Advancing Health Equity in Lung Cancer Outcomes

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Disclosures

Funding:

- American Thoracic Society

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Lecture Outline

- Cancer Disparities
- Lung Cancer Overview
- Lung Cancer Disparities
- Smoking
- Early Lung Cancer Detection
- Future Directions

- **Health equity**: All people have the opportunity to attain their highest level of health.
- **Health disparities:** One way to measure progress towards achieving health equity.

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Cancer Disparities

Population groups may be characterized by

- Gender
- Geography
- Income
- Race
- Age
- Disability
- Education
- Ethnicity

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Demographics

Demographic Information[1]

		FRANKLIN COUNTY	OHIO	UNITED STATES
	Total Population	1,163,414	11,536,504	308,745,538
Age	Under 5 Years	7.1%	6.2%	6.5%
	5-17 Years	16.8%	17.4%	17.5%
	18-64 Years	66.1%	62.3%	62.9%
	65 Years and Over	9.9%	14.1%	13.0%
Race*	White	71.8%	84.5%	74.8%
	African American	23.1%	13.4%	13.6%
	American Indian/Alaska Native	1.0%	0.8%	1.7%
	Asian	4.6%	2.1%	5.6%
	Native Hawaiian/Other Pacific Islander	0.2%	0.1%	0.4%
	Other	2.7%	1.4%	7.0%
Ethnicity	Hispanic or Latino (of any race)	4.8%	3.1%	16.3%
Gender	Male	48.7%	48.8%	49.2%
	Female	51.3%	51.2%	50.8%

*Race alone or in combination with one or more other races
1) Source: 2010 Census, U.S. Census Bureau

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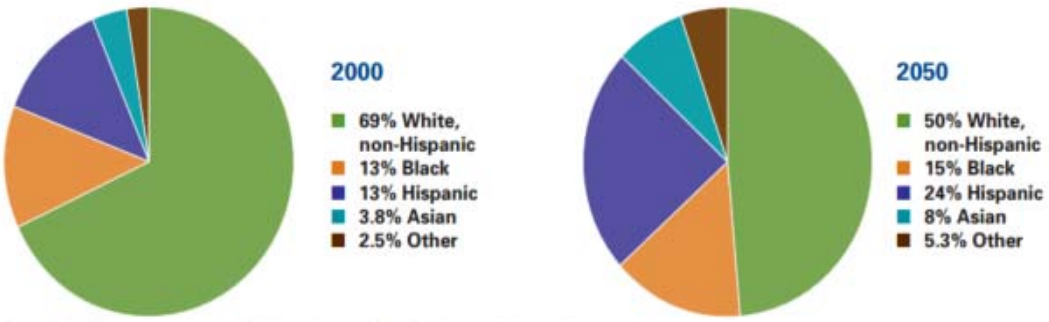
Importance of Addressing Cancer Disparities

Minority Groups will compose half of the U.S. population by 2050



Source: United States Census Bureau, U.S. Interim Projects by Age, Sex, Race and Hispanic Origin, 2004.
NOTE: "Other" includes American Indian/Alaska Native, Native Hawaiian/other Pacific Islander. Numbers add up to more than 100 percent due to rounding.

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Cancer Disparities by Race

- Cancer deaths have declined among all races.
- African Americans (AA) have the highest rate of death and shortest survival of any racial/ethnic group for most cancers in the US.
- Hispanics and AA are less likely to be diagnosed with localized disease.

Factors Driving Disparities in Cancer

- Early detection strategies
- Genetic and Biologic Differences
- Socioeconomic Status (SES)
- Lack of Healthcare
- Cultural basis and perceptions
- Clinical trial enrolment

Lung Cancer

Lung Cancer in the United States

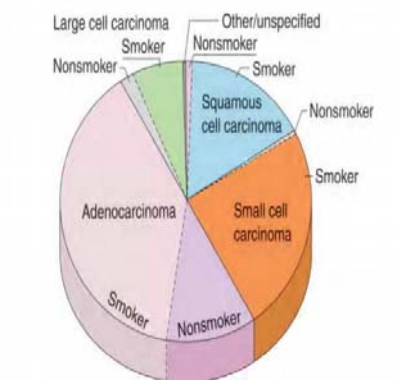
- Leading cause of cancer mortality in men and women of all racial and ethnic groups
  - 230,000 new diagnosis per year 25% of all cancer diagnosis
  - 160,000 deaths per year

- More deaths than
  - Prostate
  - Breast
  - Colon Cancer

COMBINED

Lung Cancer

- **Small Cell (15%)**
- **Non-Small Cell (85%)**
  - Adenocarcinoma
  - Large Cell
  - Squamous Cell
  - Carcinoid



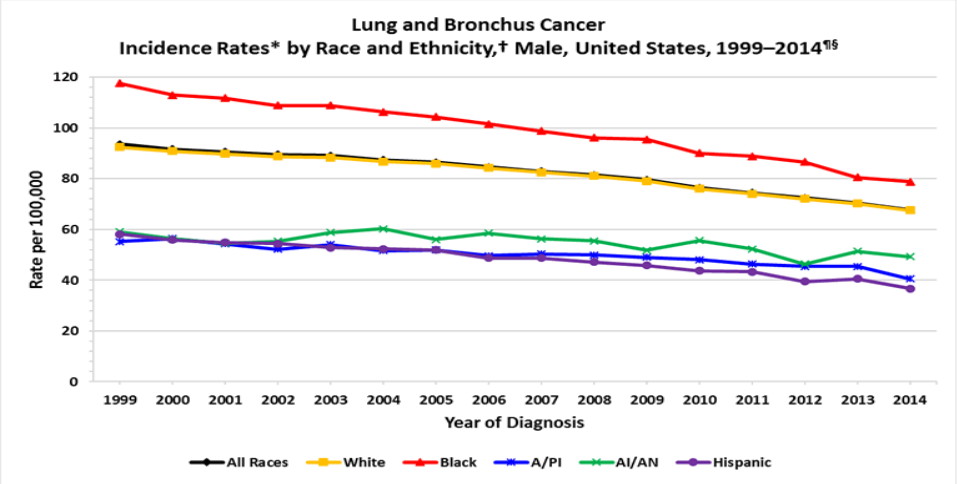
Centers for Disease Control 2016

Etiology of Lung Cancer

- **Cigarette smoking**
  - 80 – 90% are smokers (dose response relationship)
- **Individual (genetic susceptibility)**
  - 10-15% of active smokers will develop lung CA
- **COPD (independent risk factor)**
  - Risk increases as FEV-1 decreases
- **Age**
  - Average age at dx is 70
- **Exposures**
  - **Radon,** Arsenic, asbestos, polycyclic hydrocarbons and chromium

Wasswa-Kintu S, Gan WQ, Man SF, Pare PD, Sin DD. Relationship between reduced forced expiratory volume in one second and the risk of lung cancer: a systematic review and meta-analysis. Thorax 2005; 60:570–575

Lung Cancer Incidence Rates by Race and Ethnicity

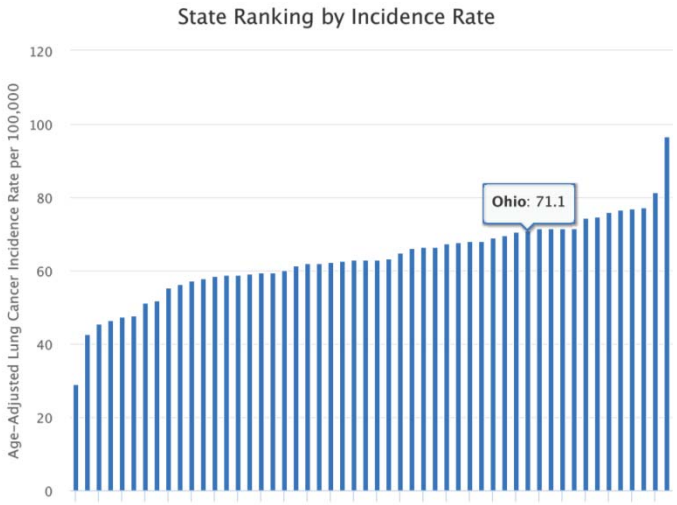


https://www.cdc.gov/cancer/lung/statistics/race.htm

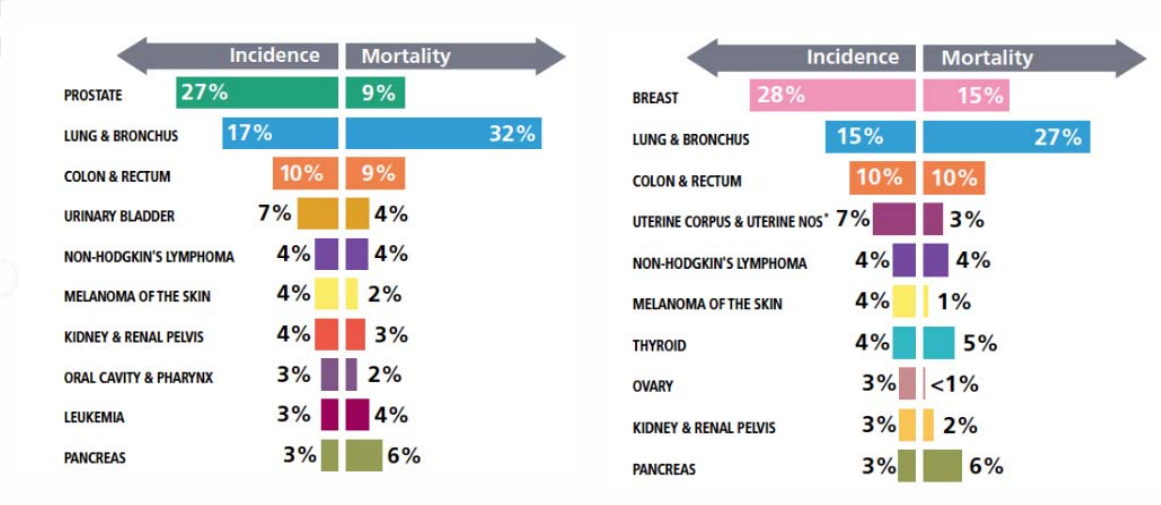
Lung Cancer in Ohio

- **Ohio:** 71.1 per 100,000
  - 39th of out 50
- **Kentucky:** 96.8 per 100,000
- **Utah:** 29.1 per 100,000
- **National Ave:** 63.0 per 100,000

www.lung.org

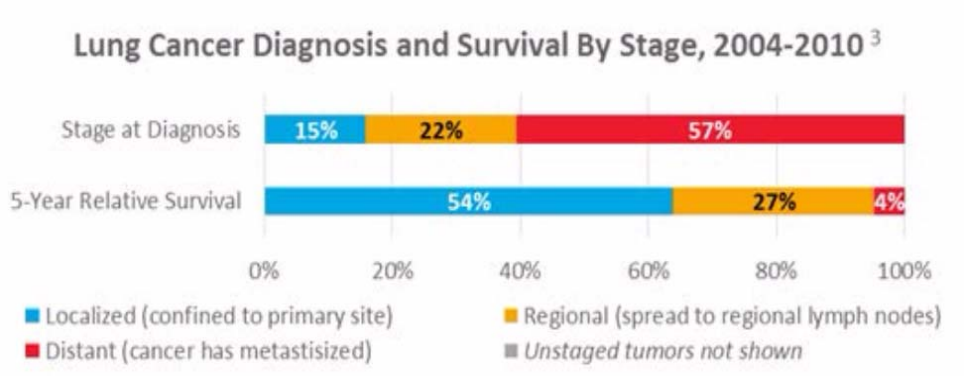


Lung Cancer in Ohio



https://www.cdc.gov/cancer/lung/statistics/race.htm

Stage Determines Outcomes



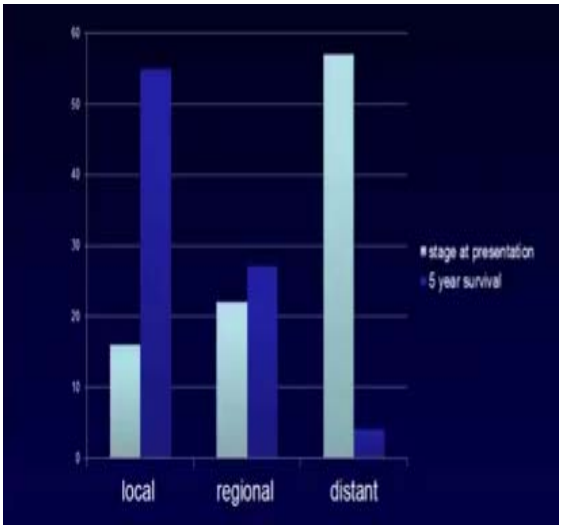
http://seer.cancer.gov/statfacts/html/lungb.html

Stage Determines Outcomes

- **Stage I:** Surgery is 1st line (may be curative)
- **Stage II:** Surgery followed by adjuvant chemotherapy
- **Stage III:** No surgery. Chemo/Radiation is 1st line
- **Stage IV:** Chemo/Radiation (often palliative)

5 year survival rates

- **Lung Cancer** = 17.7%
- Colon Cancer = 64.4%
- Breast Cancer = 84.7%
- Prostate Cancer = 98.9%



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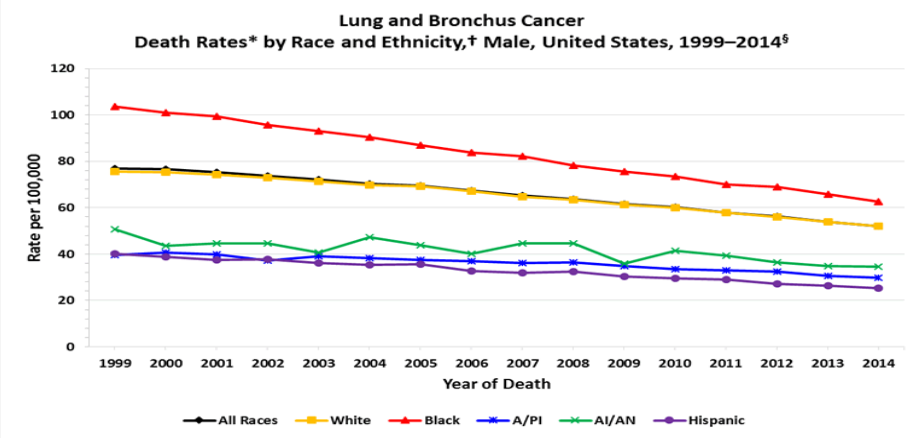
Stage Determines Outcomes

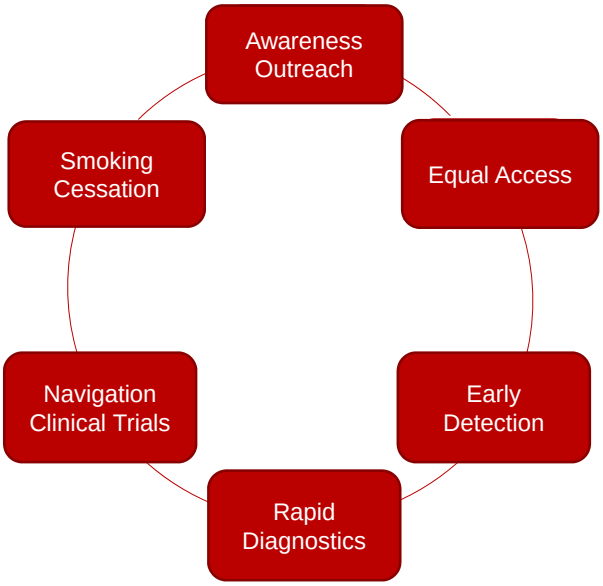
- 12% of AA diagnosed at Stage I
- 15% of Hispanics diagnosed at Stage I
- 18% of Caucasians diagnosed at Stage I

Lung Cancer Death Rates by Race and Ethnicity



https://www.cdc.gov/cancer/lung/statistics/race.htm

Reducing Lung Cancer Disparity



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Smoking

- Smoking is the leading preventable cause of disease and death in the United States.
  - 480,000 deaths annually
- Tobacco smoke contains 7,000 chemicals
  - 250 are harmful & 70 are carcinogens
- Causes Cancers of the:
  - Lung, esophagus, mouth, throat, kidney, bladder, liver, pancreas, stomach, cervix, colon, rectum and leukemia

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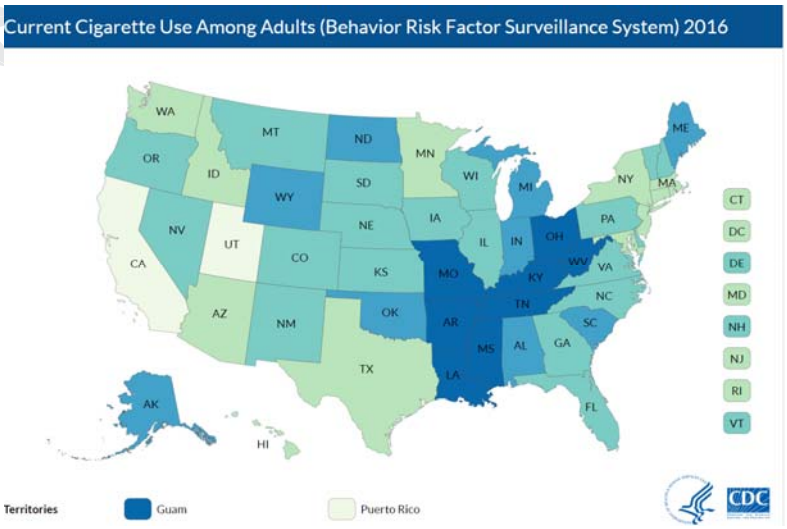
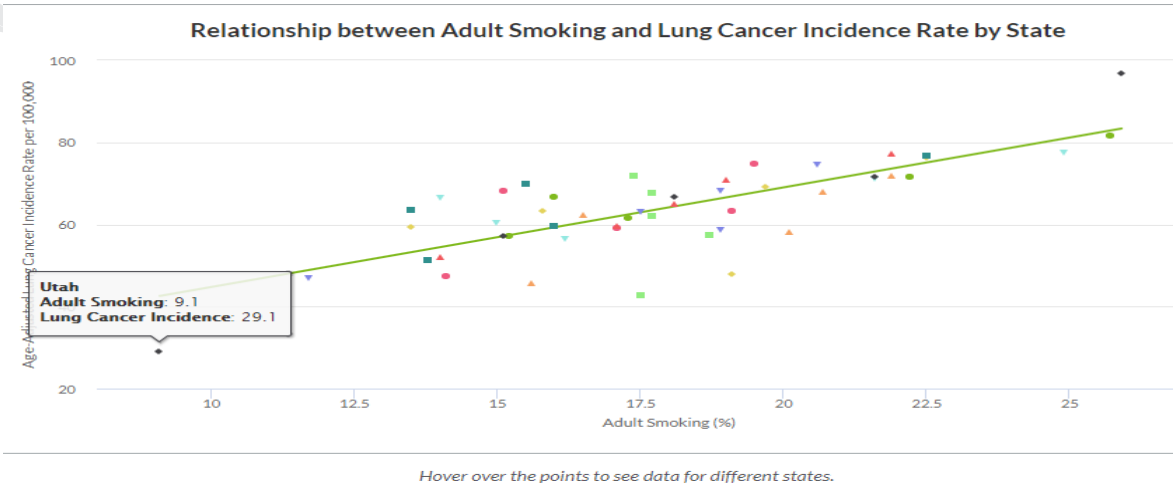
Smoking by Region



- Midwest **(20.7%)**
- South (**17.2%)**
- Northeast **(15.3%)**
- West **(13.1%)**

CDC.gov

Smoking in Utah



http://www.lung.org/our-initiatives/tobacco/reports-resources/sotc/state-grades/

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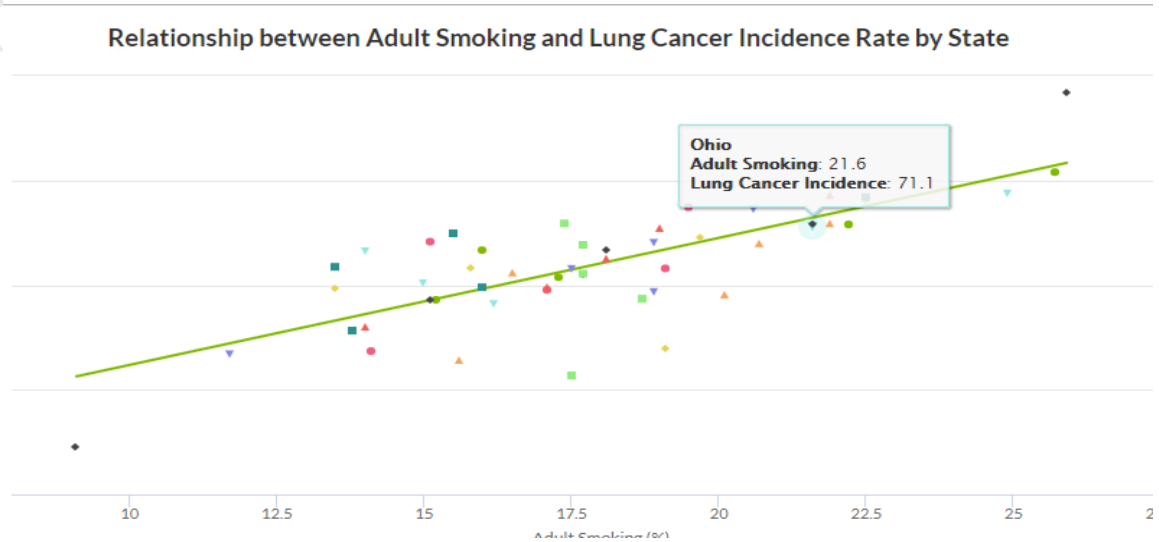
Smoking in Ohio



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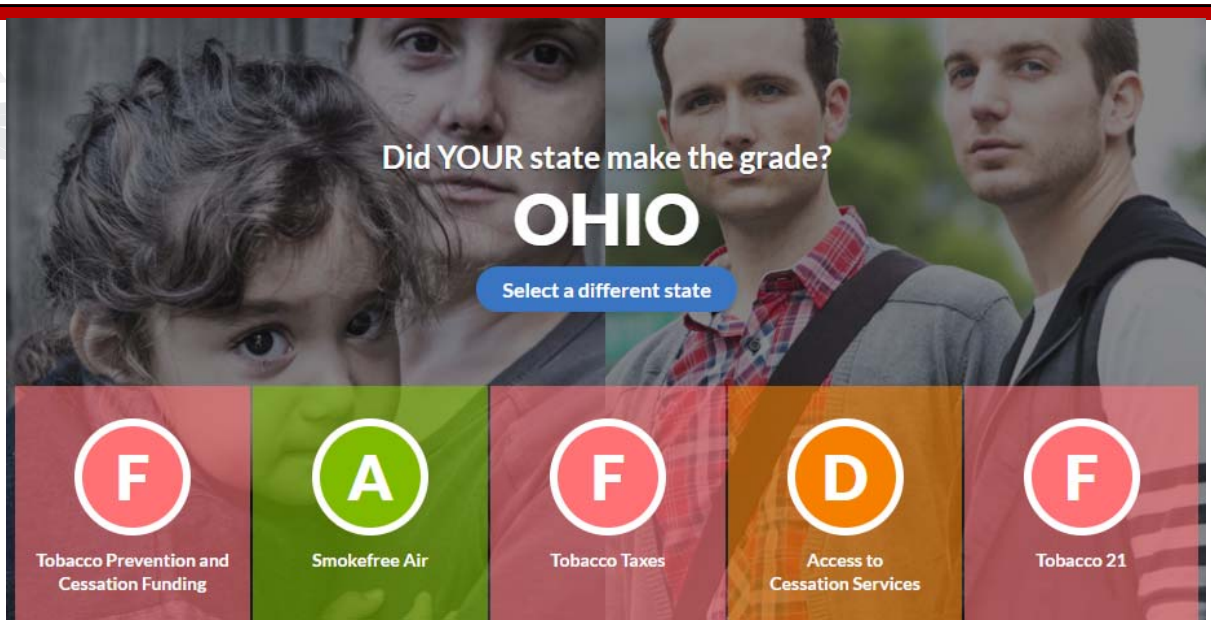

http://www.lung.org/our-initiatives/tobacco/reports-resources/sotc/state-grades/

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Smoking by Race

- American Indians/Alaska Natives **(29.2%)**
- Non-Hispanic Whites Americans **(18.2%)**
- African Americans **(17.5%)**
- Hispanic Americans **(11.2%)**
- Non-Hispanic Asians Americans **(9.5%)**

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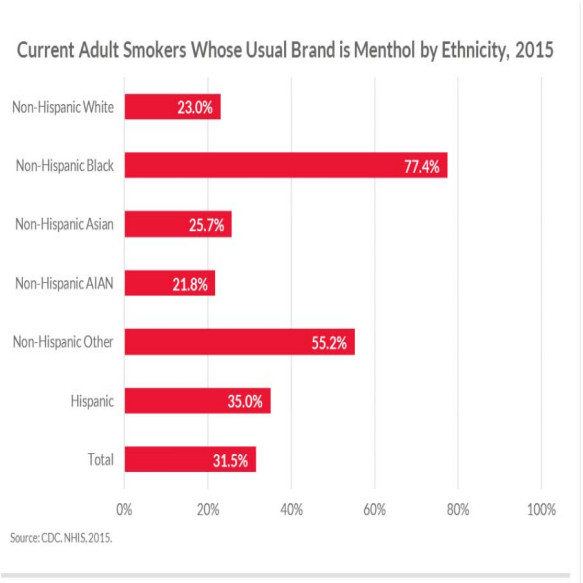
Menthol

- Menthol tobacco products have been proven to both make it easier to start smoking and harder for adult users to quit
- African-Americans use menthol tobacco products at much higher rates than other racial/ethnic groups



http://www.lung.org/our-initiatives/tobacco/reports-resources/sotc/key-findings/

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Smoking by Education

- No High school Diploma **(22.9%)**
- High school graduate with out college **(21.7%)**
- Associate's degree **(17.1%)**
- Completion of an undergraduate college degree **(7.9%)**
- Completion of a graduate degree **(5.4%)**

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Smoking by Poverty Status

- **26.3%** of adults below the federal poverty guideline smoke.
- **15.2%** of adults who live at or above the federal poverty guideline smoke.

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Smoking Cessation

- The majority of smokers want to stop smoking however, minority and low SES smokers are less likely to:
  - Offered smoking cessation counseling
  - Enroll in dedicated smoking cessation programs
  - Use recommended treatment to aid cessation

Smoking Cessation

- Quitting smoking improves the prognosis of cancer patients.
- Quitting smoking helps improve the ability to heal and respond to therapy.
- Quitting smoking lowers the risk that the cancer will recur, that a second cancer will develop.

Perceptions

Perceptions

335 patients surveyed

- AA, Caucasian & Hispanic
  - AA surgery causes LC to spread
    - Barrier to curative surgery
  - AA Fatalistic views *"its meant to happen as part of God's plan"*
    - Barrier to medical treatment


CHEST Original Resear

LUNG CA

Racial and Ethnic Differences in Beliefs About Lung Cancer Care

Sirisha Jonnalagadda, MD; Jenny J. Lin, MD; Judith E. Nelson, MD, JD, FCCP; Charles A. Powell, MD; John Salazar-Schicchi, MD; Andrew R. Berman, MD, FCCP; Steven M. Keller, MD, FCCP; Cardinale B. Smith, MD, MSCR; Linda Lurslurchachai, MPH; Ethan A. Halm, MD, MPH; Howard Leventhal, PhD; and Juan P. Wisnivesky, MD, DrPH

Racial and Ethnic differences in beliefs about lung cancer Chest 2012

Treatment

Lung Cancer Disparity in Treatment by Race

- AA patients are less likely to undergo surgical treatment for early stage lung cancer
  - Not offered surgery
    - Provider perception AA would refuse

Evaluation of the Causes for Racial Disparity in Surgical Treatment of Early Stage Lung Cancer*

Jennifer McCann, MD; Vasken Artinian, MD; Lisa Duhaime, MD; Joseph W. Lewis, Jr, MD, FCCP; Paul A. Keale, MD, FCCP; and Bruno DiGiovine, MD, MPH, FCCP

Study objectives: **Black patients undergo surgical treatment for early stage lung cancer less often than whites. We wanted to determine the causes for the racial difference in resection rates.**
Design: **We studied a retrospective cohort of patients who presented to our institution with potentially resectable lung cancer (stage I or II) between the years 1995 and 1998, inclusive.**
Setting: **A tertiary-referral hospital and clinic with a cancer database of all lung cancer patients seen.**
Patients: **A total of 281 patients were included: 97 black patients (35%) and 184 white patients (65%).**
Measurements and results: **The surgical rate was significantly lower in blacks than in whites (56 of 97 patients [58%] vs 137 of 184 patients [74%], p = 0.004). We could not find evidence that the rate at which surgical treatment was offered was different between the two racial groups (68 of 97 black patients [70%] and 145 of 184 white patients [79%], p = 0.11). After controlling for preoperative pulmonary function, tumor stage, history of smoking, and significant comorbidities, we were unable to show that race was a predictor of being offered surgical treatment (odds ratio, 0.46; 95% confidence interval, 0.18 to 1.14; p = 0.09). The difference in surgical rates was mainly due to the fact that blacks were found to decline surgical treatment more often than their white counterparts (12 of 68 patients [18%] vs 7 of 145 patients [5%], p = 0.002).**
Conclusions: **Our analysis suggests that the lower surgical rate among black patients with early stage lung cancer is mainly due to low rates of acceptance of surgical treatment.**
(CHEST 2005; 128:3440–3446)

Key words: blacks; lung neoplasms; physician-patient relations; treatment refusal; whites

Abbreviations: CAD = coronary artery disease; CI = confidence interval; HFHS = Henry Ford Health System; NSCLC = non-small cell lung cancer; OR = odds ratio

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Lung Cancer Disparity in Treatment by Race

- Compared data from the SEER registry of 10,984 pt with resectable NSCLC
- Surgical resection was 12.7 % lower in (AA) than Caucasians
- 5 year survival was also lower
  - 26.4% in AA vs 34.1 % in Caucasians


The New England Journal of Medicine

Special Article

RACIAL DIFFERENCES IN THE TREATMENT OF EARLY-STAGE LUNG CANCER

PETER B. BACH, M.D., LAURA D. CRAMER, SC.M., JOAN L. WARREN, PH.D., AND COLIN B. BEGG, PH.D.

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Provider Perception Targeted Treatment

- EGFR
- ROS-1
- PD-1 & PDL-1
- KRAS

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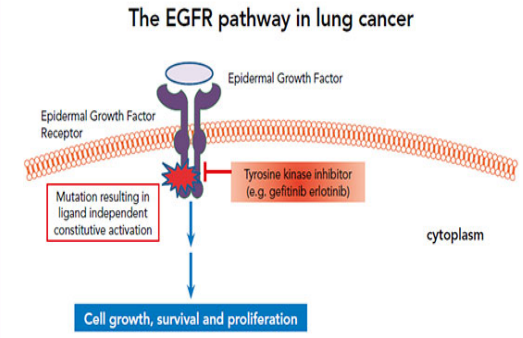
EGFR Driver (activating) Mutation

- Mutation in the tyrosine kinase domain of EGFR resulting in continued activation
- Observed in 15% of Adenocarcinomas in the US
  - Never smokers
  - Patients of Asian ancestry

EGFR, epidermal growth factor receptor; NSCLC, non-small cell lung cancer
Figure reproduced from ref 1
1. Jakobovits A et al. *Nat Biotechnol* 2007;25:1134–43

Tyrosine Kinase Inhibitors

- Erlotinib, Gefitinib and Afatinib all have shown better progression free survival than standard chemotherapy.
- First line treatment for Stage IV NSCLC



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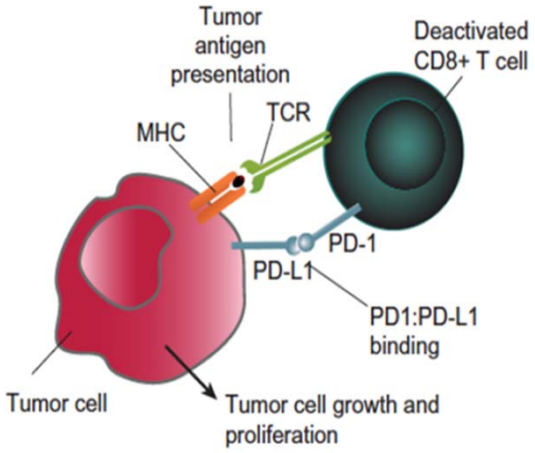
ROS-1

- Tyrosine kinase and driver oncogene
- Found in 1-2 % of NSCLC
- Drug of choice: Crizotinib

Immunotherapy checkpoint inhibition

- PD-1 pathways are immune checkpoint pathways that play critical roles in controlling T-cell immune responses
- T cells become unresponsive PD-1 binds PD-L1 on target cells
- Antagonist antibodies to PD-1 and PD-L1



KRAS (Kirsten rat sarcoma oncogene)

- Most common mutation 25% of adenocarcinomas
- Mediates multiple signal transduction and activation pathways
- Exclusive to smokers
- Associated with worse prognosis
- No approved effective targeted therapies

Mutations in Lung Cancers

245 AA and 264 n-HW with NSCLC had genomic tumor analysis.

- Mutational frequencies and copy number changes were not significantly different
- Activating alterations in members of the receptor tyrosine kinase pathway including EGFR and KRAS were not significantly different
- These results indicate that AA with NSCLC harbor somatic EGFR mutations at a frequency similar to whites with NSCLC

Research

JAMA Oncology | Original Investigation

Comparison of Prevalence and Types of Mutations in Lung Cancers Among Black and White Populations

Joshua D. Campbell, PhD; Christopher Lathan, MD, MPH; Lynette Sholl, MD; Matthew Ducar; Mikenah Vega; Ashwini Sunkavalli; Ling Lin, PhD; Megan Hanna; Laura Schubert; Aaron Thorner, PhD; Nicholas Faris, MDiv; David R. Williams, PhD, MPH; Raymond U. Osarogiagbon, MBBS; Paul van Hummelen, PhD; Matthew Meyerson, MD, PhD; Laura MacConaill, PhD

Early Lung Cancer Detection Program

Remember Stage Determines Outcomes

- Stage I: Surgery is 1st line (can be curative)
- Stage II: Surgery followed by adjuvant chemotherapy
- Stage III: No surgery. Chemo/Radiation is 1st line
- Stage IV: Chemo/Radiation (often palliative)

What is Screening and Why is it important for Lung Cancer?

- Screening: Testing of individuals who are asymptomatic, but at risk for a disease.
- The purpose of screening is to prevent, interrupt or delay the development of advanced disease.

National Lung Screening Trial

The NEW ENGLAND JOURNAL of MEDICINE
AUGUST 4, 2011

Reduced Lung-Cancer Mortality with Low-Dose Computed Tomographic Screening

The National Lung Screening Trial Research Team*

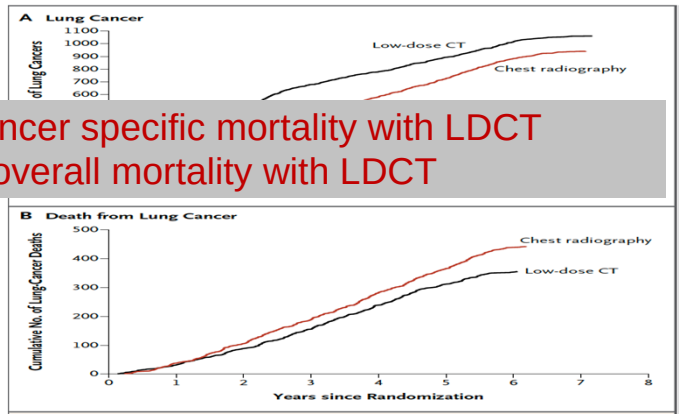
Multicenter Randomized Trial

54,000 patients

CXR vs LDCT

Screened for 3 years

20% reduction in lung-cancer specific mortality with LDCT
6.7% reduction in overall mortality with LDCT



N Engl J Med 2011;365:395-409

Lung Cancer Screening

Lung Cancer: Screening

Release Date: December 2013

Recommendation Summary

Summary of Recommendation and Evidence

Population	Recommendation	Grade (What's This?)
Adults Aged 55-80, with a History of Smoking	The USPSTF recommends annual screening for lung cancer with low-dose computed tomography (LDCT) in adults aged 55 to 80 years who have a 30 pack-year smoking history and currently smoke or have quit within the past 15 years. Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery.	B

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USPSTF.org

Who participated in the NLST?

- Current and former smokers within the last 15 years
- At least 30 pack years of smoking
- Age 55-74
- No signs or symptoms of lung cancer
- Medically fit for surgery

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Disparity in Lung Cancer Screening

- Fee for serviceprior to 2015
- 99 dollar fee
- Martha Morehouse Medical Plaza

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Disparity in Lung Cancer Screening

CMS.gov

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Lung Cancer Screening Racial Differences

- A subgroup analysis of the NLST by **Tanner et al** showed AAs screened with LDCT had a greater reduction in
  - All cause mortality
  - Lung Cancer specific mortality

ORIGINAL ARTICLE

Racial Differences in Outcomes within the National Lung Screening Trial

Implications for Widespread Implementation

Nichole T. Tanner[1,2], Mulugeta Gebregziabher[1,3], Chanita Hughes Halbert[1,4,5], Elizabeth Payne[3], Leonard E. Egede[1,6], and Gerard A. Silvestri[2]

[1]Health Equity and Rural Outreach Innovation Center, Ralph H. Johnson Veterans Affairs Hospital, Charleston, South Carolina; and [2]Division of Pulmonary and Critical Care Medicine, [3]Department of Public Health Sciences, [4]Department of Psychiatry and Behavioral Sciences, [5]Hollings Cancer Center, and [6]Department of Medicine, Medical University of South Carolina, Charleston, South Carolina

ORCID ID: 0000-0003-3768-1973 (N.T.T.).

Implementing Lung Cancer Screening in the Era of CMS Coverage

- Shared decision making
- Smoking Cessation
- Standardized reporting
- Management of Incidental Findings
- Rapid Diagnostics
- Follow up

Lung Cancer Screening & Smoking Cessation Clinic

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Tobacco Dependency Clinic

WHAT DOES OHIO STATE'S TOBACCO DEPENDENCE CLINIC OFFER?

The Tobacco Dependence Clinic is a service of Ohio State's Lung Center. The clinic offers smokers who are interested in quitting appointments with a dedicated Smoking Cessation Nurse Practitioner. Services include counseling and prescriptions for tobacco cessation medications when indicated.

- Complete nicotine dependence assessment
- Comprehensive counseling
- Personalized medication approach
- Relapse prevention
- Thorough follow up

You can schedule an appointment today with Gretchen Whitby, MS, RN, APRN, BC.

Ruthann Kennedy, CNP

Quit Smoking **Today.**
We can help.
The Ohio State University
Wexner Medical Center

THE DIVISION OF PULMONARY MEDICINE
CarePoint East
543 Taylor Ave., 3rd Floor
Columbus, OH 43203
614-688-6540

THE OHIO STATE UNIVERSITY
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DEDICATED TO HELPING YOU QUIT.

The Tobacco Dependence Clinic

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Early Lung Cancer Detection Clinic

Lung cancer screenings are offered every week at the following locations:

Ohio State's Martha Morehouse Medical Plaza – Tower Building
2050 Kenny Road • Columbus, OH 43221
614-293-5066 or 800-293-5066

CarePoint East
543 Taylor Avenue • Columbus, OH 43203
614-293-5066 or 800-293-5066

Visit us online at
cancer.osu.edu/lungcancerscreening

The James
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Future Directions

- 3rd Early Detection Clinic
- Mobile Lung Cancer Screening
- Total Cancer Care and Bio-banking Protocol
- 23 Lung Cancer Clinical Trials

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Summary

- AA and Hispanics are more likely to be diagnosed with advanced stage lung cancer.
- Smoking Cessation must be offered to all patients
- AA are less likely to have surgical resection even when presenting with localized disease
- AA and Caucasians do not differ in rates of cancer mutations
- AA have a greater benefit in Lung Cancer Screening

Lung Cancer Team