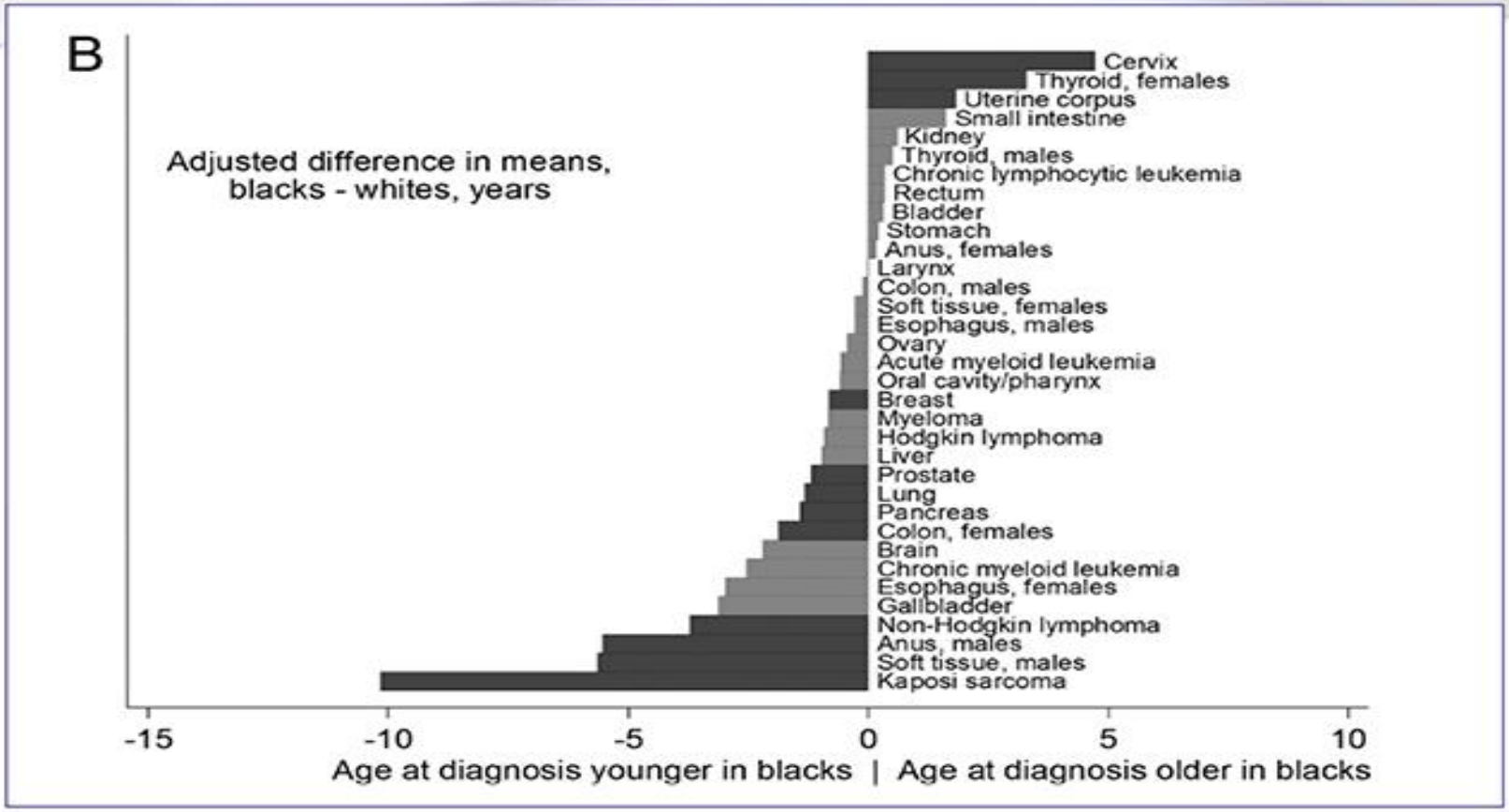

Robbins et al.,JNCI J Natl Cancer Inst (2015) 107 (3)

Diagnosis age

Younger age at diagnosis for most cancers

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Cancers mainly diagnosed at younger age in black men and women
NHL, anal cancer, Kaposi sarcoma and soft tissue

Etiologic heterogeneity
Cause of the cancer differs across groups, causes cancer at different ages
Subtypes can be caused by different factors – can contribute to disparities

Timing or intensity of exposure
For example, exposure to tobacco could occur earlier in one population

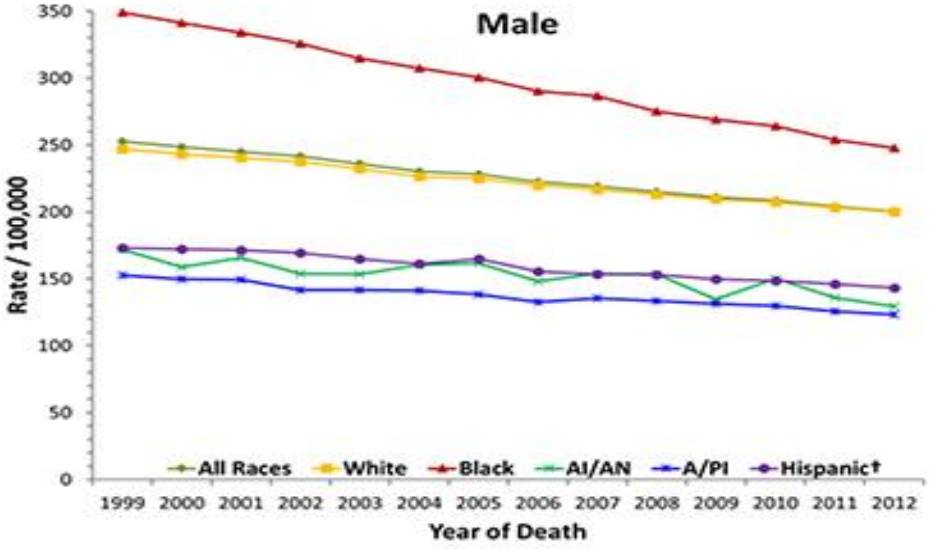
Timing, prevalence and frequency of early cancer detection
Screening, or through follow after an incidental finding

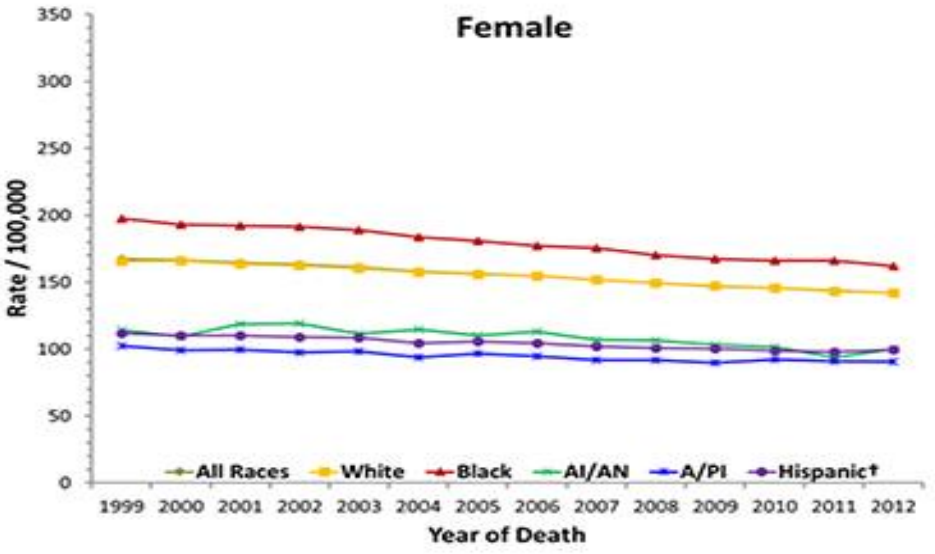
NCI Early Onset Malignancy Initiative
The Center for Cancer Genomics (CCG) in collaboration with the Division of Cancer Prevention's NCI Community Oncology Research Program (NCORP) invited the twelve Minority/Underserved NCORP sites to participate in this project

Robbins et al.,JNCI J Natl Cancer Inst (2015) 107 (3)

Mortlity rates

Mortality Rates by Race/Ethnicity and Sex, U.S., 1999–2012



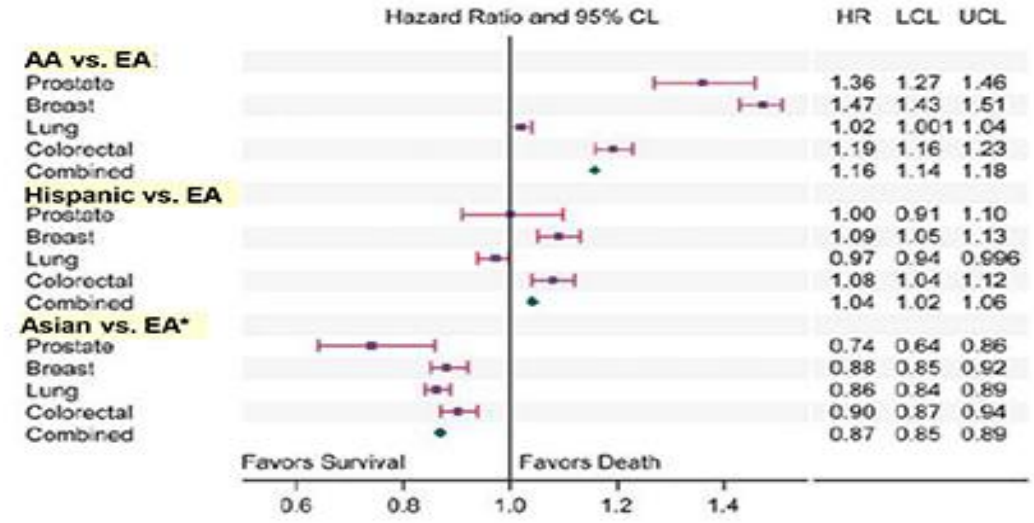


Cancer site

Survival Health Disparities by Cancer Site

African Americans have the highest rate of cancer specific mortality
Racial differences are not reducing over time
Breast cancer—might even be getting worse

Survival health disparities between population groups



Prostate cancer

Race	HR (95% CI)
White	
1990-1994	1 [Reference]
1995-1999	0.69 (0.67-0.71)
2000-2004	0.48 (0.46-0.50)
2005-2009	0.47 (0.45-0.50)
Black	
1990-1994	1 [Reference]
1995-1999	0.58 (0.54-0.62)
2000-2004	0.42 (0.39-0.46)
2005-2009	0.35 (0.31-0.39)
Asian	
1990-1994	1 [Reference]
1995-1999	0.72 (0.63-0.82)
2000-2004	0.53 (0.45-0.60)
2005-2009	0.48 (0.40-0.58)

AA = African-American; EA = European-American

Aizer et al., Cancer 2014, 120: 1532-9
Zeng et al., Jama Oncology 2015 1: 88-96

Key determinants

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Key determinants of disparities

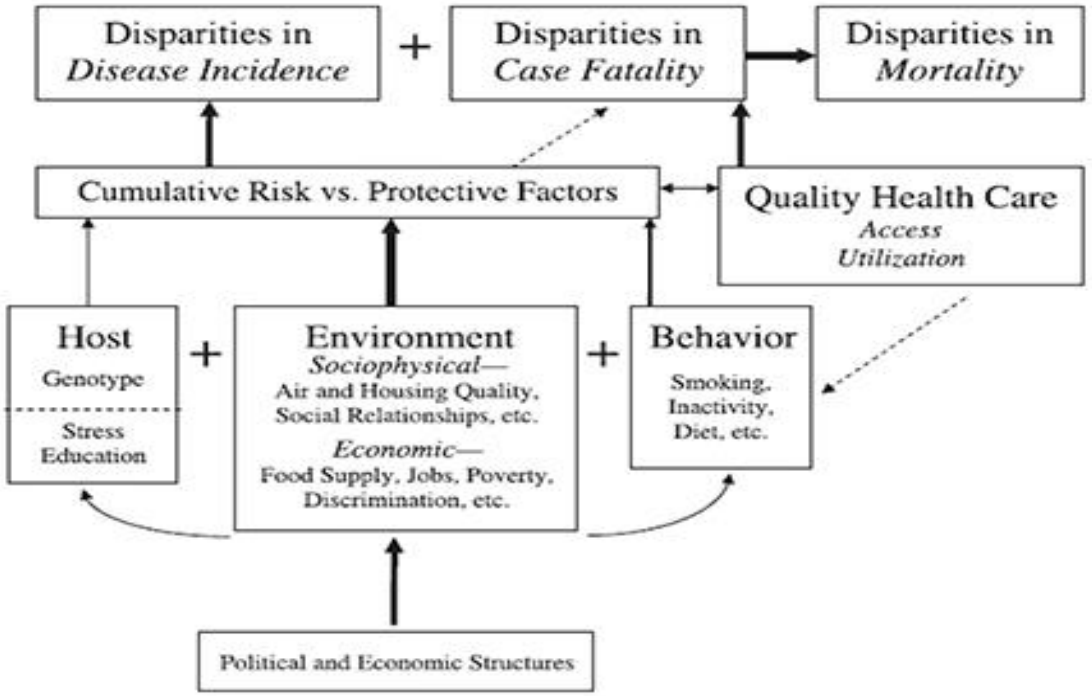

Figure 1. Key determinants of health disparities.

James, SA Epidemiologic Reviews 31(1):1-6

Some of the reasons for disparities in incidence

- Geography
- Genetic? Differential susceptibility?
- Tobacco use
- Nutrition & Physical Activity
- Infection (Hepatitis B, HPV)

Some of the reasons for disparities in mortality

- Lack of early-detection
- Lack of timely and aggressive treatment
- Access to care
- Genetics?
- Biology?

Disparity geography

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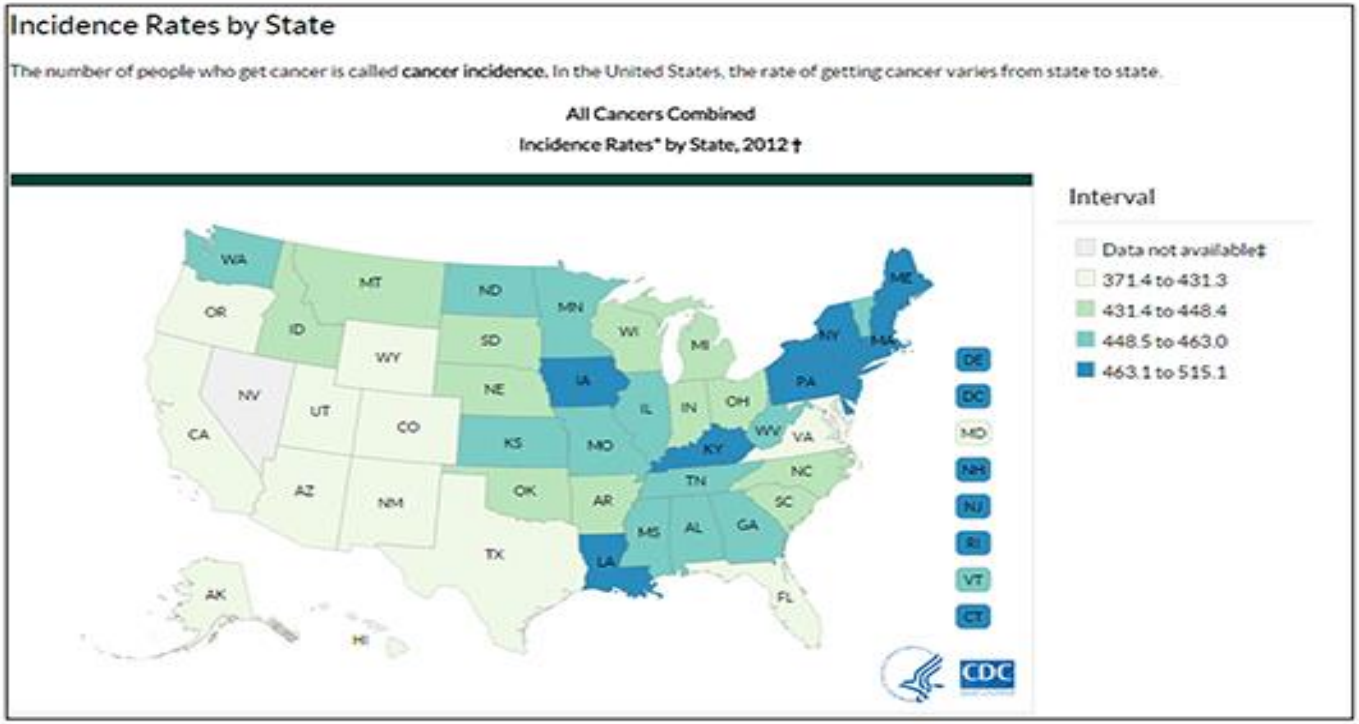
Some of the reasons for disparities in incidence: Geography?



Highest
Kentucky
Rhode Island
Delaware
Louisiana
New Jersey

Lowest
New Mexico
Arizoma
Wyoming
Alaska
Virginia

Geography disparity

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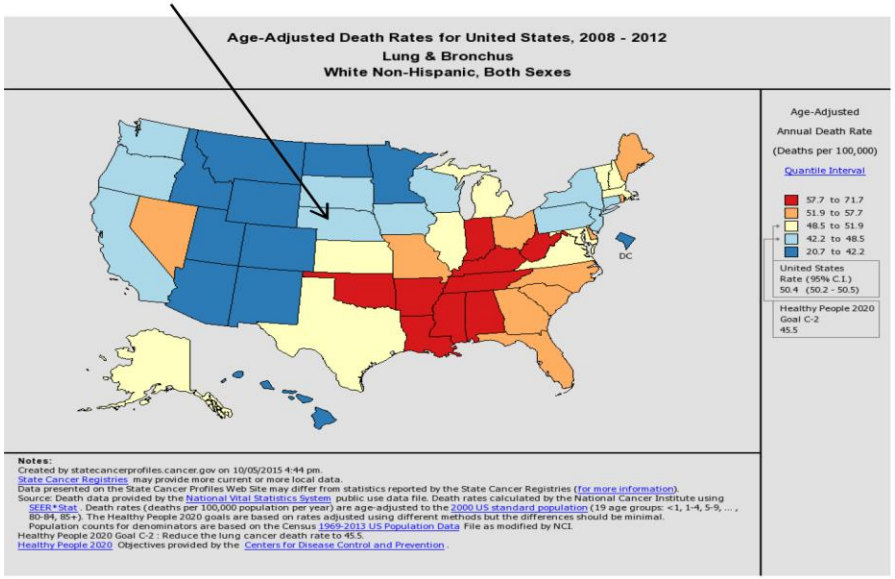
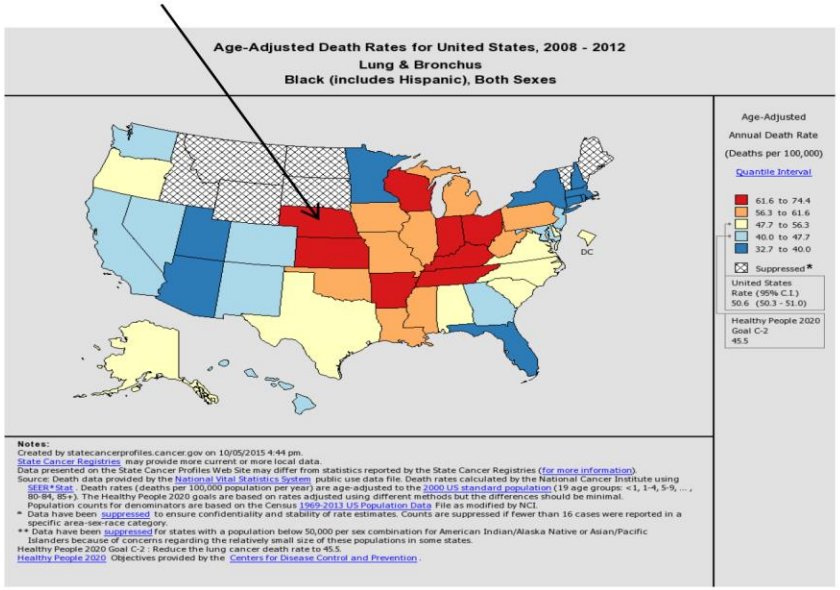
Some of the reasons for disparities in incidence: Geography?

Lung Cancer Incidence by State White



Lung Cancer Incidence by State Black



- ✓ Regional differences in smoking prevalence may contribute to disparities in lung cancer incidence
- ✓ Residential migration; Racism; Advertising; Cultural influences; Community structure; Social stress

http://statecancerprofiles.cancer.gov

Geography

Some of the reasons for disparities in incidence: Geography?

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- **A low socioeconomic status (SES) neighborhood confers additional incidence or mortality risk beyond individual SES** *(J. Epidemiol. Community Health 2003, 57:444-52)*
  - Unequal burden of pollution
  - Areas with the highest percentage of African Americans have the highest exposure to cancer-associated pollutants *(Environ Health Perspect. 2005 113(6): 693–699)*
  - Exposure to second-hand tobacco smoke

- **Can a deleterious neighborhood-effect early in life affect health outcomes through physiological adaptations to the environment?**
  - Similar to the "Barker hypothesis" of the developmental origins of adult diseases including heart disease and diabetes.
  - Mechanism of adaptation may include epigenetic modification of gene expression

Geography

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Some of the reasons for disparities in incidence: Geography?

- **Rural populations are more likely Unequal burden of pollution**
  - Forego medical care and prescriptions due to cost
  - Report fair/poor heath and health-related unemployment
  - Experience psychosocial distress

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Palmer NR et al, Cancer Epidemiol Biomarkers Prev, 2013.
Weaver KE et al., Cancer Causes Control, 2013.
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Tobacco use

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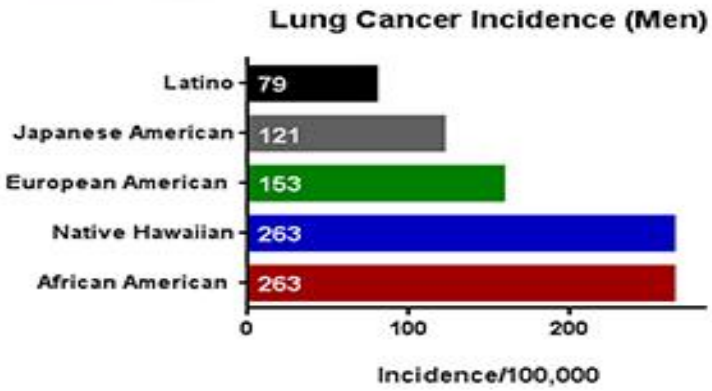
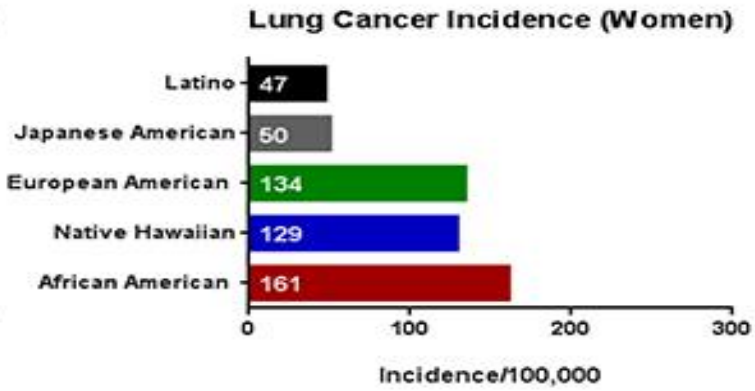
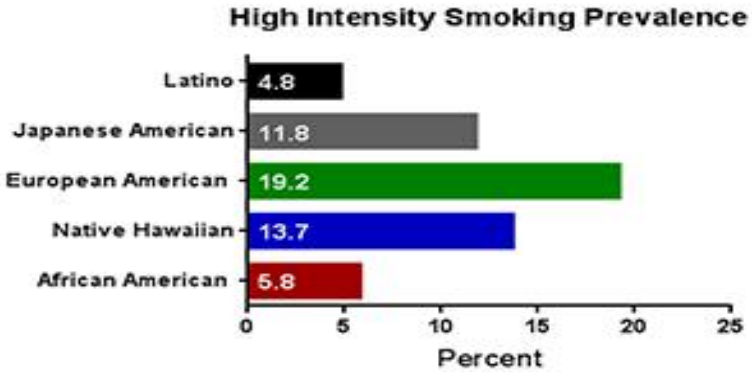
Some of the reasons for disparities in incidence: Tobacco use?







Lung cancer incidence is highest in African Americans despite having the second to lowest prevalence of high intensity smoking

Adapted from *N Engl J Med 2006; 354:333-342*

Tobacco use

Some of the reasons for disparities in incidence: Tobacco use?

- Initiate smoking later (average age at onset, 17.4 years for blacks versus 14.7 years for whites; $p < .05$)
- Smoke fewer cigarettes (14.1 versus 18.4 cigarettes per day)
- Prevalence as adults similar (Black men, 23.9%; black women, 19.2%; white men, 24.5%; white women, 19.8%)
- Disparities observed in never smokers
- Menthol cigarettes not associated with increased risk of lung cancer relative to non-menthol cigarettes

Tobacco use

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Some of the reasons for disparities in incidence: Tobacco use?

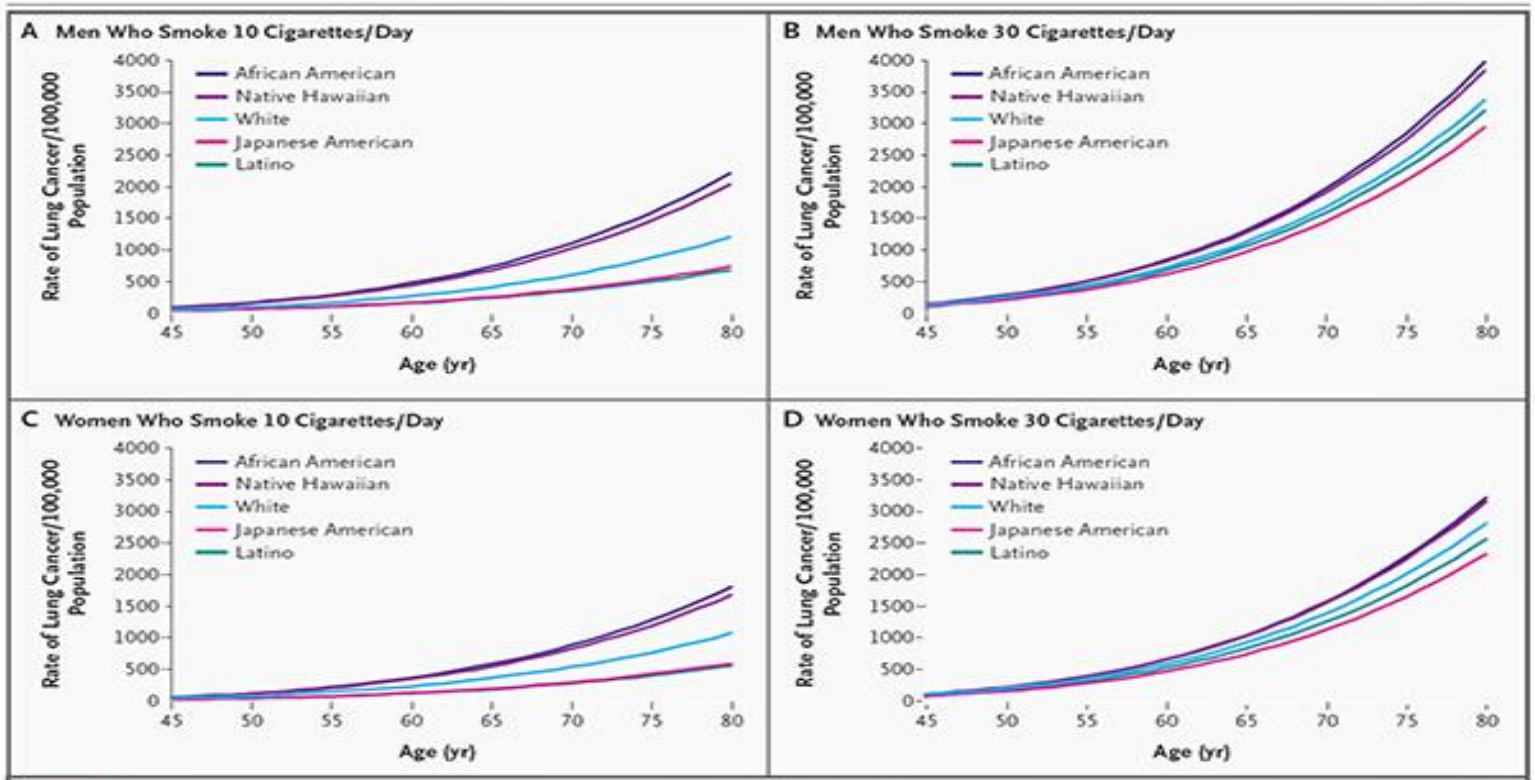

Figure 1. Predicted Rates of Lung Cancer among Men Who Currently Smoke 10 Cigarettes per Day (Panel A) or 30 Cigarettes per Day (Panel B) and among Women Who Currently Smoke 10 Cigarettes per Day (Panel C) or 30 Cigarettes per Day (Panel D).

Adapted from *N Engl J Med 2006; 354:333-342*

Some of the reasons for disparities in incidence

- Geography
- Genetic? Differential susceptibility?
- Tobacco use
- Nutrition & Physical Activity
- Viruses (Hepatitis B, HPV)

Extrinsic factors

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Some of the reasons for disparities in incidence: Extrinsic Factors

- Metformin is one of the most prescribed medications in the United States
- Recent study of VA records finds that metformin use is associated with reduced risk of prostate cancer in Hispanic men only
- Use of metformin and finasteride was associated with a greater prostate cancer incidence reduction in Hispanics and AA compared with NHW

Table 3. HR (95% CI) of prostate cancer incidence associated with metformin use by race/ethnicity: comparison between unadjustment and adjustment of generalizability weights that calibrate between race/ethnic groups

	NHW	AA	Hispanics
Metformin	0.91 (0.82–1.01)	1.10 (0.94–1.27)	0.63 (0.49–0.80)
		0.92[a] (0.82–1.04)	0.50[a,b] (0.47–0.52)
Metformin + Statin	0.58 (0.49–0.69)	0.70 (0.58–0.86)	0.40 (0.30–0.53)
		0.59[a] (0.48–0.72)	0.32[a,b] (0.28–0.35)
Metformin + Finasteride	0.48 (0.37–0.63)	0.61 (0.44–0.77)	0.58 (0.37–0.99)
		0.25[a,b] (0.16–0.39)	0.25[a,b] (0.20–0.30)

Abbreviations: AA, African American; NHW, non Hispanic white.
[a]Generalizability weights were used to calibrate posttreatment clinical characteristics between comparison groups.
[b]Significantly different from NHW based on 95% CI of HR.

Wang et al., Can Prev Res 2015 9(10); 779–87

Lack of early detection

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Some of the reasons for disparities in cancer mortality: Lack of early detection?

Lack of early detection

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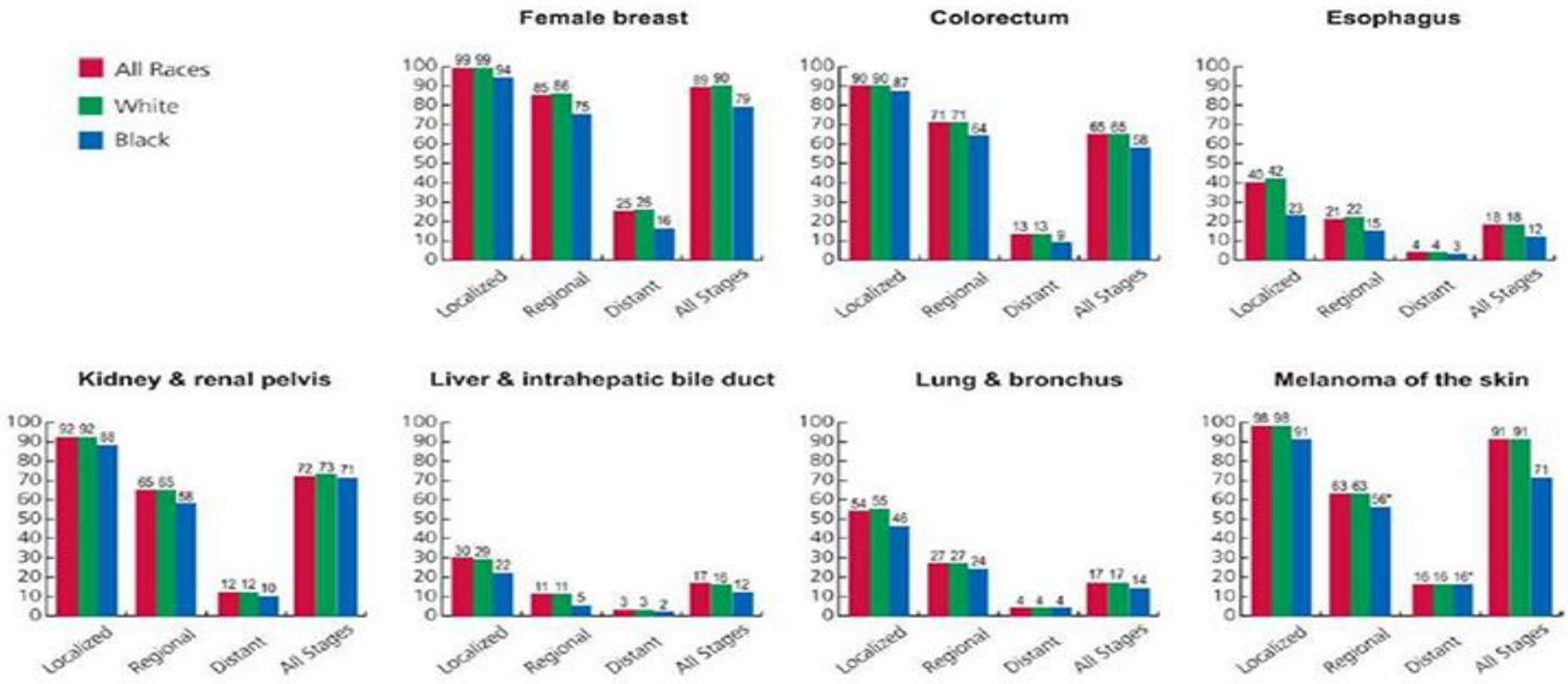

CA CANCER J CLIN 2015;65:5–29

Access to screening

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Some of the reasons for disparities in cancer mortality: Access to screening?

Access to screening

Some of the reasons for disparities in cancer mortality: Access to screening?

- Possibly for some cancers
- Breast cancer mammography use similar in equal access to care setting (Cancer 2013 Oct 1;119(19):3531-8)
- Colorectal cancer screening is lower among African Americans even in an equal access to care setting (Cancer. 2013; 4(3): 270–280)
- Uptake of screening for other cancers, such as HPV, may also be lower in minority populations
- But the differences exist even in cancers where there is no validated screening modality (lung, esophagus, etc)

Access to care

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Some of the reasons for disparities in cancer mortality: Access to care?

Access to care

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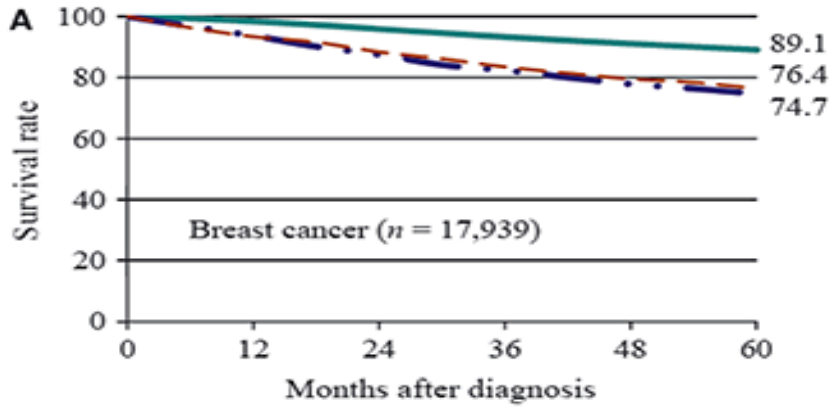

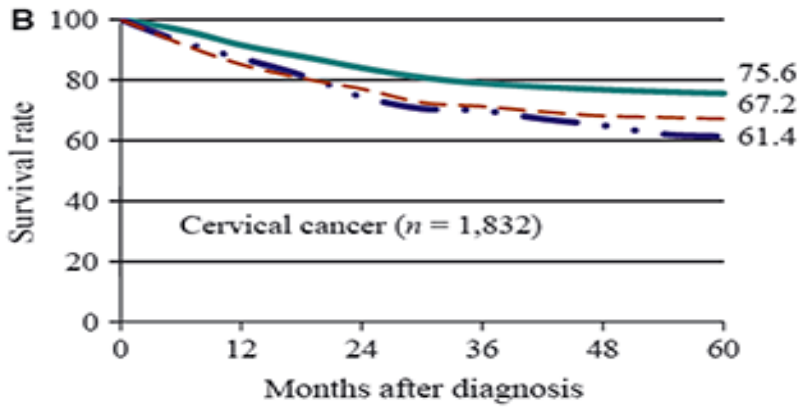

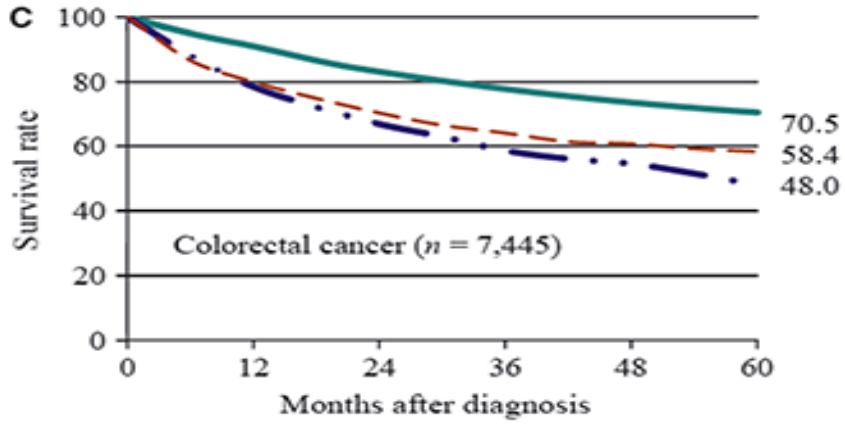

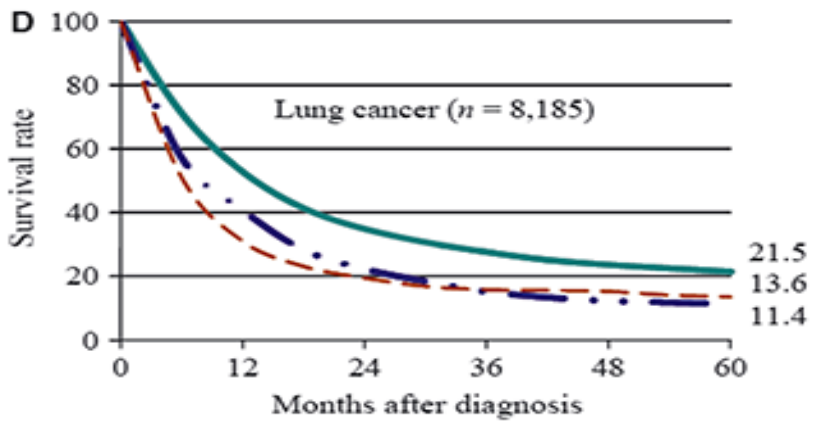

Cancer Medicine 2013; 2(3): 403–411

Access to care

Some of the reasons for disparities in cancer mortality: Access to care?

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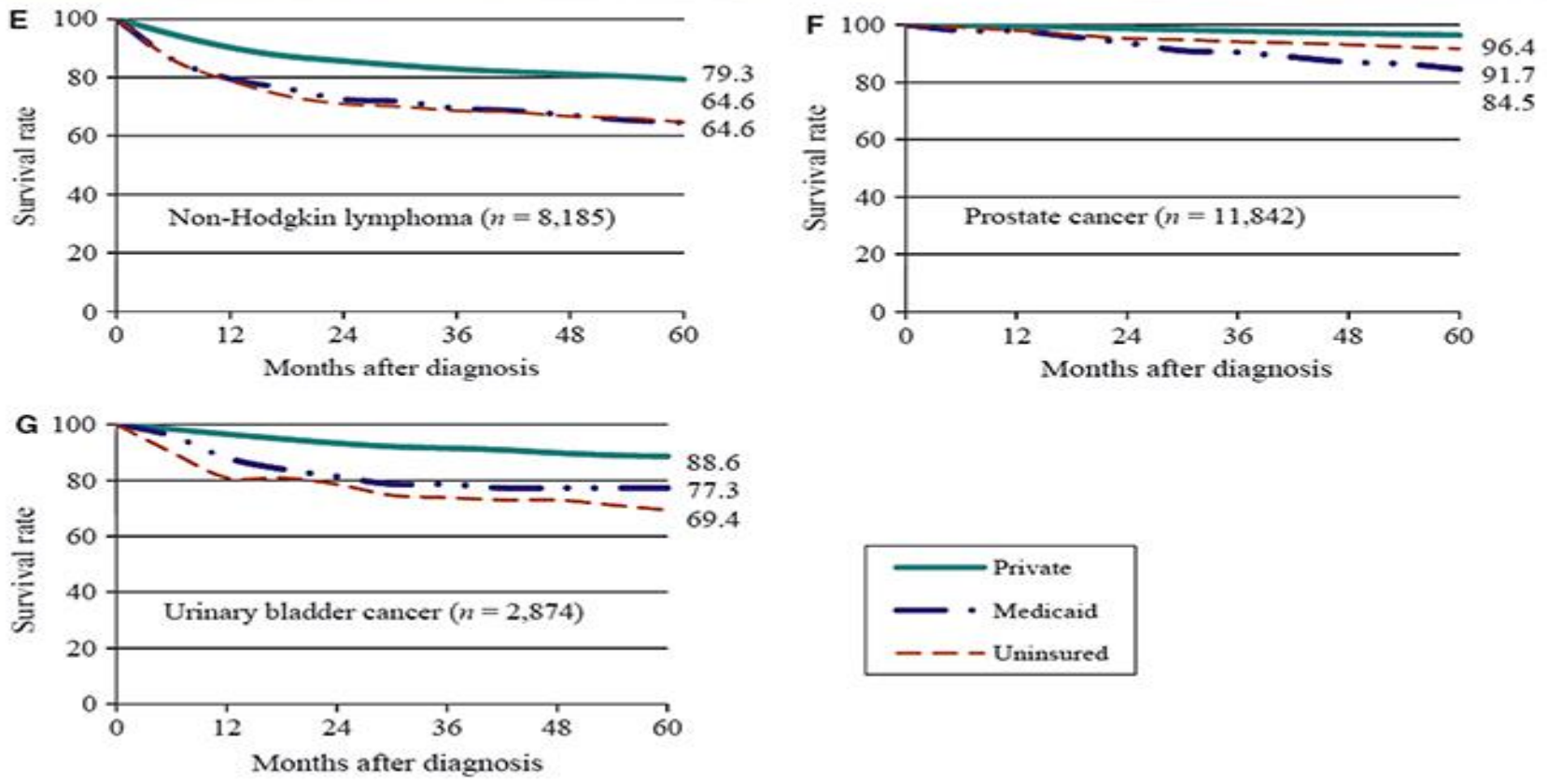

Cancer Medicine 2013; 2(3): 403–411

Lung cancer access to care

Some of the reasons for disparities in cancer mortality: Access to care?

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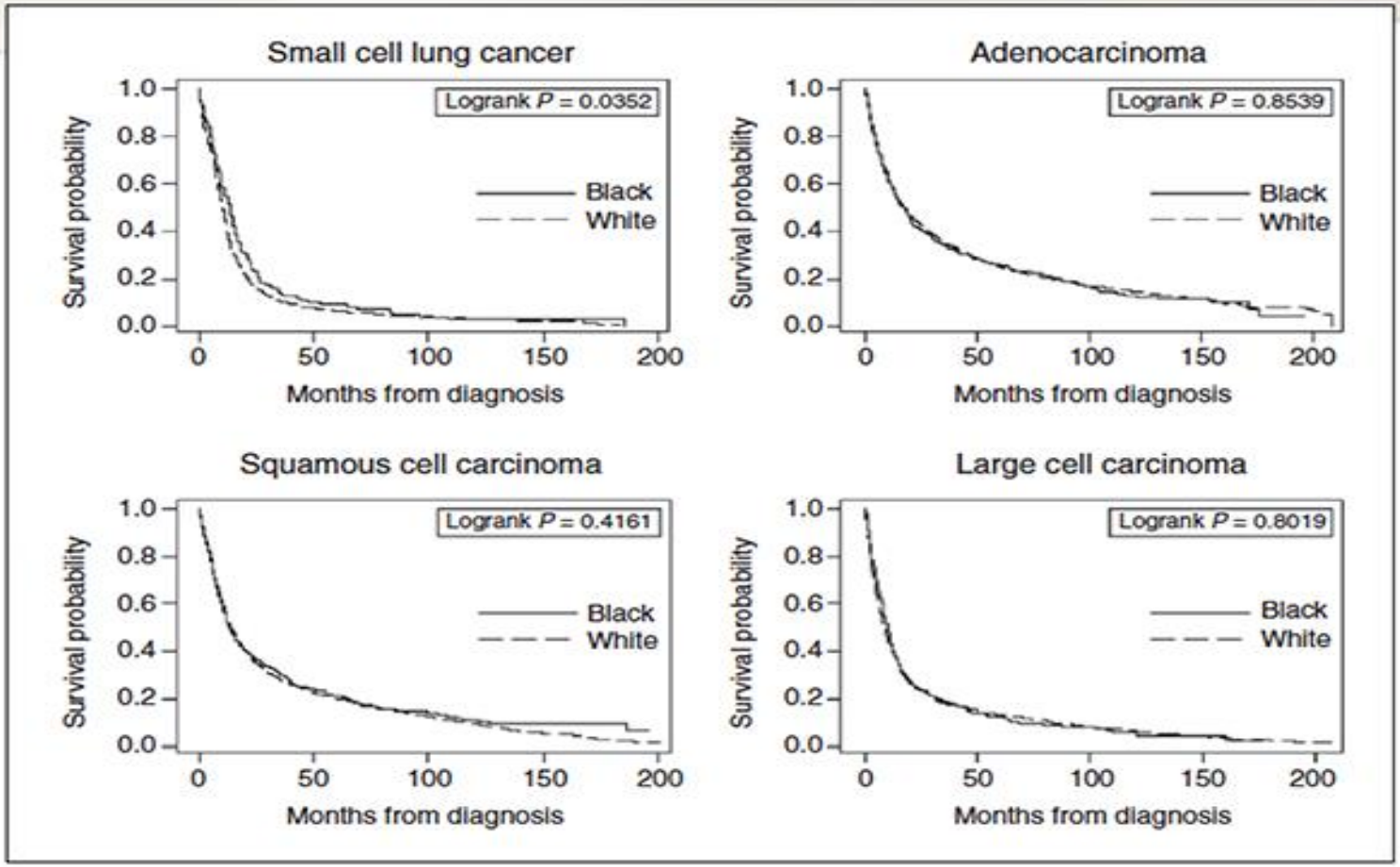


Cancer Epidemiol Biomarkers Prev; 21(10) 2012

Renal cell carcinoma access to care

Some of the reasons for disparities in cancer mortality: Access to care?

US Department of Defense Cancer Registry Military Health System (MHS)

"The lack of racial difference in survival among RCC patients in the MHS may be related to equal access to health care. Improved access could reduce the survival disparity among RCC patients in the general population".

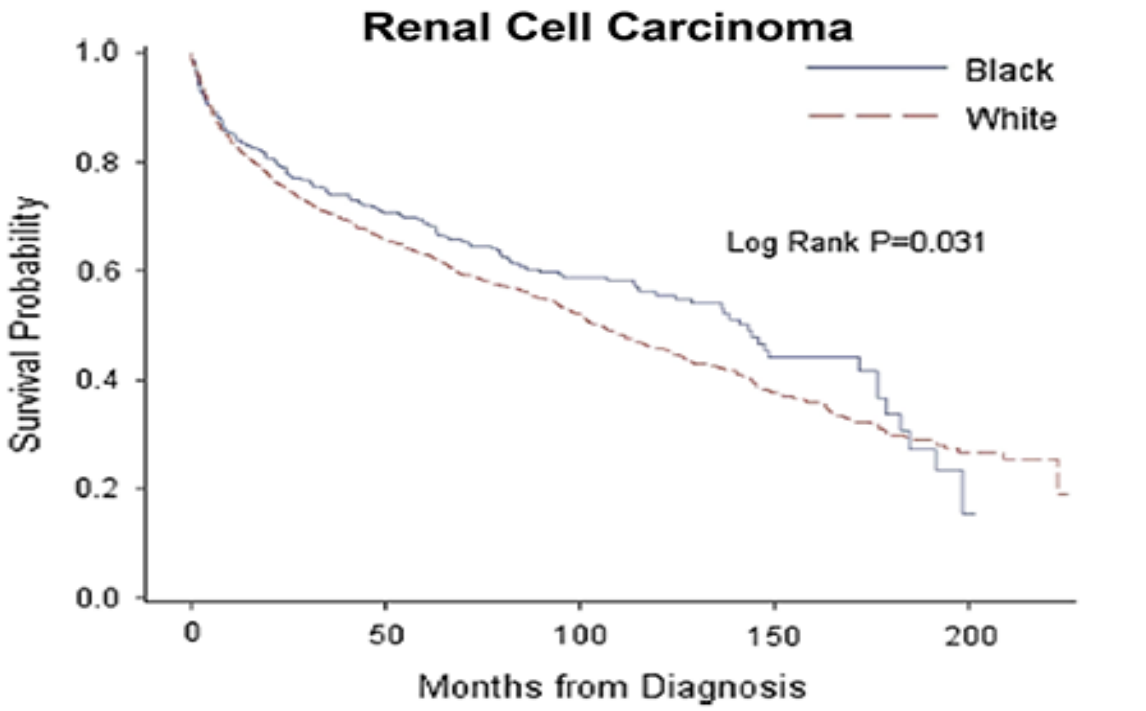


Fig. 1 Kaplan–Meier survival curves comparing Black and White clear cell RCC patients diagnosed from 1988 to 2004 in the US Department of Defense Cancer Registry

Cancer Causes Control 2015 26(7):1019-26

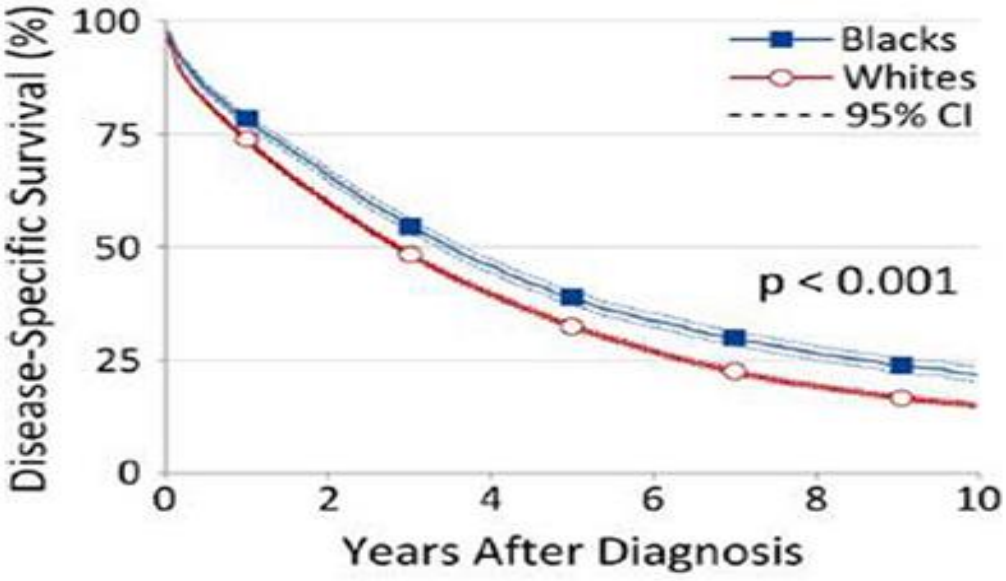
Myeloma access to care

Some of the reasons for disparities in cancer mortality: Access to care?

Multiple myeloma

Increased incidence among African Americans but adverse disparities in outcome not observed

African Americans may have a more indolent form of MM



AA patients with myeloma have better survival than EA patients

Waxman et al. *Blood 2010*

Uptake of care

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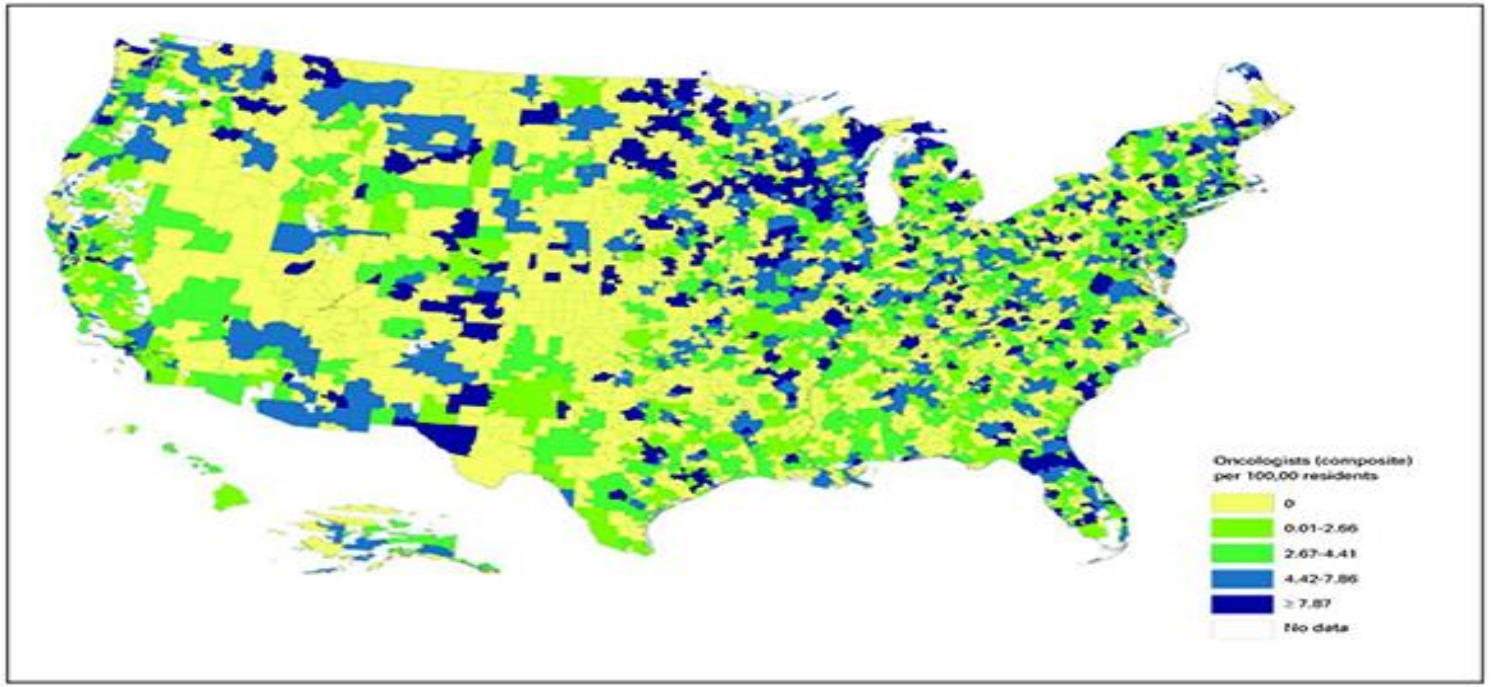
Some of the reasons for disparities in cancer mortality: Access and uptake of care?

Oncologist density

Oncologists per 100,000 residents by hospital service area

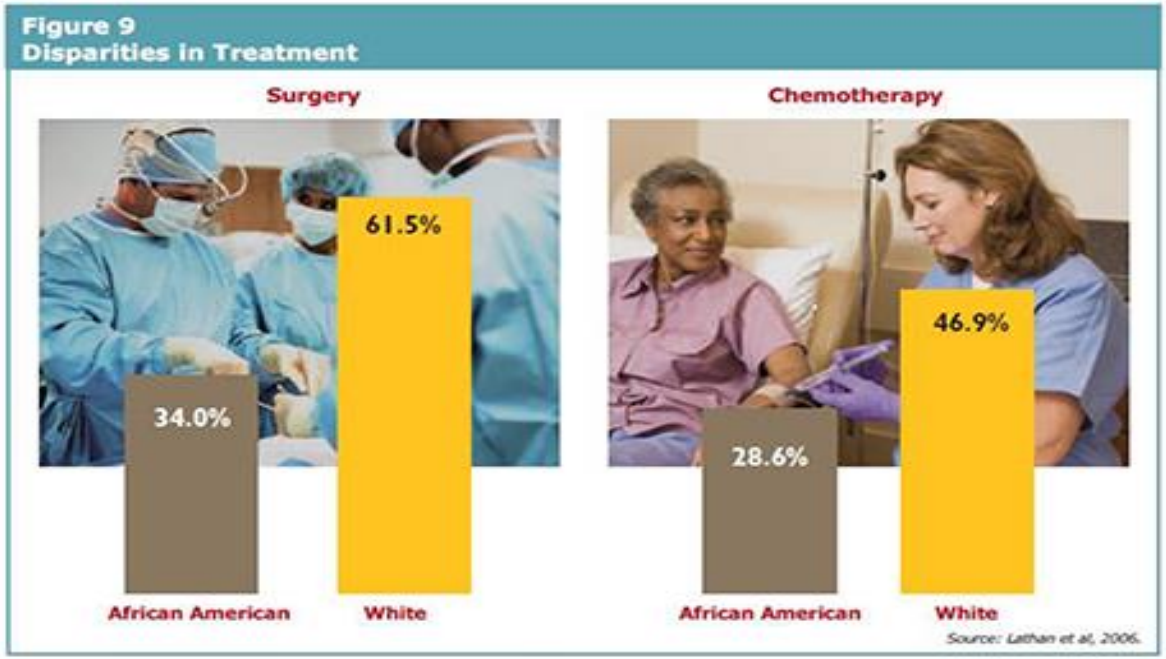


Chun Chieh Lin et al. JCO doi:10.1200/JCO.2015.61.1558

Access and uptake of care

Some of the reasons for disparities in cancer mortality: Access and uptake of care?

- Even among those with medicare, AA are less likely to receive treatment for lung cancer (Cancer 2008 112 900-908)
- African American renal cancer patients are less likely to receive surgical treatment (nephrectomy) and die more often from competing causes than European American patients (*J Clin Oncol 2007, 25: 3589 – 3595*)



Access and uptake of care

Some of the reasons for disparities in cancer mortality: Access and uptake of care?

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TABLE 4. Multivariate regression analyses assessing race and the odds of treatment among all of the study subjects and by tumor stage, age, and sex

Parameter	*OR*[a]	*95% CI*[a]
Surgery, all subjects	0.75	0.37–1.53
Chemotherapy, all subjects	0.79	0.59–1.04
Tumor stage		
I	2.52	0.64–9.98
II	0.98	0.61–1.60
III	0.55	0.30–1.00
IV	0.80	0.40–1.58
Age at diagnosis, y		
<50	1.10	0.47–2.59
50–64	0.74	0.48–1.15
≥65	0.93	0.60–1.44
Sex		
Men	0.80	0.56–1.14
Women	0.74	0.45–1.22

N = 2560.

[a]ORs and 95% CIs of race (non-Hispanic black versus non-Hispanic white) and treatment after adjusting for race, year of diagnosis, age at diagnosis (continuous), sex, marital status at diagnosis, active duty status at diagnosis, service branch of active duty member/sponsor, colon cancer site, tumor stage, tumor grade, surgery, chemotherapy, recurrence, and comorbidities. Respective treatments and stratified variables were not included in stratified analysis.

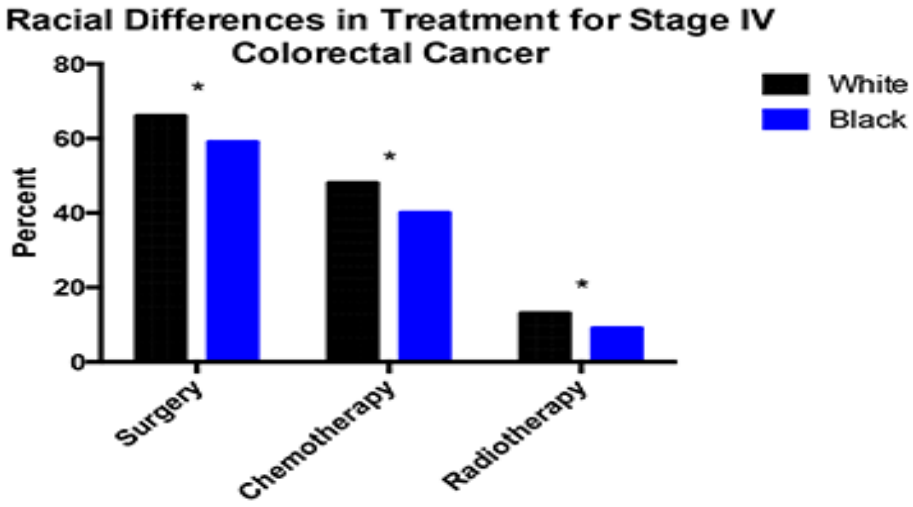
In a setting of equal access to care, African Americans with colon cancer are as less likely to receive surgery and chemotherapy as European Americans

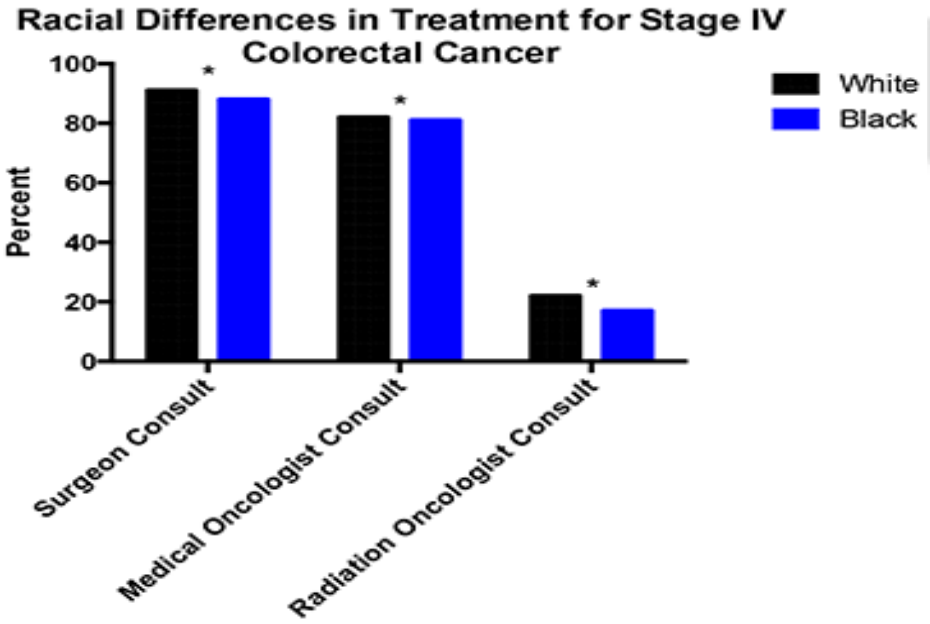
Diseases of the Colon & Rectum Volume 57: 9 (2014)

Access and uptake of care

Some of the reasons for disparities in cancer mortality: Access and uptake of care?

In a "regular" medical setting, studies show that racial disparity in specialist consultation as well as subsequent treatment with multimodality therapy for metastatic colorectal cancer exists.





Adapted from JNCI 2013 105(23):1814-20

Some of the reasons for disparities in cancer mortality: Access and uptake of care?

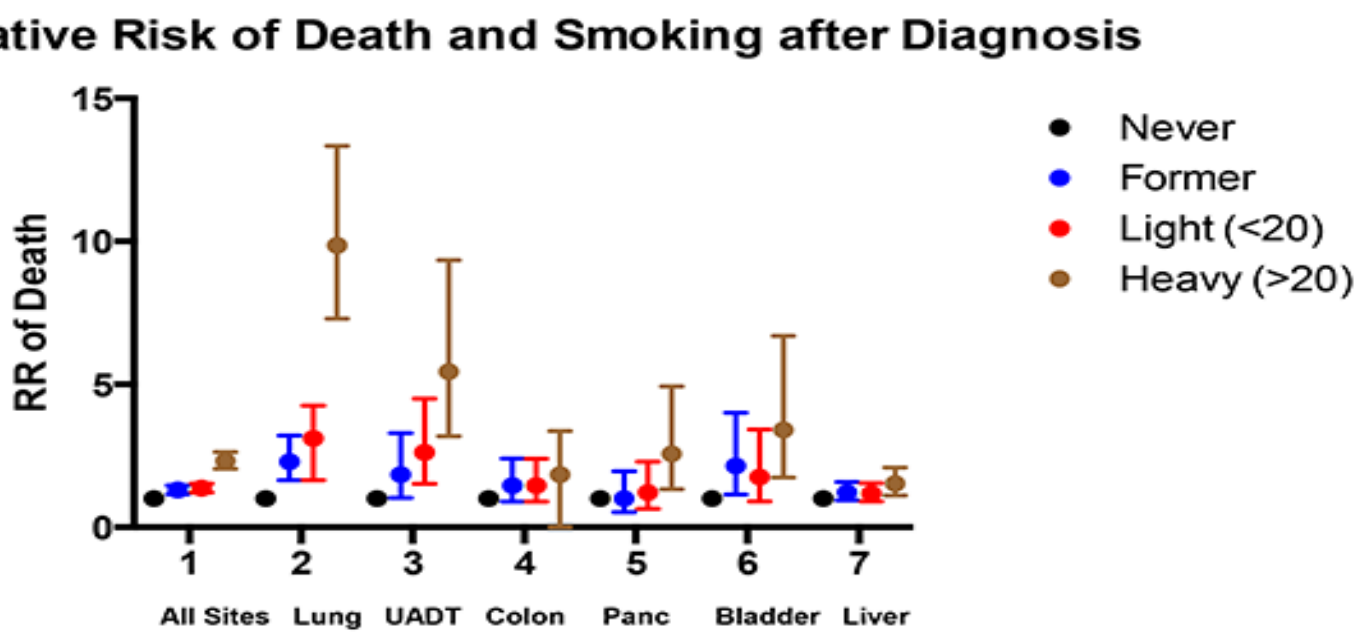
Potential factors that influence access and uptake of care:

- Personal beliefs
- Fear
- Culture
- Patient-doctor relationship
- Patient bias
- Provider bias
- Patient-doctor communication
- Co-morbid conditions

Smoking cessation

Some of the reasons for disparities in cancer mortality: Smoking cessation?

- African Americans are at risk for continued smoking and thus poor cessation outcomes
- Lung, pancreatic, bladder, and liver cancer patients at risk of poorer outcomes



CEBP, 2015 24(10)

Smoking cessation

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Some of the reasons for disparities in cancer mortality: Smoking cessation?

Racial differences in continued smoking may be attributable to several factors:

- Socioeconomic vulnerabilities (including poverty, stress, and secondhand smoke exposure)
- Although the majority of black smokers express a desire to quit, they are less likely to receive and use evidence-based treatments (e.g., screening for tobacco use and advice to quit, smoking cessation pharmacotherapy, and counseling).
- In addition, black smokers are less likely to enroll in smoking cessation trials.
- Blacks are more likely to smoke mentholated cigarettes, which might be harder to quit than nonmentholated cigarettes, which leads to poorer cessation outcomes
- Less accurate knowledge about the risks and prevalence of smoking and about the benefits and risks of effective smoking cessation treatments.

Cancer mortality

Some of the reasons for disparities in cancer mortality:

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Factors that contribute to racial differences in outcomes:

- Access to screening
  - Less engagement might lead to a later stage of diagnosis
- Access to care
  - Reduced access reduces availability of potentially life saving therapeutic interventions
- Uptake of care
  - Reduced uptake of therapeutic options reduces availability of potentially life saving therapeutic interventions
- Smoking
  - Continued smoking is associated with adverse outcomes

But….. There are some cancers where, even in an equal access to care setting, disparities in survival persist

Disparities persist

For some cancers, disparities persist even in equal access to care settings

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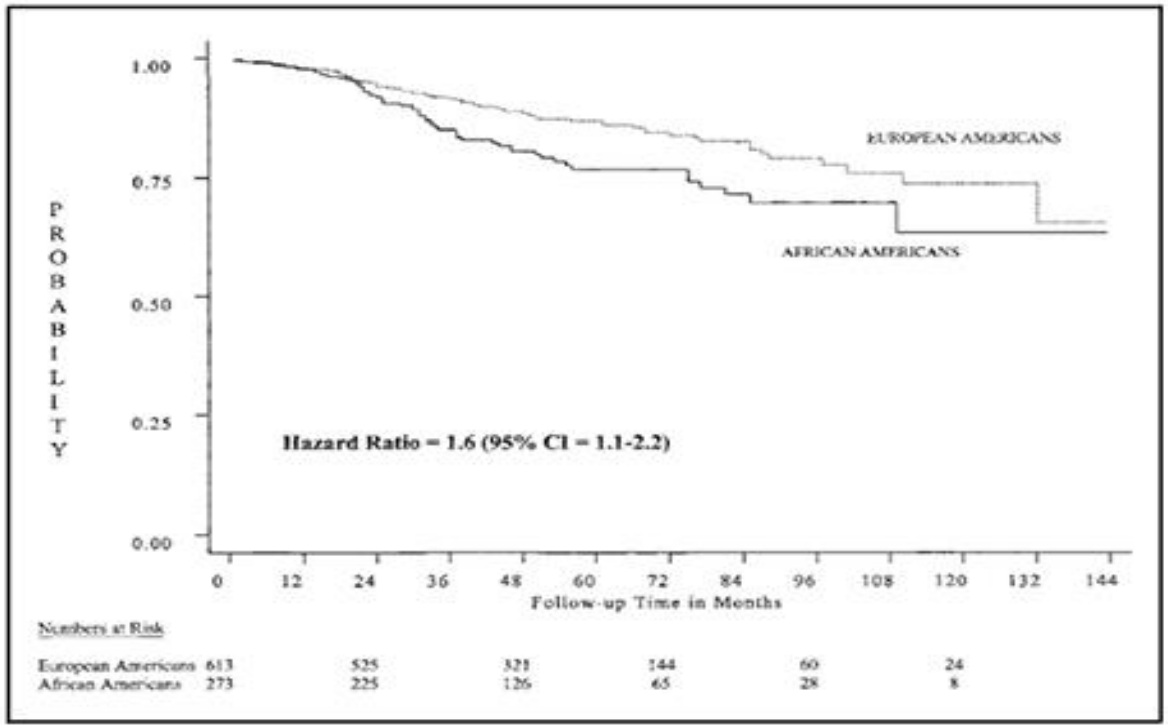

Cancer 1998, 82: 1310 - 1318;
Cancer 2003, 98: 894 – 899
JNCI 91:17, 1999
JNCI Monographs, No. 35, 2005

Biology

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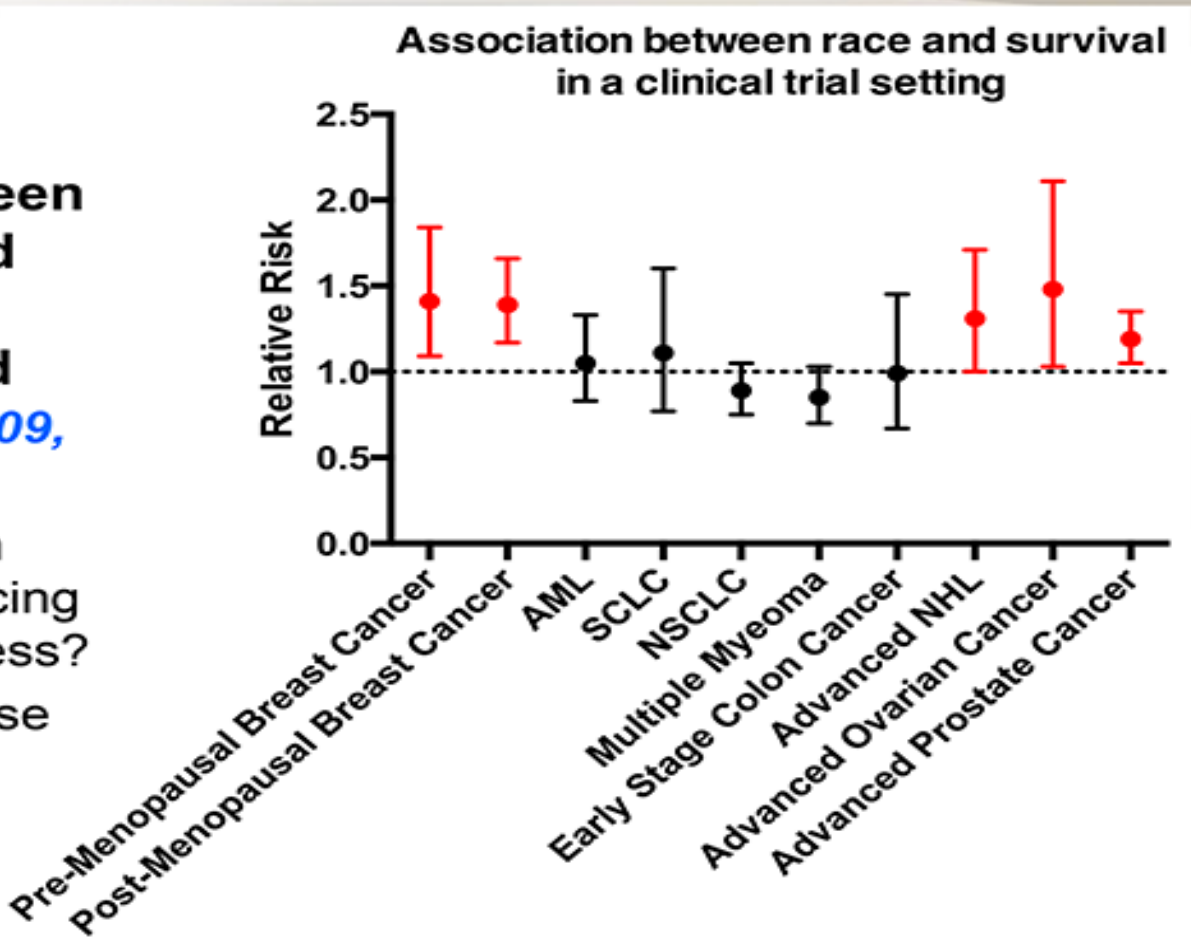
Is biology a contributing factor?

- **Racial disparities in prostate and breast cancer survival between African-American and European-American persist in randomized clinical trials** (*JNCI 2009, 101: 984 – 92*)
  - Intrinsic differences in tumor biology influencing disease aggressiveness?
  - Differences in response to therapy?



Biology

CENTER FOR CANCER RESEARCH

Is Biology a Contributing Factor?

While data suggest that access to quality care is a factor in cancer disparities, other factors also play a major role, including tumor biology and genetics

Intrinsic differences in tumor biology influencing disease aggressiveness?

Differences in response to therapy?

Biology

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Is biology a contributing factor?

- **Differences in**
  - Genetics
  - Somatic mutations
  - Molecular subtype and gene expression
  - Gene expression and methylations profiles
  - Systems biology
  - Inflammation
  - Cell biology

Differences in gene expression, molecular subtypes and molecular signatures will reveal differences in tumor biology between African American and European American patients

Genetics

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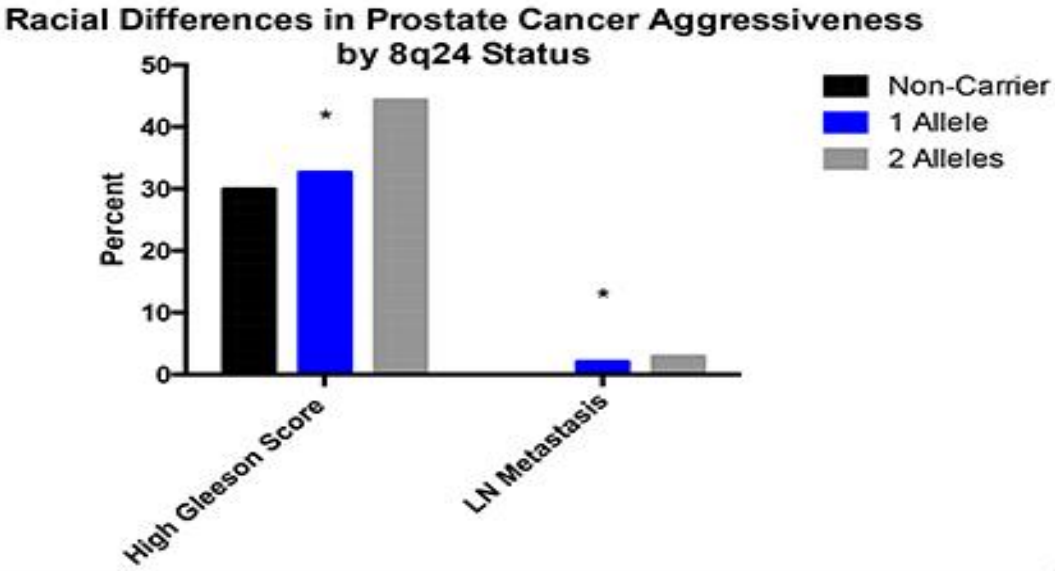
Biological determinants of cancer health disparities in outcome: Genetics

- **8q24 is associated with higher grade, more aggressive prostate cancers**
  - Risk alleles are more common among AA men, *(Powell et al., J Urology 2010, 183: 1792 – 7)*
- **Faster disease progression in AA men (vs. EA men)**
  (Powell et al., J Urology 2010, 183: 1792 – 7)



Biological determinants of cancer health disparities in outcome: Genetics

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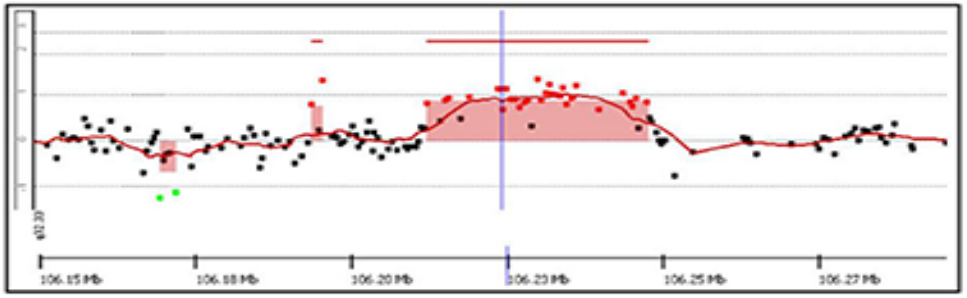
- Duplication event at 14q32.33 encompasses *IGHG3* in African American prostate tumors (familial, suggesting inherited predisposition)
- Contribute to the high prevalence and mortality of prostate cancer in African American men?



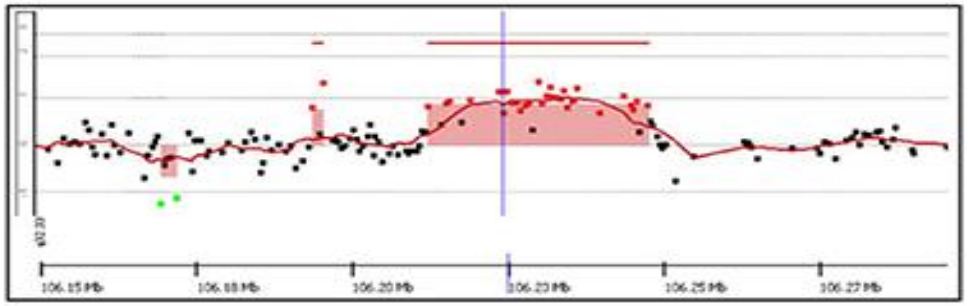
Prostate 2013 73(6):614-23

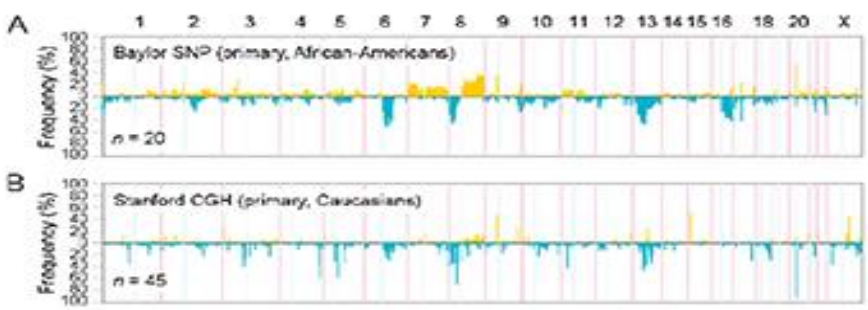
Genetics

CENTER FOR CANCER RESEARCH

Biological determinants of cancer health disparities in outcome: Genetics

- Duplication event at 14q32.33 encompasses *IGHG3* in African American prostate tumors (familial, suggesting inherited predisposition)
- Contribute to the high prevalence and mortality of prostate cancer in African American men?
- Differences exist in the regions amplified and lost in European American and African American prostate cancers





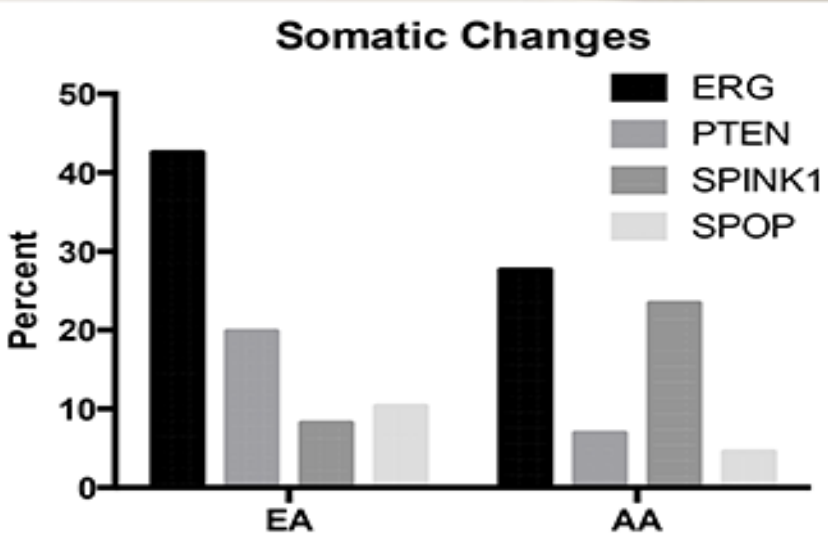
Prostate 2013 73(6):614-23

Neoplasia 2009 11(3):305-12.

Somatic mutations

Biological determinants of cancer health disparities in outcome: Somatic mutations

- **Global heterogeneity in acquired mutational events in prostate tumors: Evidence of a different disease etiology?** (*Cancer Res 2010, 70: 5207 – 12; Prostate 2011, 71: 489 – 97; Urology 2012, 80: 749 – 53; Clinical Cancer Res 2014, 20: 4925 – 34*)



- High frequency of oncogenic TMPRSS2:ERG gene fusion events in European/European-American patients (about 50%), intermediate frequency in African-American patients (24%-31%), but rather uncommon in Asian patients (2%-16% among Chinese, Japanese patients)

- Common PTEN loss in European/European-American patients (30%-50%) but uncommon in Asian and African-American patients (5%-15%)

Int J Mol Sci. 2013 Jul 25;14(8):15510-31

Molecular subtype

Biological determinants of cancer health disparities in outcome: Molecular subtype

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- Population differences in molecular subtypes and disease grade
- Race/ethnic disparity in prevalence of basal-like/triple-negative breast tumors *(JAMA 2006, 295: 2492 – 2502;* J Clin Oncol 2009, 27: 4514 – 21)

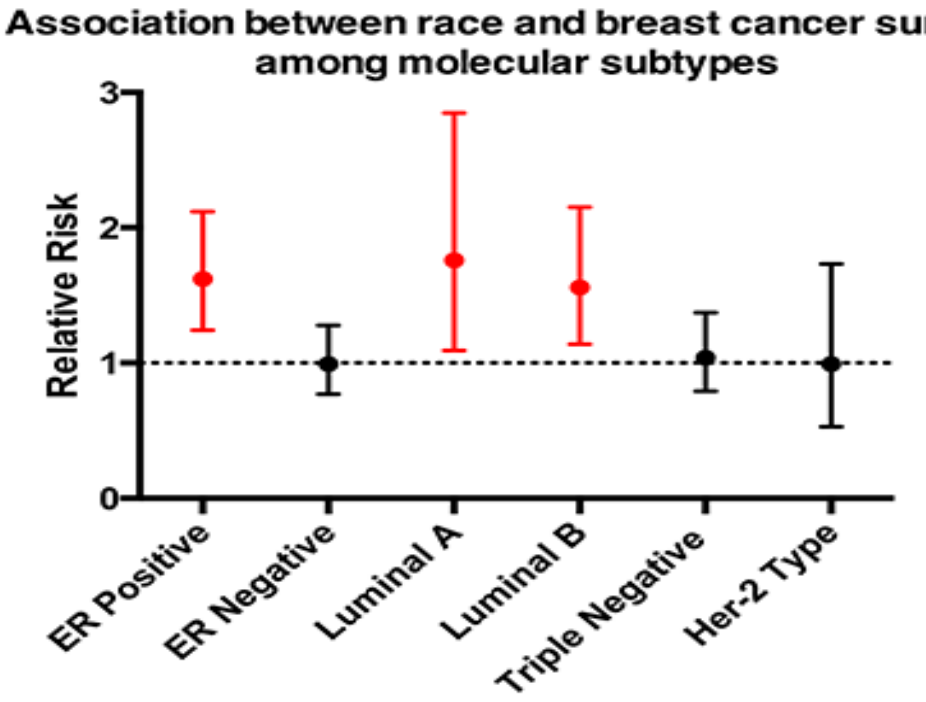
Table 2. Prevalence of Breast Cancer Subtypes According to Race and Menopausal Status

		No. (%)			
		African American*		Non–African American†	
Tumor Status	All Cases	Premenopausal (n = 97)	Postmenopausal (n = 99)	Premenopausal (n = 164)	Postmenopausal (n = 136)
Basal-like	100	38 (39)	14 (14)	26 (16)	22 (16)
HER2+/ER–	33	9 (9)	7 (7)	9 (6)	8 (6)
Luminal A	255	35 (36)	58 (59)	83 (51)	79 (58)
Luminal B	77	9 (9)	16 (16)	30 (18)	22 (16)
Unclassified	31	6 (6)	4 (4)	16 (10)	5 (4)

*$P<.001$, χ^2 test for basal-like vs other tumor types in premenopausal vs postmenopausal African American women.
†$P = .94$, χ^2 test for basal-like vs other tumor types in premenopausal vs postmenopausal non–African American women.

Molecular subtype

Biological determinants of cancer health disparities in outcome: Molecular subtype



However: Breast cancer survival disparity in US is irrespective of some tumor subtypes (JNCI 2009, 101: 993-1000)

Cell Biology

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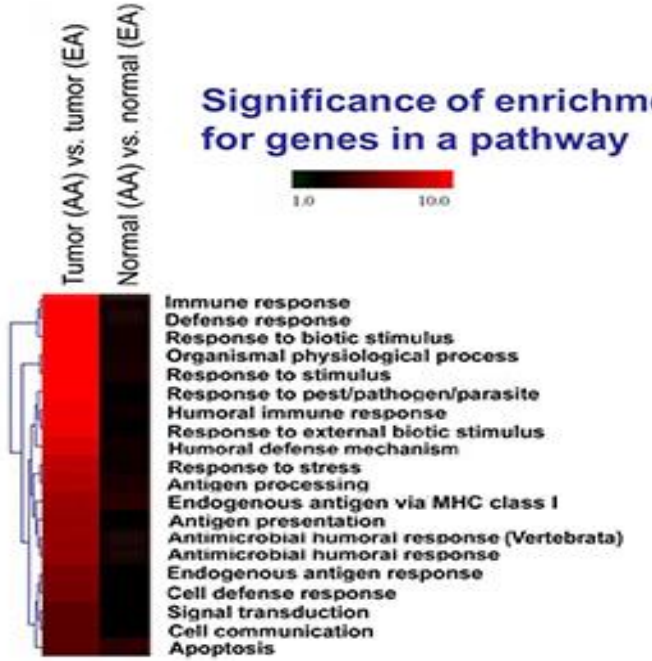
Biological determinants of cancer health disparities in outcome: Cell biology

- **162 genes differently expressed by race/ethnicity (FDR ≤ 5%)**
  - Several metastasis-related genes, e.g., CXCR4, MMP9, AMFR
- **Differently expressed genes were not shared with the published list(s) of marker genes for prostate tumors**



Wallace…. Ambs, Cancer Res 2008, 68: 927– 36

Cell Biology

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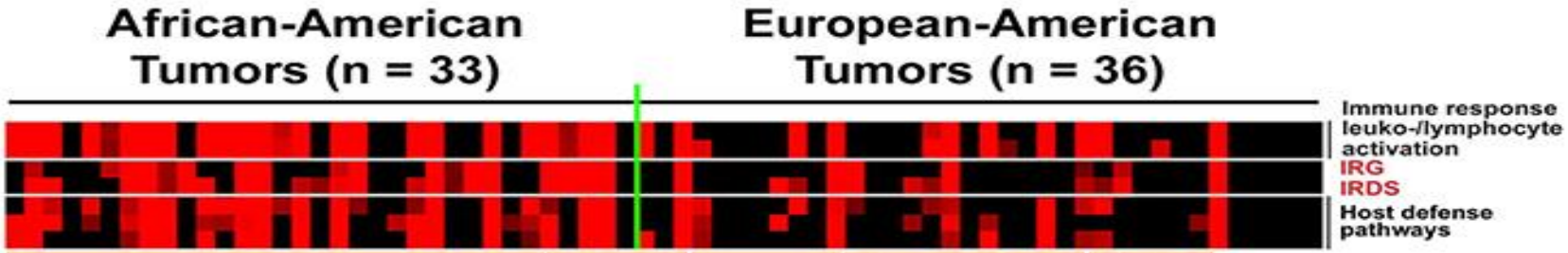
Biological determinants of cancer health disparities in outcome: Cell biology

- Interferon signature predicts survival and poor outcomes (*PNAS 2008, 105: 18490 – 95; Genome Biol 2007, 8: R191*)

- IRDS is a predictive marker for resistance to chemotherapy and radiation and poor survival. Key signature genes mediate experimental resistance to therapy (*PNAS 2008, 105: 18490 – 95*)



Interferon Signature(s)	AA	EA	Permutated *P* value*	FDR (%)*
Epithelial-mesenchymal interaction signature (IRG)	18/33 (55%)	7/36 (19%)	1.5×10^{-4}	4.1
Interferon-related DNA damage resistance signature (IRDS)	22/33 (67%)	12/36 (33%)	1.6×10^{-4}	3.7

Interferon signatures
- *Buess et al., Genome Biol 2007, 8: R191 (IRG)*
- *Weichselbaum et al., PNAS 2008, 105: 18490-5 (IRDS)*

Ambs, unpublished observations

Inflammation

Biological determinants of cancer health disparities in outcome: Inflammation

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- Increase in some autoimmune/infectious diseases: Lupus and TB (AJPH 2001 91:8 1251-53)
- Increased IL-6 (Am J Hum Genet 2007;80(4):716-26)
- Different allele frequencies (Cytokine 2009;46(2):236-44)
- Cytokine profiles between serum from AA and EA patients are different, some of which are associated with poor outcomes *(Pine…. Ryan….. Harris, CEBP 2015)*
- Inflammation in non-cancerous prostate biopsies is more prevalent among African American than European American men (JNCI 1998, 90: 756 – 60)
- African Americans more likely to have some co-morbidities, such as COPD

Environmental determinants

Are there environmental determinants of different biological signatures?

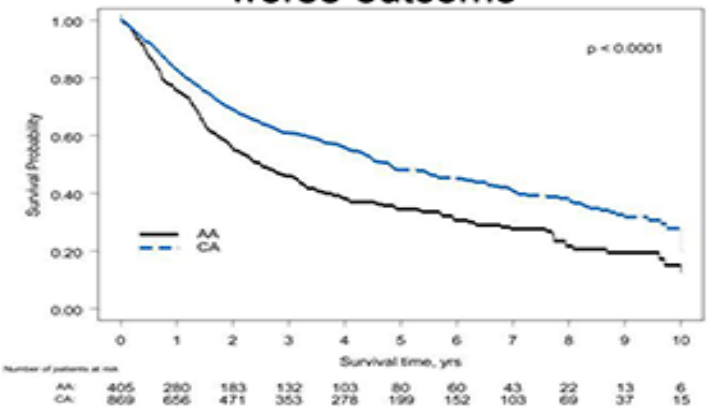
- Viral infections
- Germline differences e.g. SNPs by ancestry
- Stress, different inherent responses to stress
- Reactivation of endogenous retroviruses e.g. HERV-K
- Acquired genetic alterations in tumor
- Toxins
- Air pollution
- Carcinogens

- Don't know yet if and how each of these exposures contribute to biological determinants of cancer health disparities

Environmental determinants

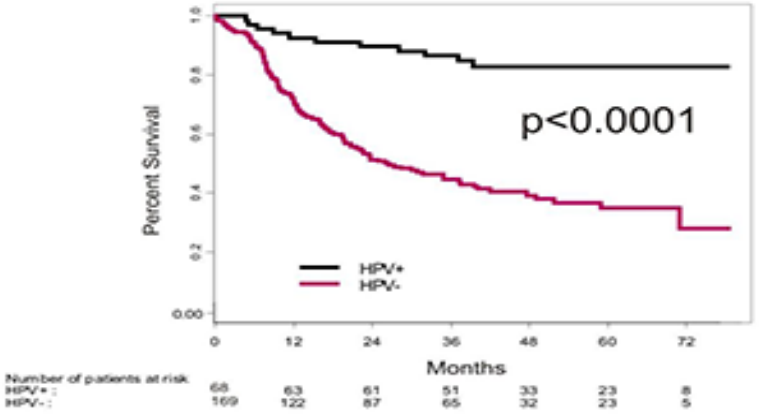
Are there environmental determinants of different biological signatures?

AA with head and neck cancer have worse outcome



Zandberg, *Head Neck* 38: 564, 2016

HPV positive tumors have better outcome



Posner, *Annals Oncology* 22: 1071, 2011

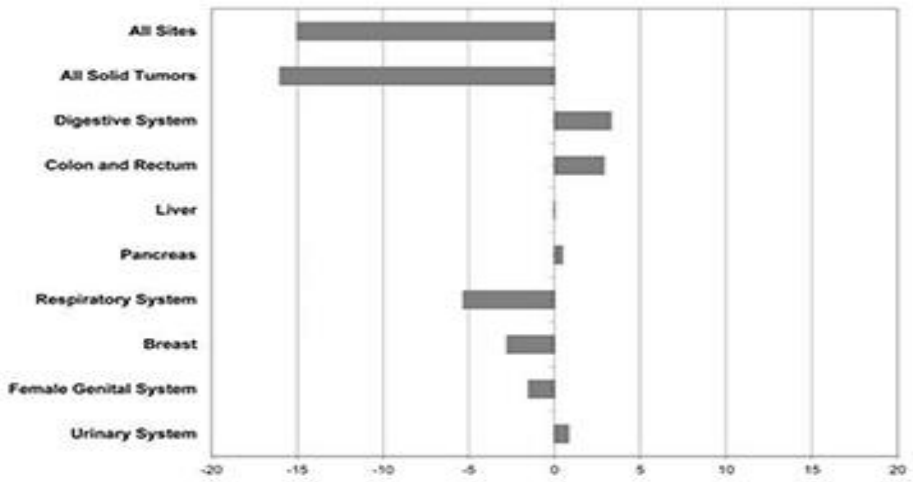
Prevalence of HPV is higher in EA patients, Cullen et al discovered this as one of the key factors leading to improved outcomes in EA patients

Second cancers

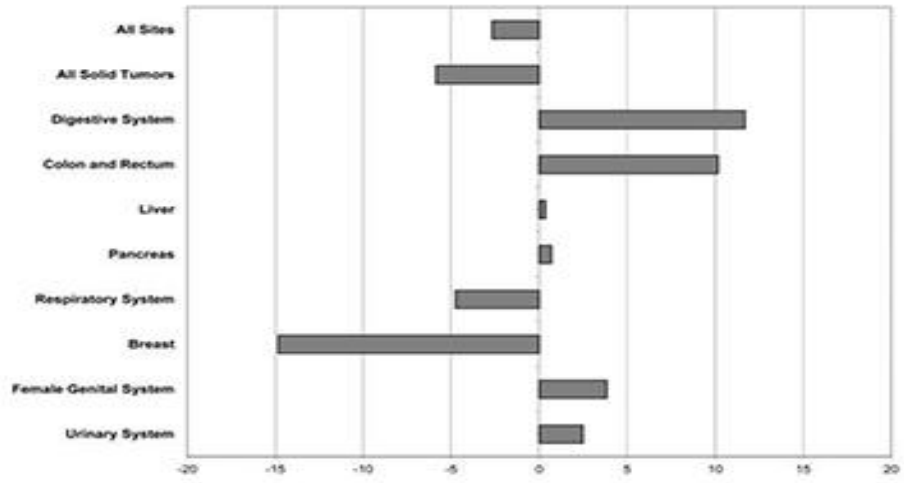
Cancer Health Disparities: Additional perspectives-second cancers

African Americans also have a higher risk of second cancers

European American



African American



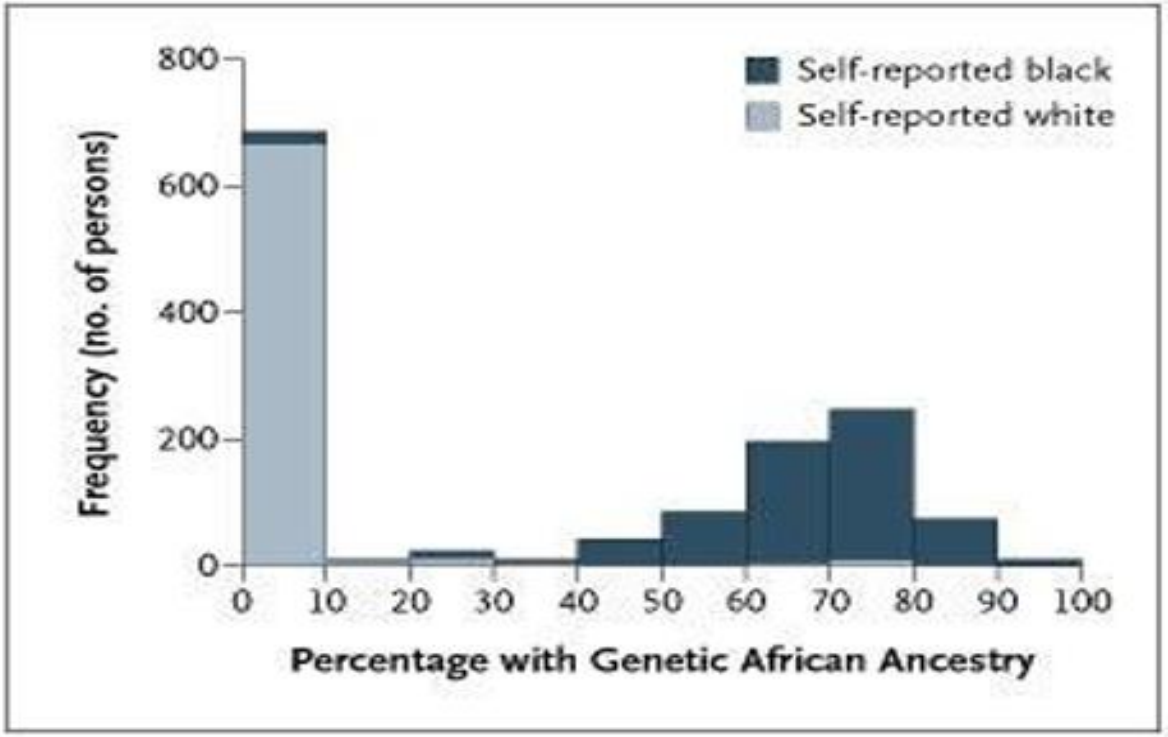
Int J Gynecol Cancer. 2011 21(2): 309–315

Ancestry markers

Cancer Health Disparities: Additional Perspectives-Ancestry Informative Markers

African and European ancestry in self-identified African Americans can vary widely

Frequency Histogram Showing the Percentage of African Ancestry in a Population Living in Cleveland.



Sinha M et al. N Engl J Med 2006;354:421-422.

Ancestry markers

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Cancer Health Disparities: Additional Perspectives-Ancestry Informative Markers

The percentage of European contribution to several African American communities varies 10-fold

Figure 1 Map showing estimates of the percentage of European contribution to several African American communities throughout the US. The percentage of European contribution to several African American samples within the continental US varies tenfold, from 3.5% in the isolated Gullah-speaking Sea Islanders from South Carolina to 35% in Seattle. Reproduced from Parra [15].

Human Genomics (2015) 9:1

Perespective screening

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Cancer Health Disparities: Additional Perspectives-Screening

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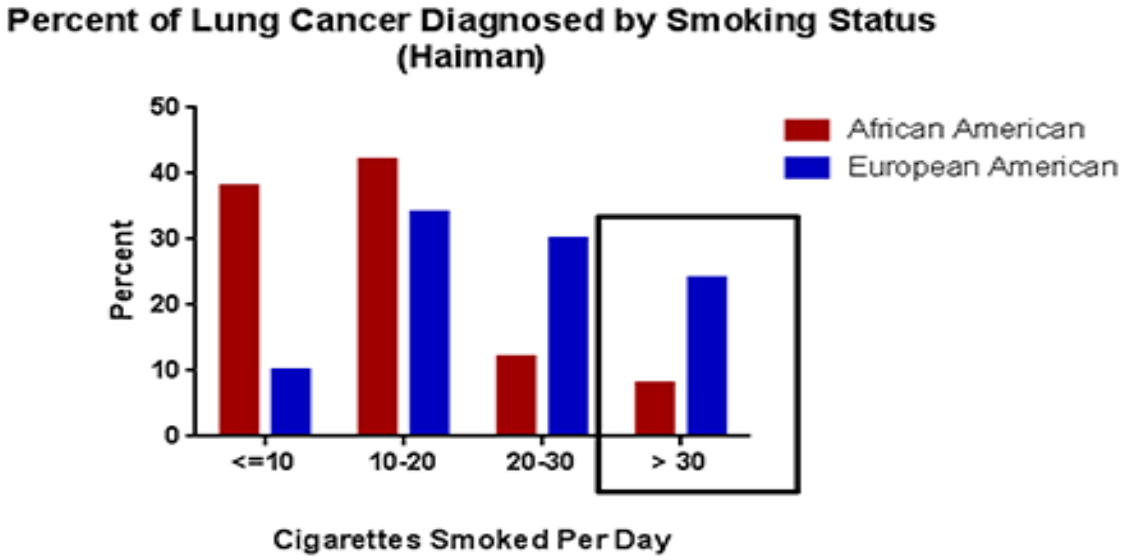
- Increased proportion of Native American ancestry is associated with increased risk of childhood acute lympoblastic leukemic
- Screening implications
- Also related to treatment—Children with more than 10% Native American ancestry need an additional round of chemotherapy to respond to the treatment (Yang et al., Nature Genetics 2011 43(3); 237-241)
- Ancestry informative markers provide a greater granularity to studying race

Perspectives screening

Cancer Health Disparities: Additional Perspectives-Screening



Evidence to support the idea that AA are more susceptible to lung cancer at low doses of cigarettes

Implications for lung cancer screening and potential to widen disparities

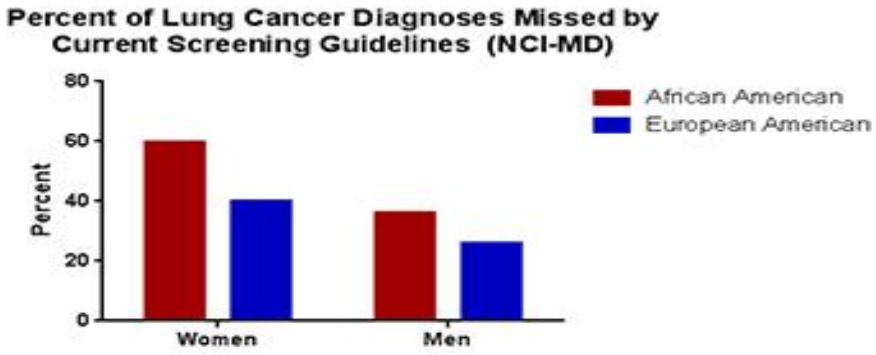
Lung cancer screening guidelines:

Age

Smoking history

Perspectives screening

Cancer Health Disparities: Additional Perspectives-Screening



Unintended consequence:
Widening of disparities

New Treatments

Some of the reasons for disparities in mortality: Access to care and new treatments?

- We are aware of biological differences between tumors from different ethnic groups
- Key question: will these differences translate to different responses to targeted therapy?
- Key issue: to avoid increasing disparities we need to ensure equal access to new targeted drugs

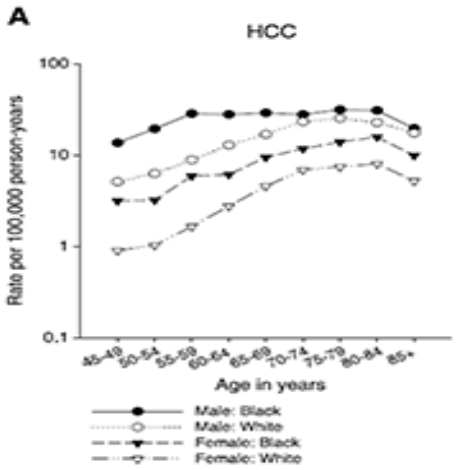


Figure 2. Age-specific incidence rates of (A) HCC and (B) ICC by ethnicity and gender (SEER, 1996-2000).

Remain vigilant re the use of new drugs in the clinic?

Can we expect similar responses across ethnic groups?

CEBP 2006 15(6):1198-203
J Natl Cancer Inst. 2014 18;106(12)

Some of the reasons for disparities in incidence

- **Geography**
  - Highly possible to play a role but more research needed
  - Is it related to pollution, toxin exposure and air quality?

- **Genetic? Differential susceptibility?**
  - 8q24 may explain up to 60% of prostate cancer differences
  - More research needed on other cancers

- **Tobacco use**
  - Use alone does not explain all disparities

Some of the reasons for disparities in mortality

- ✓ **Lack of early-detection**
  - Possibly for some cancers, but not all
  - Still need to work on programs and strategies to ensure that all populations are aware of, and have the opportunity, to avail of screening
  - What are the reasons driving lower use of screening in equal access to care settings/all settings?

- ✓ **Access to care**
  - Insurance
  - For some cancers, insurance is the reason for differences in outcomes, for others it isn't

- ✓ **Lack of timely and aggressive treatment**
  - Access to care can drive this, but research also needed on societal, cultural and demographic reasons leading to reduced utility of treatment modalities

Some of the reasons for disparities in mortality

- ✓ **Genetics**
  - 8q24 related to prostate cancer aggressiveness
  - Are differences in CNV that are also evident in normal tissue
  - Somatic mutation profiles of some cancer are different as are the molecular subtypes

- ✓ **Biology**
  - Gene expression
  - Methylation
  - Less efficient G2M checkpoint
  - Inflammation differences

Determinants

Determinants of cancer health disparities

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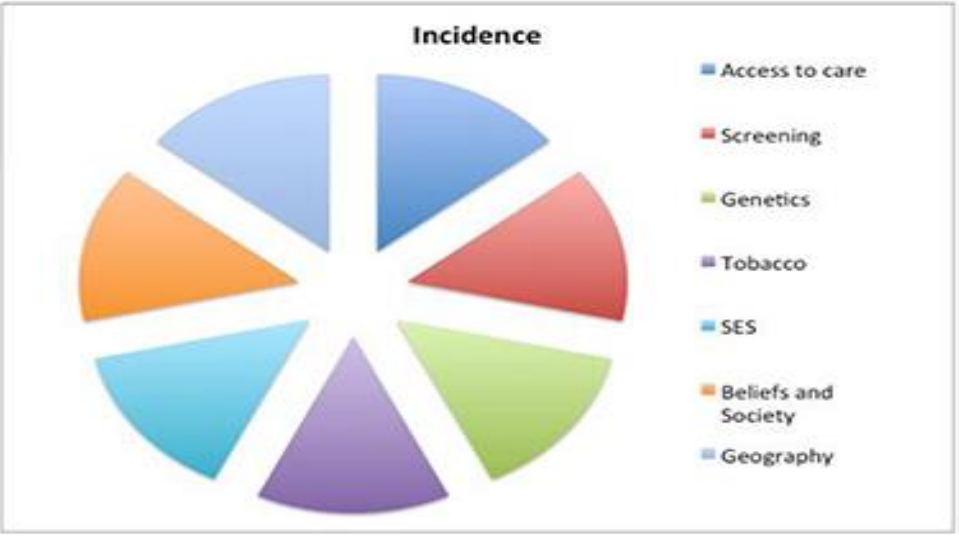
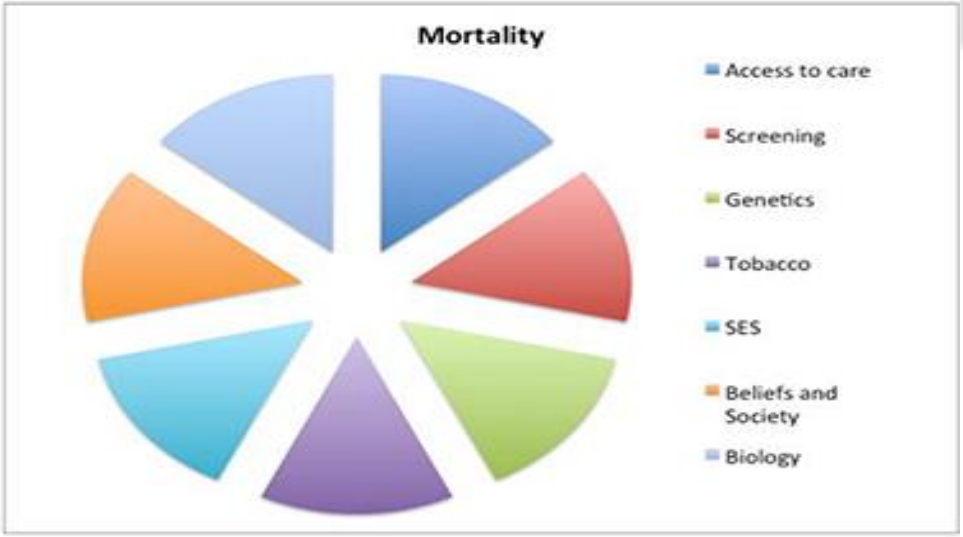
A multidisciplinary problem that requires a multidisciplinary approach





Determinants of cancer health disparities

- **A multidisciplinary problem that requires a multidisciplinary approach including Prevention, Early Detection, Diagnosis, Treatment and Mortality**