



Equity and Equality for Minorities in Cancer Care

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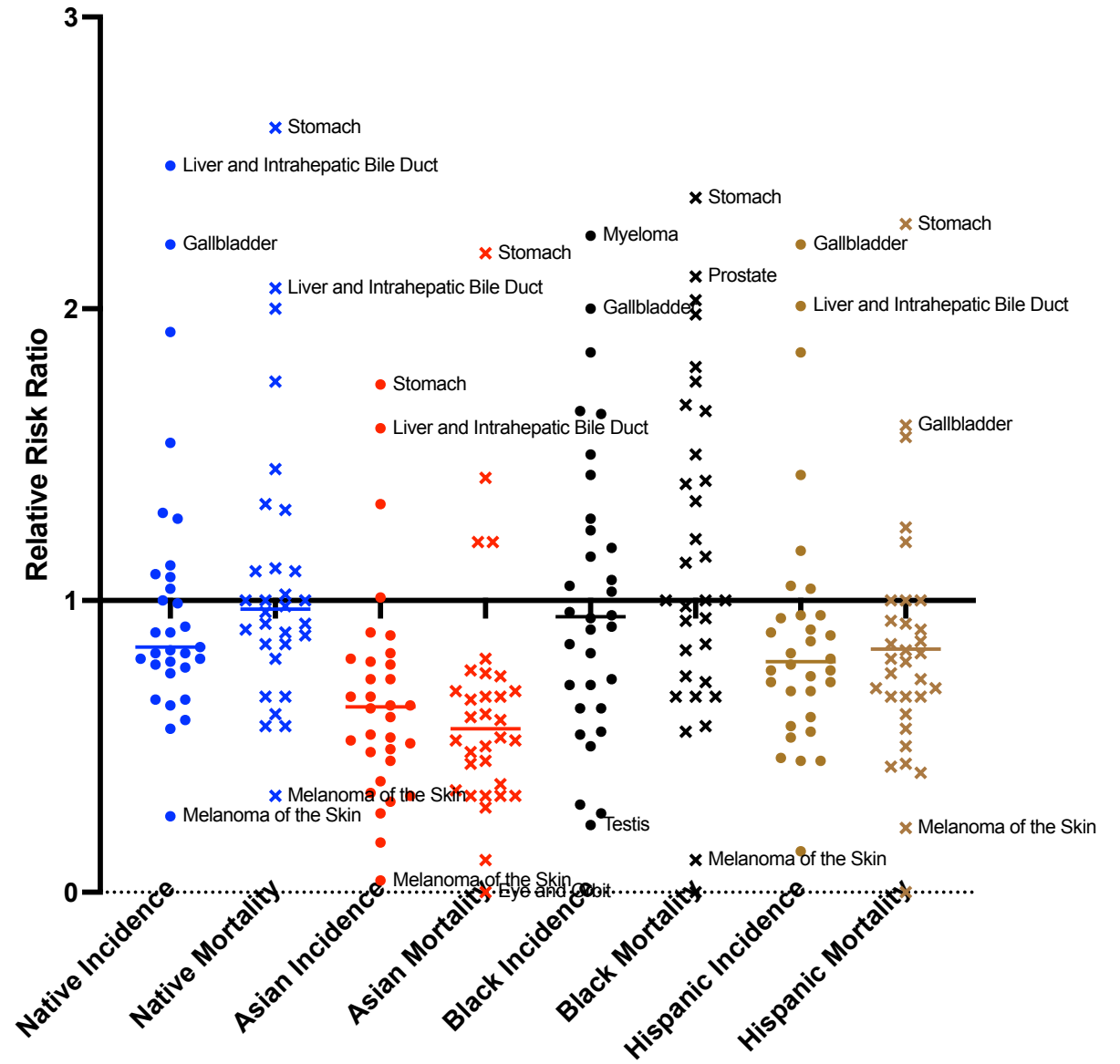
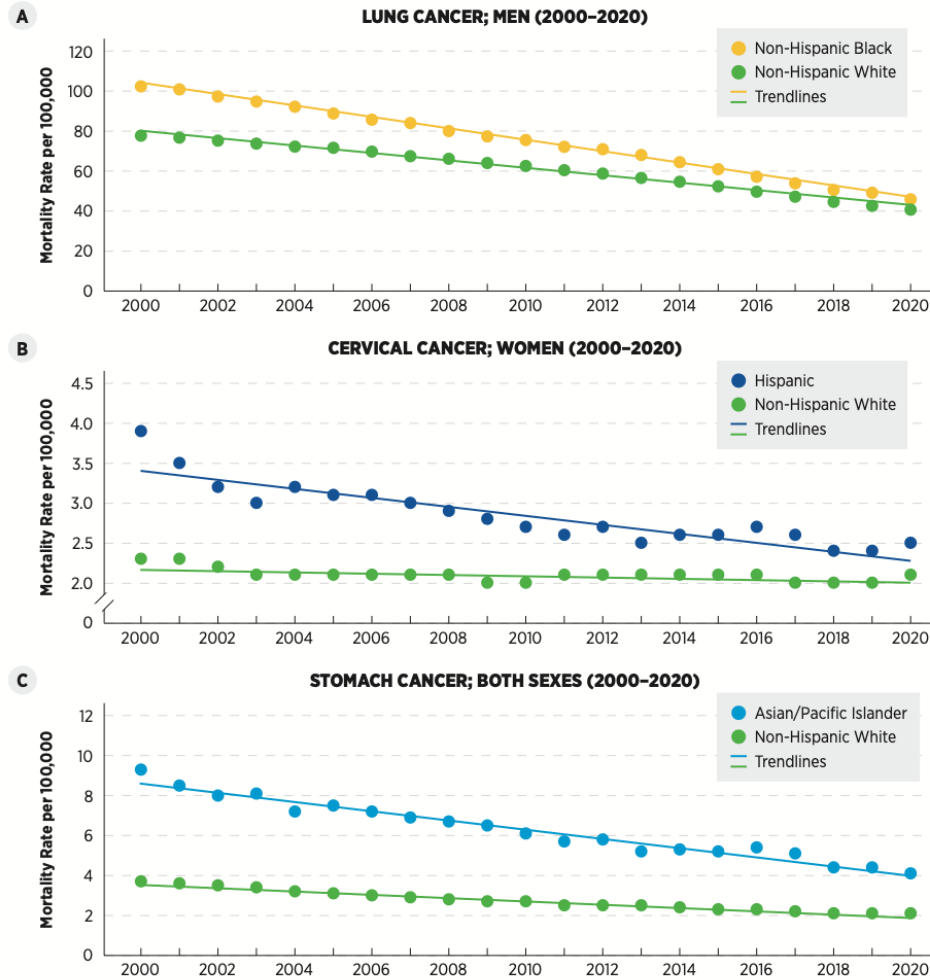
USC/Norris Comprehensive Cancer Center

Outline

- Review treatment patterns that lead to disparities
 - Financial and Social Determinants of Health
 - Biological factors and epidemiological distributions
- Discuss diagnosis and workup patterns that lead to disparities
- Explore structural issues related to clinical trial enrollment

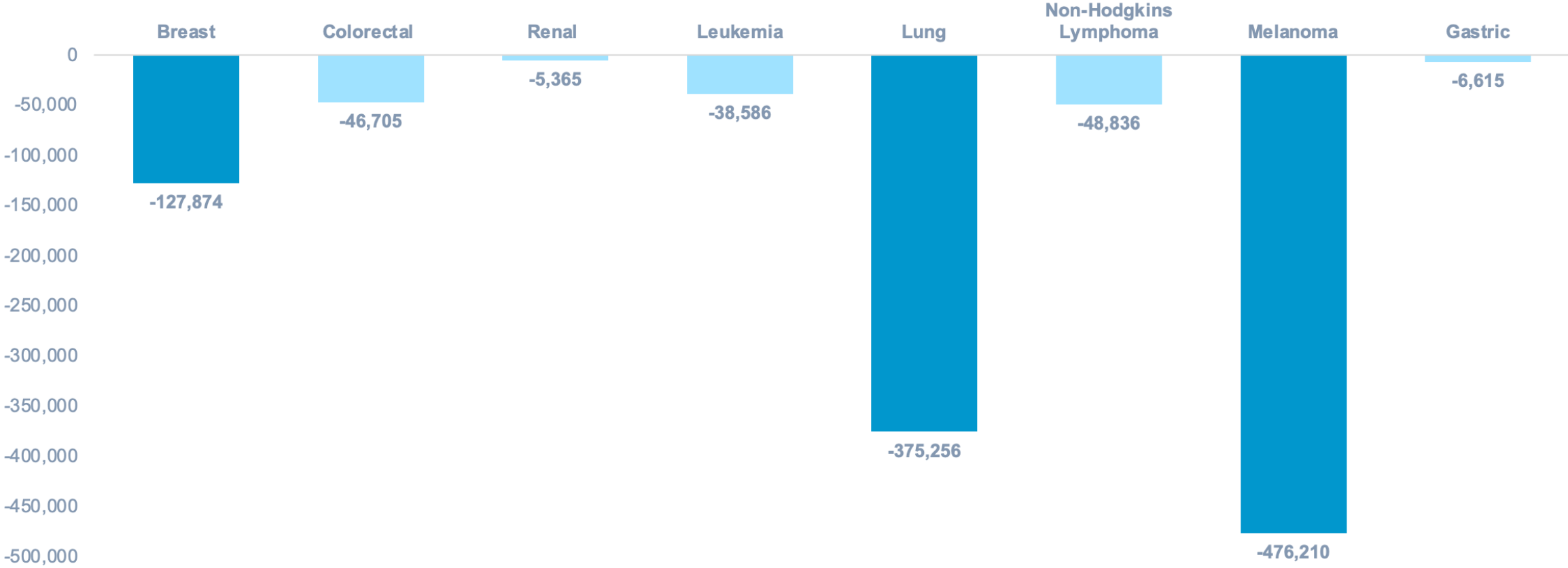
- *My Bias: I am a lung cancer doctor and will demonstrate my bias by focusing on disparities related to lung cancer care.*

Improvement in Cancer Disparities



New Medicines Are Associated with Reduced Mortality Across Many Forms of Cancer, Including Lung Cancer¹

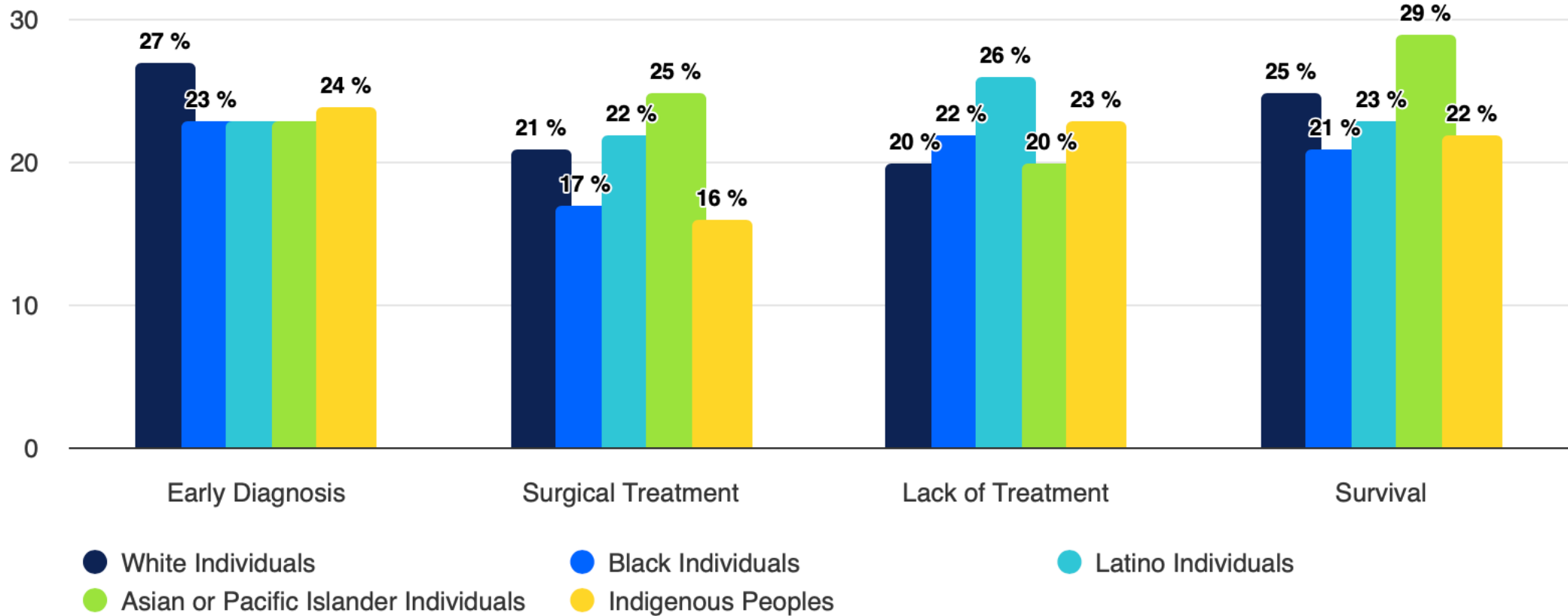
Change in Total Deaths Associated with New Cancer Medicines in the U.S., 2000–2016* **



*Results are show for the 15 most common tumor types with statistically significant results.
**106 new drugs were approved in 173 indications from 2000 to 2016 across 15 most common tumor types.

Racial Disparities in Lung Cancer

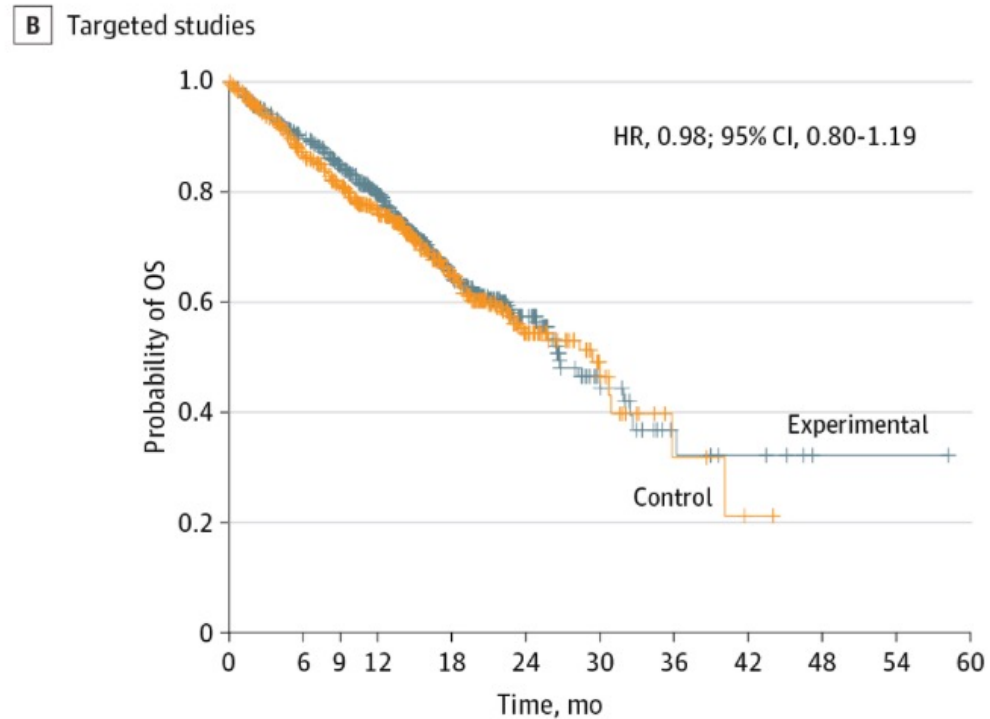
Latinos have the highest rates of no treatment, Blacks have the worst survival



The Impact of Targeted Therapy

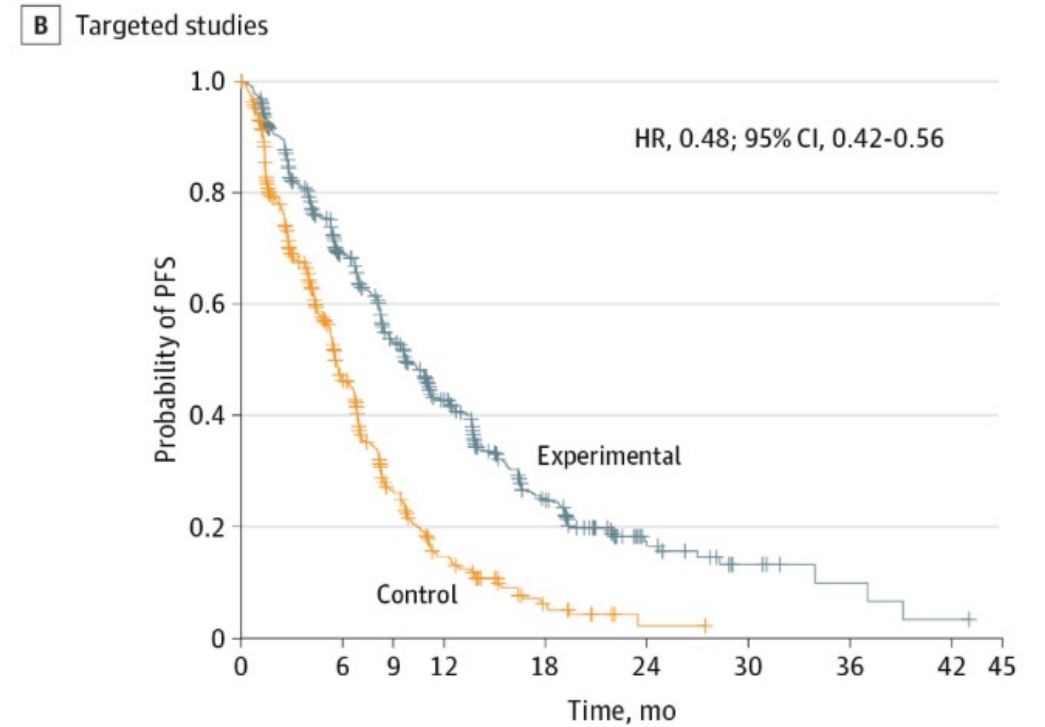
FDA meta-analysis

Overall Survival



No. at risk	0	6	9	12	18	24	30	36	42	48	54	60
Experimental	661	546	486	405	213	73	21	8	5	1	1	
Control	548	426	370	307	160	61	16	4	1			

Progression Free Survival



No. at risk	0	6	9	12	18	24	30	36	42	45
Experimental	661	389	281	193	80	20	7	3	1	
Control	548	191	96	46	11	1				

Not all races benefit from targeted therapy

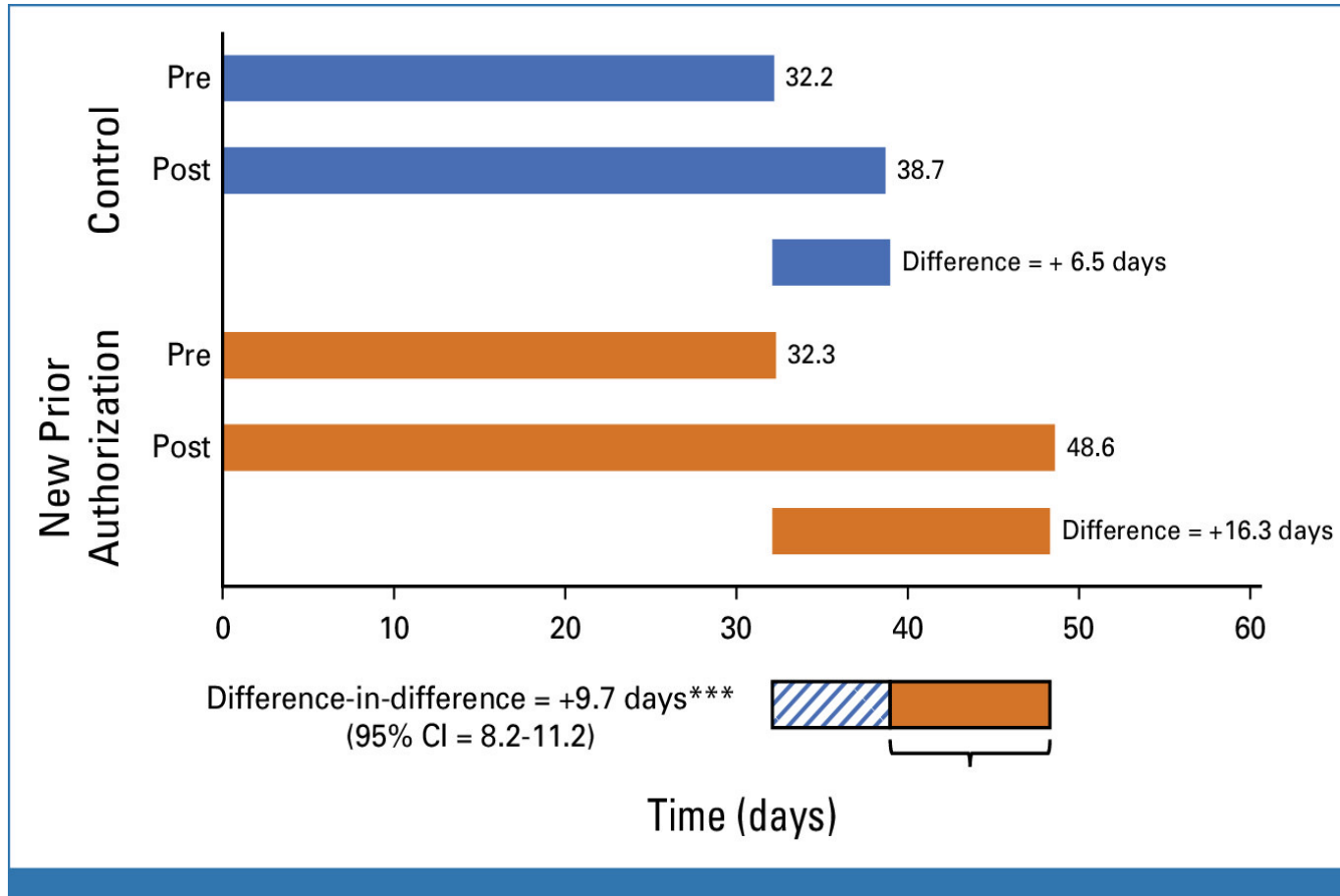
TABLE 2. Mutation Prevalence by Race

Mutation N = 15,306	Black n = 3,363	White n = 9,507	Hispanic n = 1,989	Asian n = 447
<i>EGFR</i> n = 9,459	6 (5 to 7)	12 (11 to 13)	35 (33 to 37)	46 (40 to 51)
<i>BRAF</i> n = 2,535	1 (0 to 2)	3 (2 to 3)	4 (1 to 18)	2 (0 to 11)
<i>ROS-1</i> n = 686	0 (0 to 1)	1 (0 to 3)	NA	0
<i>ALK</i> n = 2,626	1 (0 to 2)	2 (1 to 3)	7 (2 to 23)	6 (1 to 11)

NOTE. % (95% CI), n = number tested.

Abbreviation: NA, not available.

Impact of Preauthorization in Oncology for Targeted Therapy



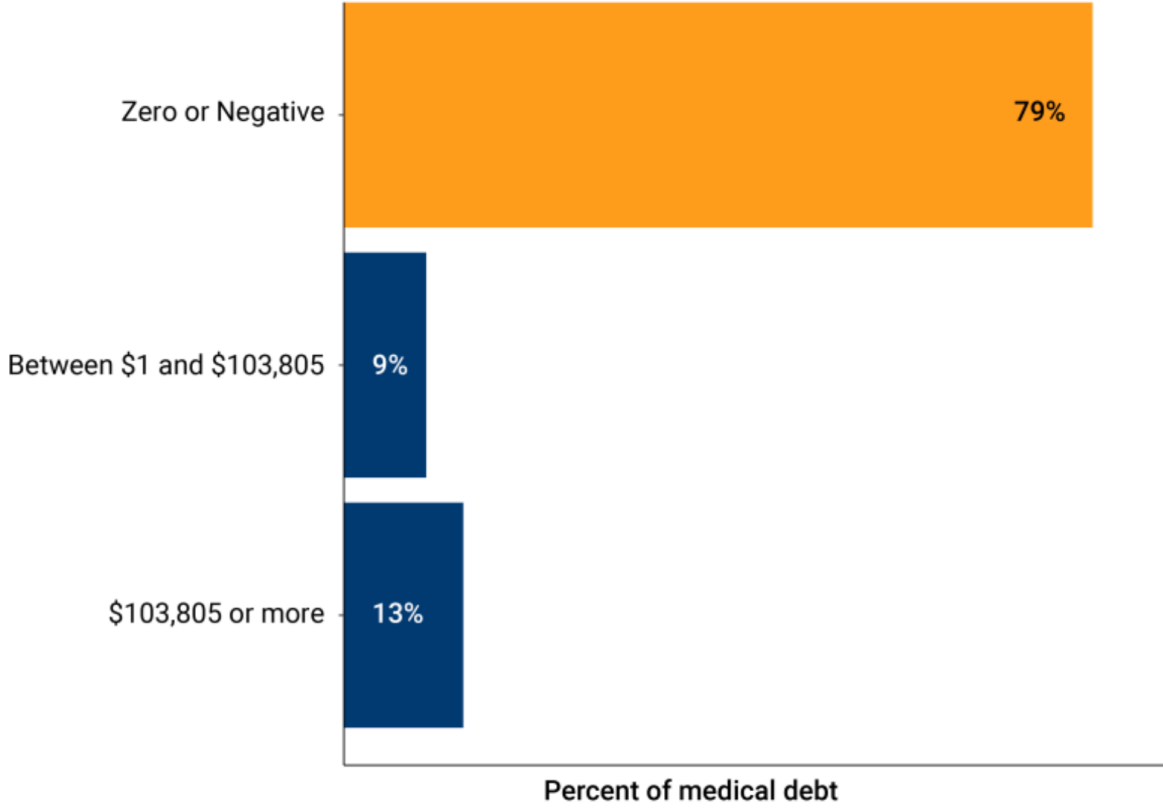
	Prior authorization required	Standard
Stopped <120 days	5.8%	1.4%
Delayed fill >30 days	21.7%	7.1%

Most Common NSCLC Therapies Used by Race¹

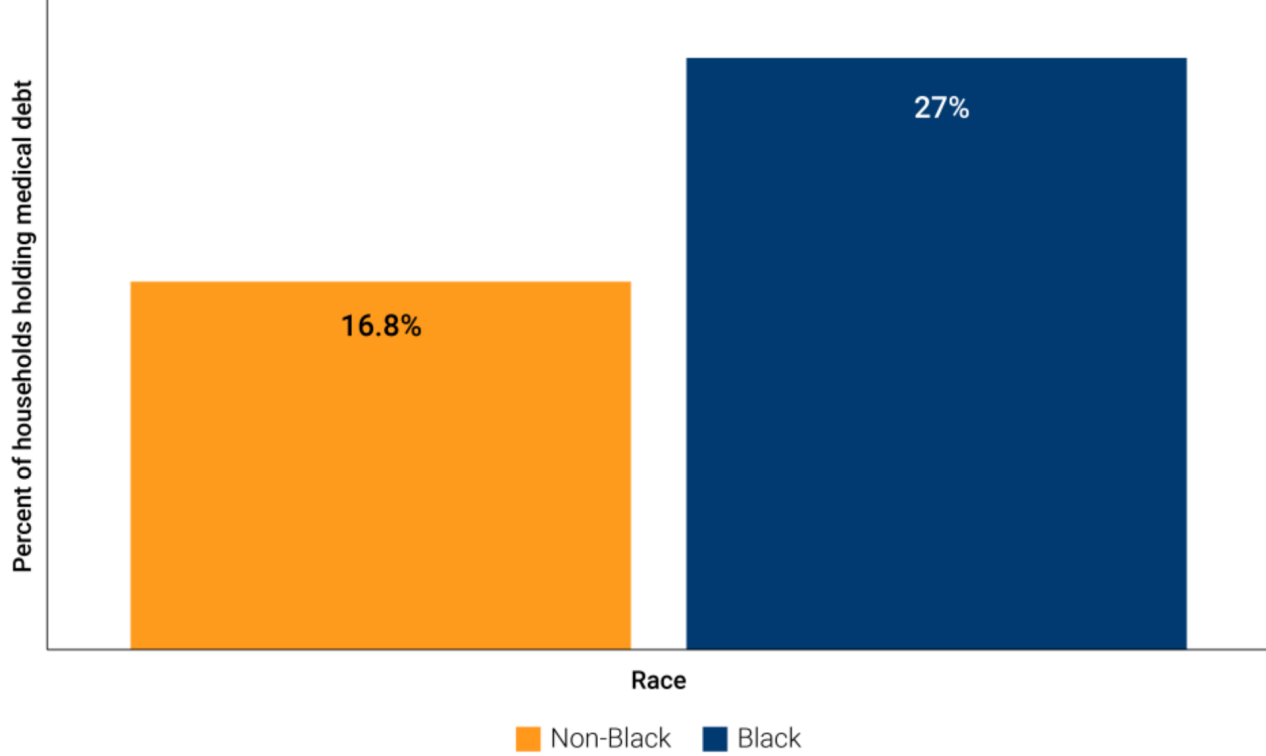
First-line regimen	NSCLC overall (n=14,768)	White (n=9,793)	Black or African American (n=1,288)
Carboplatin, Pembrolizumab, Pemetrexed	2933 (19.9)	1936 (19.8)	291 (22.6)
Carboplatin, Paclitaxel	2428 (16.4)	1617 (16.5)	240 (18.6)
Pembrolizumab	2042 (13.8)	1450 (14.8)	148 (11.5)
Carboplatin, Pemetrexed	944 (6.4)	618 (6.3)	81 (6.3)
Osimertinib	819 (5.5)	447 (4.6)	52 (4.0)
Nivolumab	537 (3.6)	377 (3.8)	59 (4.6)
Carboplatin, Paclitaxel, Pembrolizumab	499 (3.4)	348 (3.6)	37 (2.9)
Carboplatin, Paclitaxel Protein-Bound	352 (2.4)	246 (2.5)	37 (2.9)
Carboplatin, Paclitaxel Protein-Bound, Pembrolizumab	360 (2.4)	234 (2.4)	31 (2.4)
Bevacizumab, Carboplatin, Pemetrexed	334 (2.3)	218 (2.2)	28 (2.2)

Medical Debt¹

Percent of total medical debt by household net worth



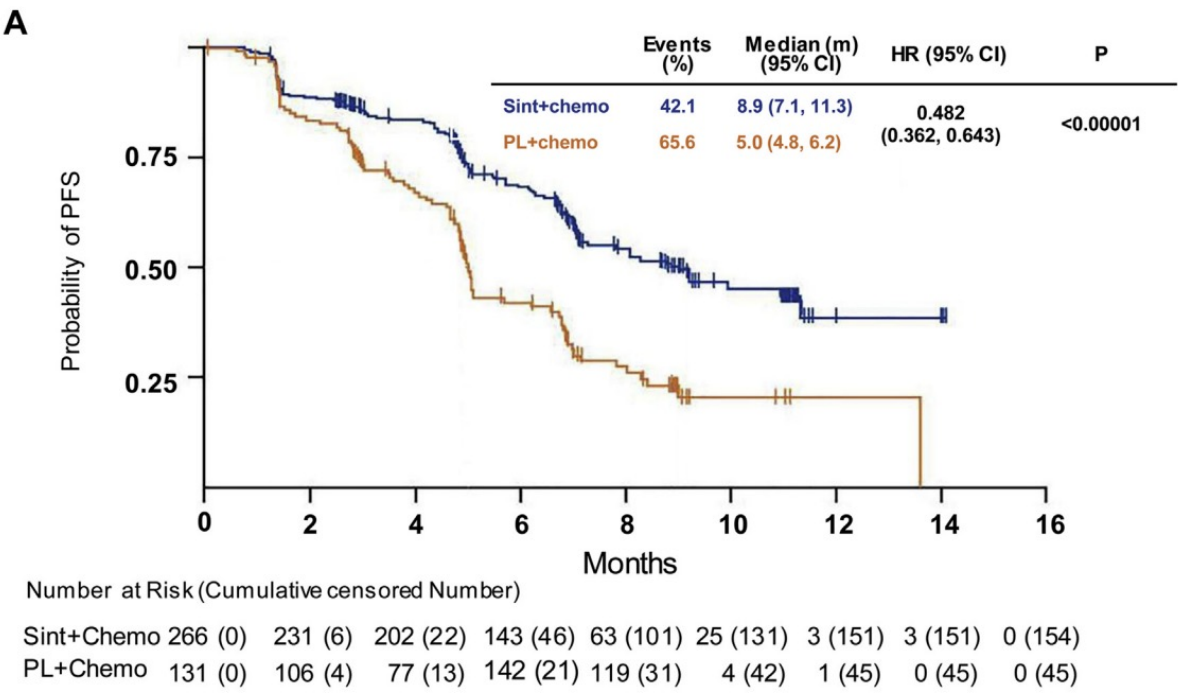
Percent of households holding medical debt by race



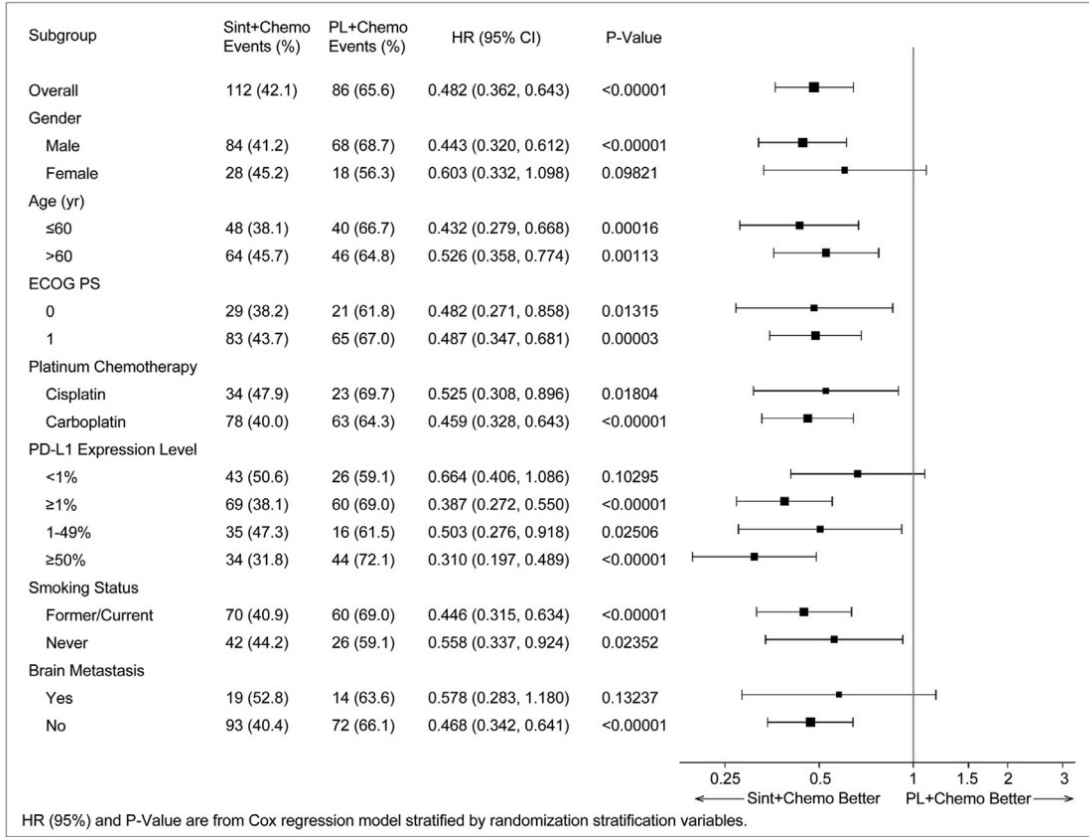
1. Brookings analysis of 2018 SIPP data.

ORIENT-11 as a Case Study¹

Kaplan-Meier plots for PFS in all randomized patients



Forest plot of HRs for PFS according to patient characteristics at baseline

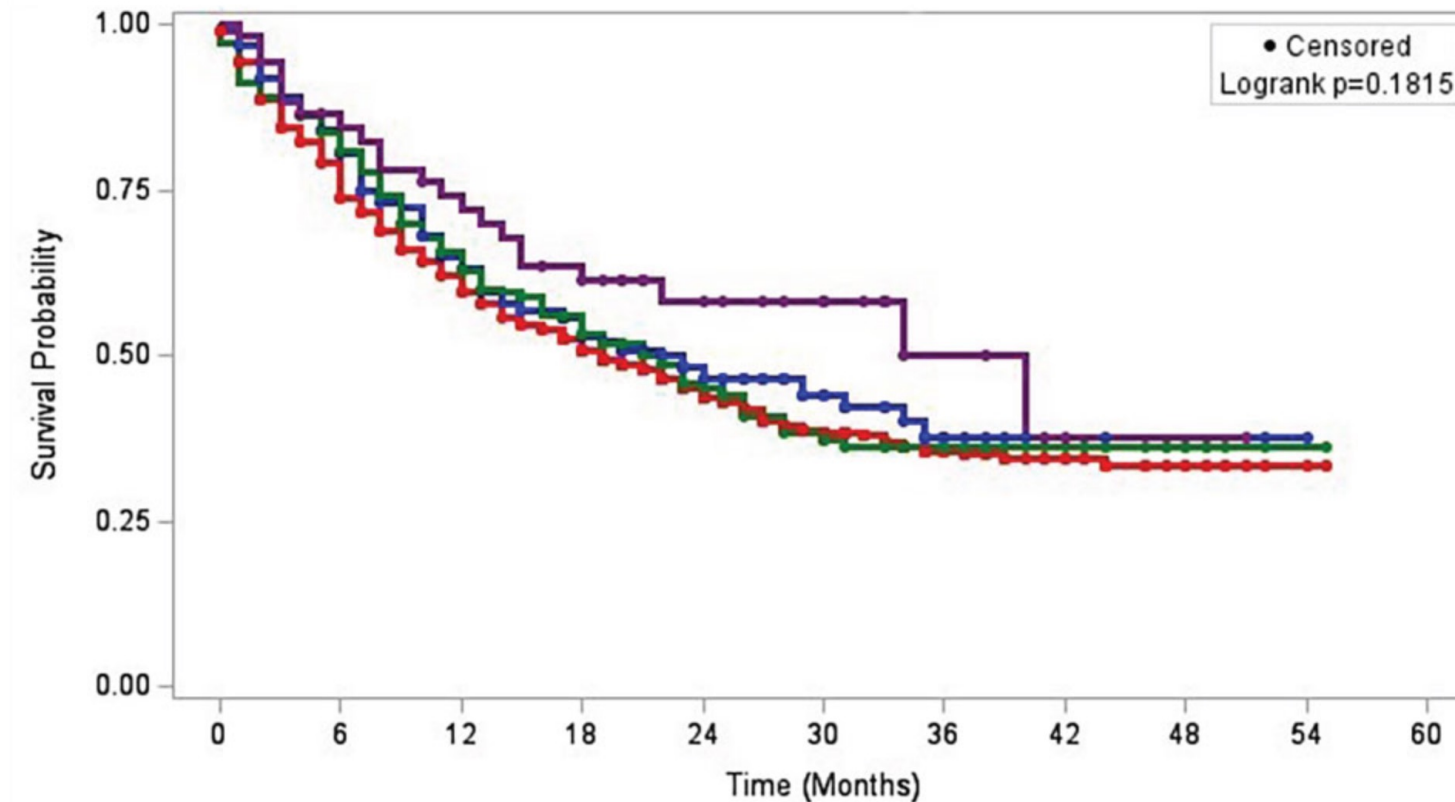


Generalizability/applicability to US population?

- Similar clinical practice standards between US and China
- Similar PK and PD of sintilimab in US and Chinese patients
- Similar efficacy and safety of sintilimab in US and Chinese patients

1. Yang Y et al. *J Thorac Oncol.* 2020;15(10):1636-1646.

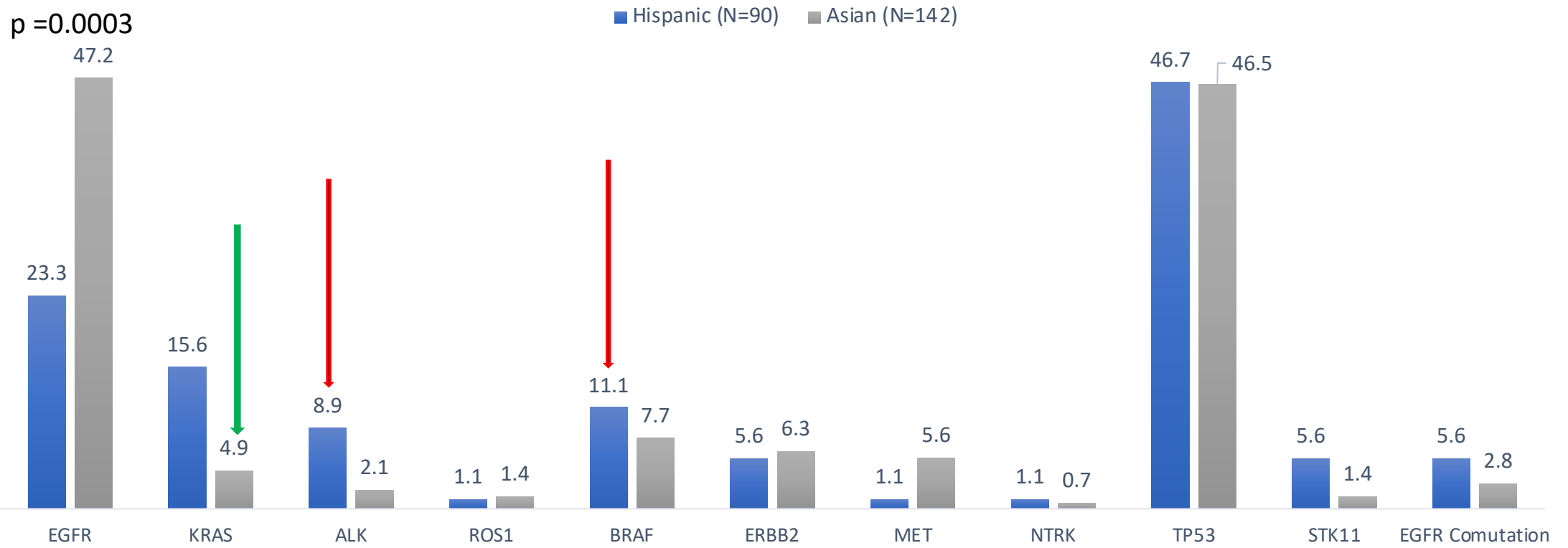
Asian patients have Similar Outcomes when Immunotherapy is used.



	White	Black	Hispanic	Asian		
White	1044	654	403	174	49	13
Black	185	127	76	30	4	2
Hispanic	172	115	68	34	17	3
Asian	52	38	26	16	4	1

Actionable Biomarkers Differ by Race

Tumor Mutations By Race



Gaps and Disparities in Biomarker Testing in NSCLC

MYLUNG Consortium

Test Types	Overall (N = 3,474)	Nonsquamous (n = 2,820)
EGFR	70%	76%
ALK	70%	76%
ROS1	68%	73%
BRAF	55%	59%
PD-L1	83%	83%
Any biomarker	90%	91%
All 5 biomarker tests	46%	49%
NGS	37%	39%

Study Period: April 2018 to March 2020

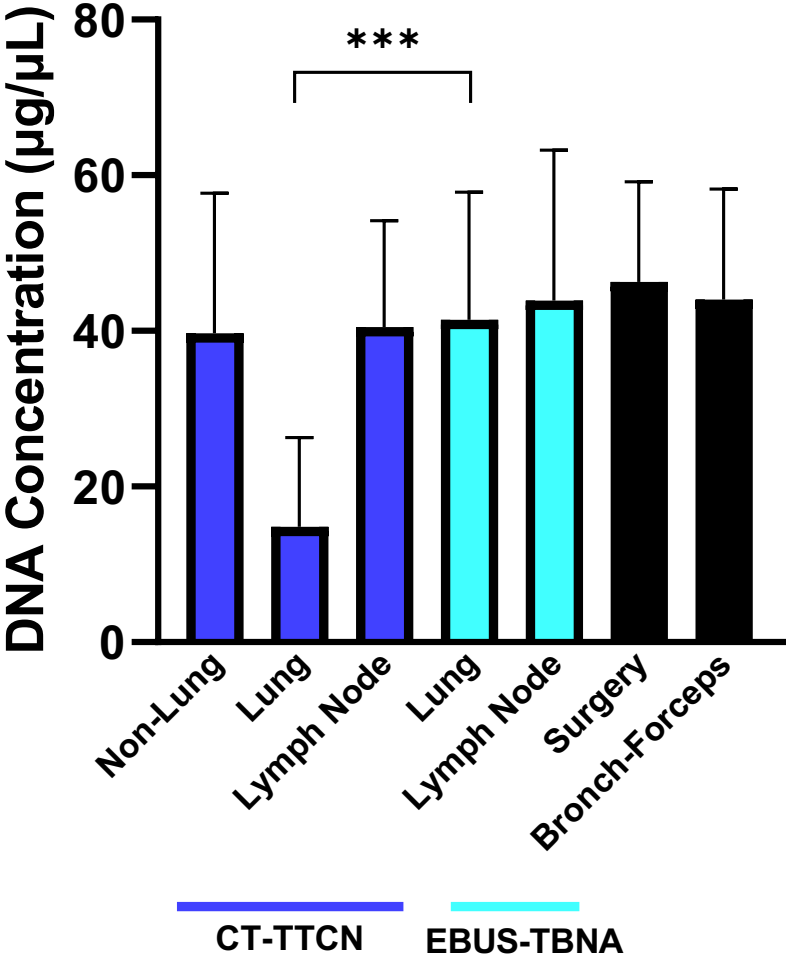
FLATIRON EHR-Derived Data

	NSCLC Overall (N = 14,768)	White (n = 9,793)	Black/AA (n = 1,288)	P, White vs Black/AA
All patients with NSCLC				
Ever tested	11,297 (76.5%)	7,477 (76.4%)	948 (73.6%)	.03
Tested prior to 1L therapy		6,064 (61.9%)	784 (60.9%)	.47
Ever NGS tested	7,185 (48.7%)	4,904 (50.1%)	513 (39.8%)	< .0001
NGS tested prior to 1L therapy		3,081 (31.5%)	332 (25.8%)	< .0001
	Nonsquamous (n = 10,333)	White (n = 6,705)	Black/AA (n = 922)	P, White vs Black/AA
Patients with nonsquamous NSCLC				
Ever tested	8,786 (85.0%)	5,699 (85.0%)	764 (82.9%)	.09
Tested prior to 1L therapy		4,881 (72.8%)	662 (71.8%)	.52
Ever NGS tested	5,494 (53.2%)	3,668 (54.7%)	404 (43.8%)	< .0001
NGS tested prior to 1L therapy		2,452 (36.6%)	274 (29.7%)	< .0001

**Still missing the mark overall,
and there are notable
disparities in testing**

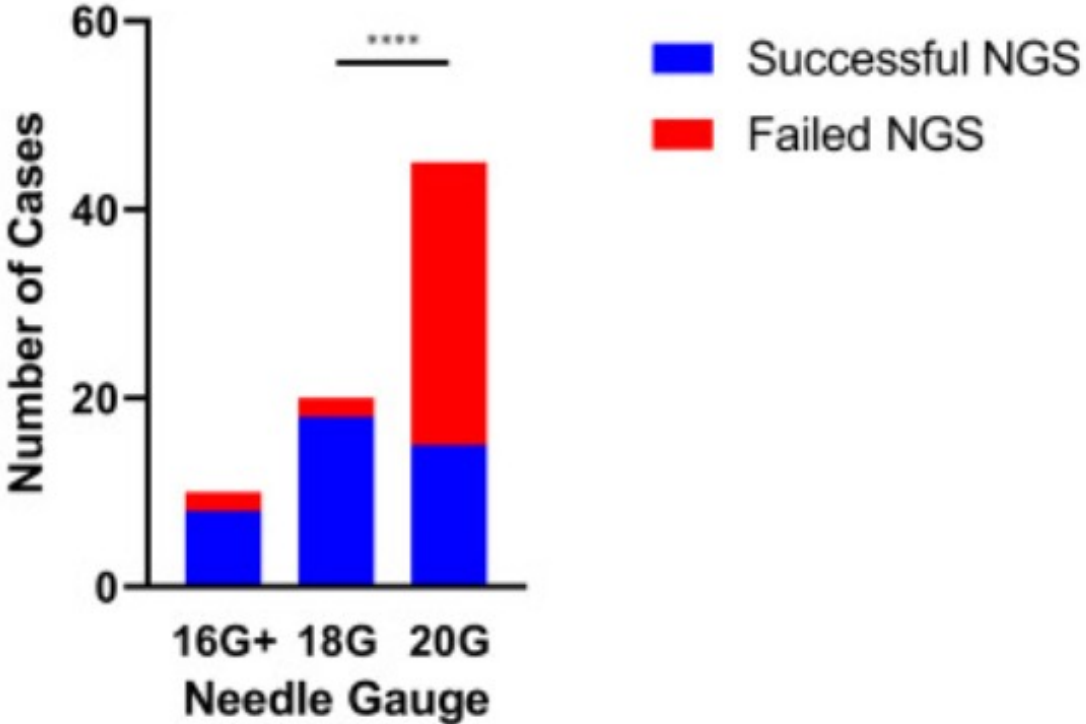
Needle Gauge Matters

DNA Yield Based on Biopsy Type



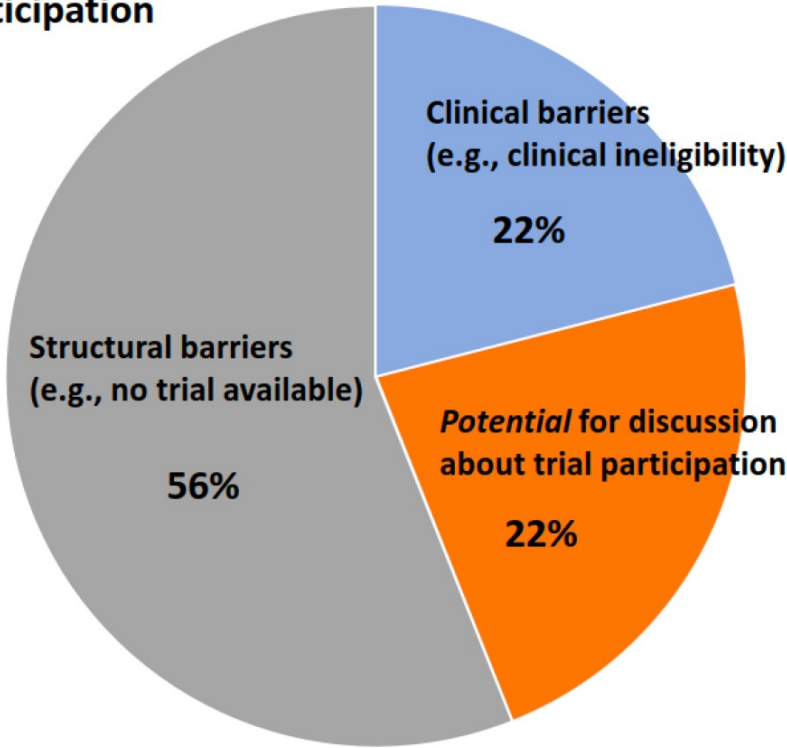
*** p=0.0002

CT-guided Transthoracic Core Needle Biopsy

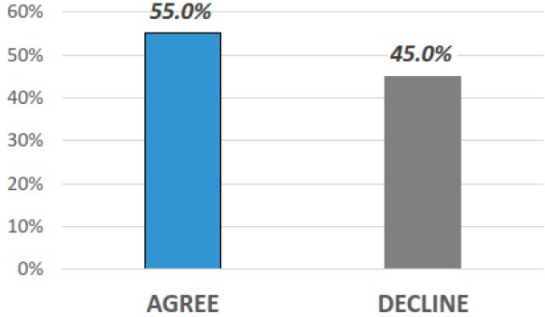


Real Barriers to Clinical Trial Participation

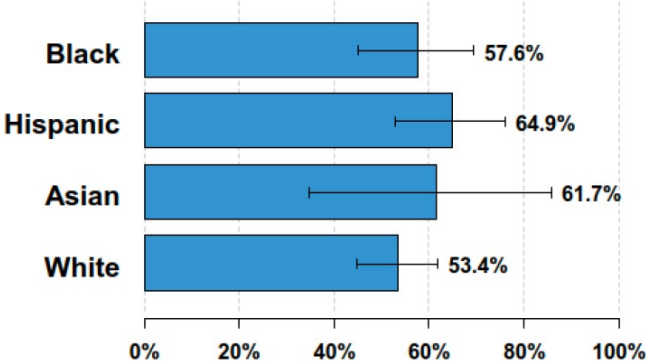
Primary Barriers to Trial Participation



If Offered a Trial, What Proportion of Patients Agree to Participate?

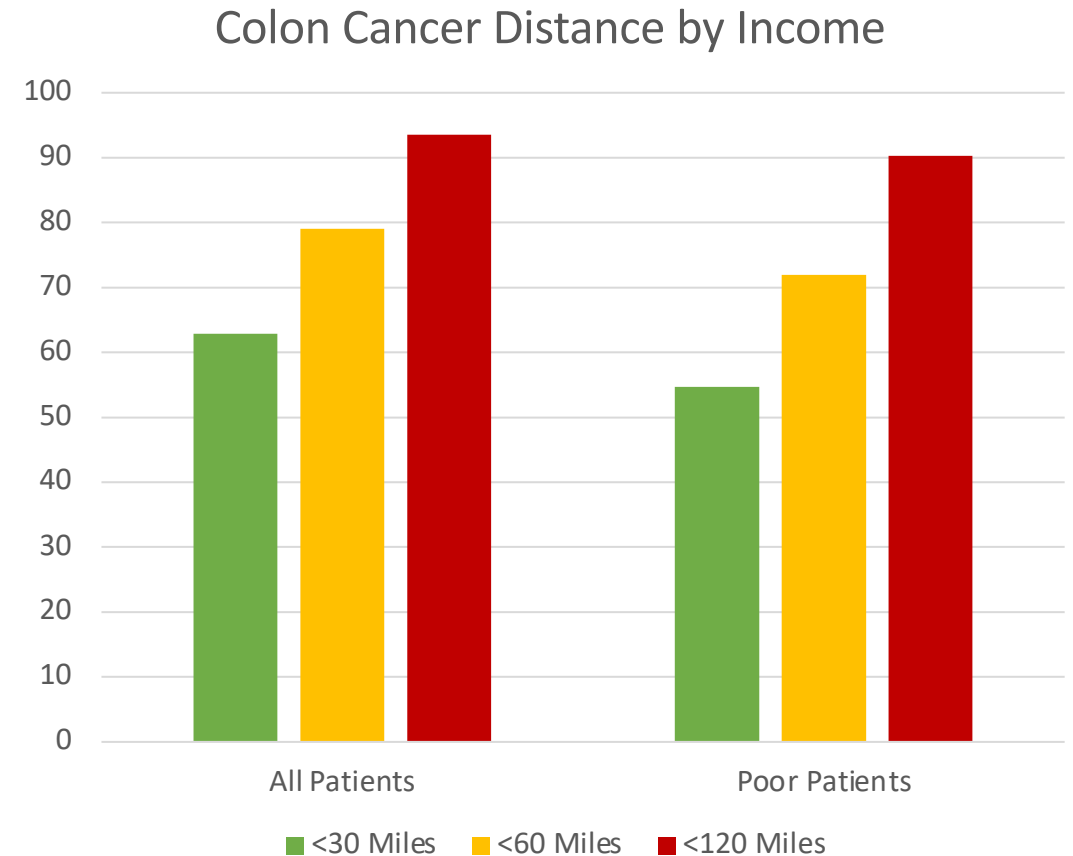
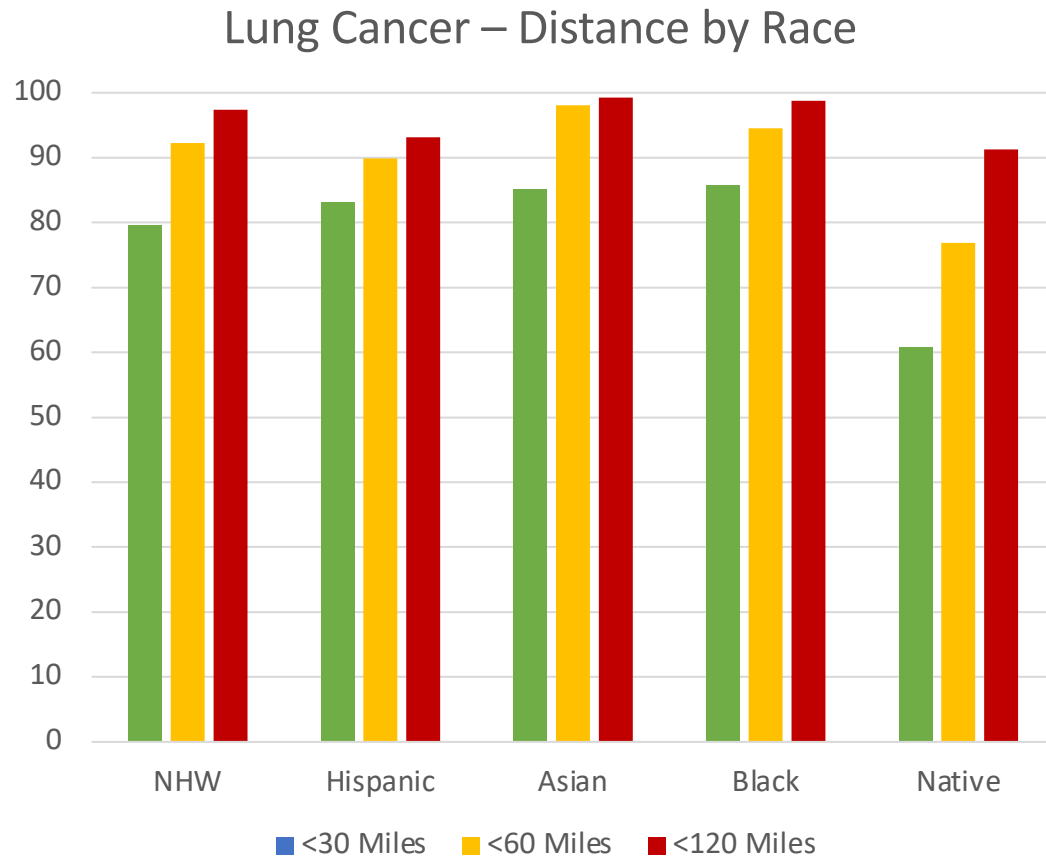


Results by Race/Ethnicity



Osarogiagbon RU, Sineshaw HM, Unger JM, Acuña-Villaorduña A, Goel S. Am Soc Clin Oncol Educ Book. 2021 Mar;41:1-13. PMID: 33830825.

Probability that you live close to a clinical trial



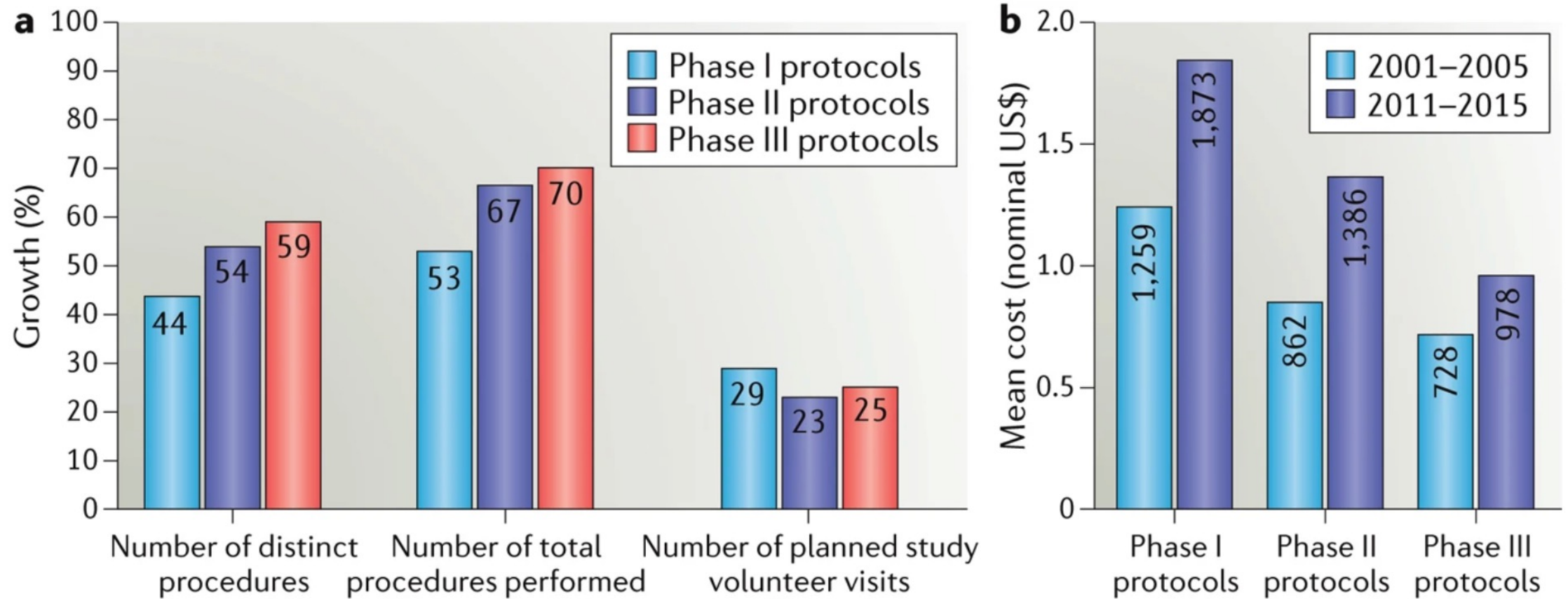
Why few clinical trials in small communities?

A survey of 61 centers

- CTO median employees 104 (4-811)
- Median analytic cases 3856
- Annual budget \$8.2M (.25M-23.9M)
- Median days to activation 167
- Median accruals per center 480 (5-6271)
- Median trials per center 282 (31-1833)
- **Median accruals per trial 1.7**

There is a structural bias in our clinical trial system favoring urban centers, those with philanthropic support and well insured patients

Trends in Clinical Trial Complexity and Cost

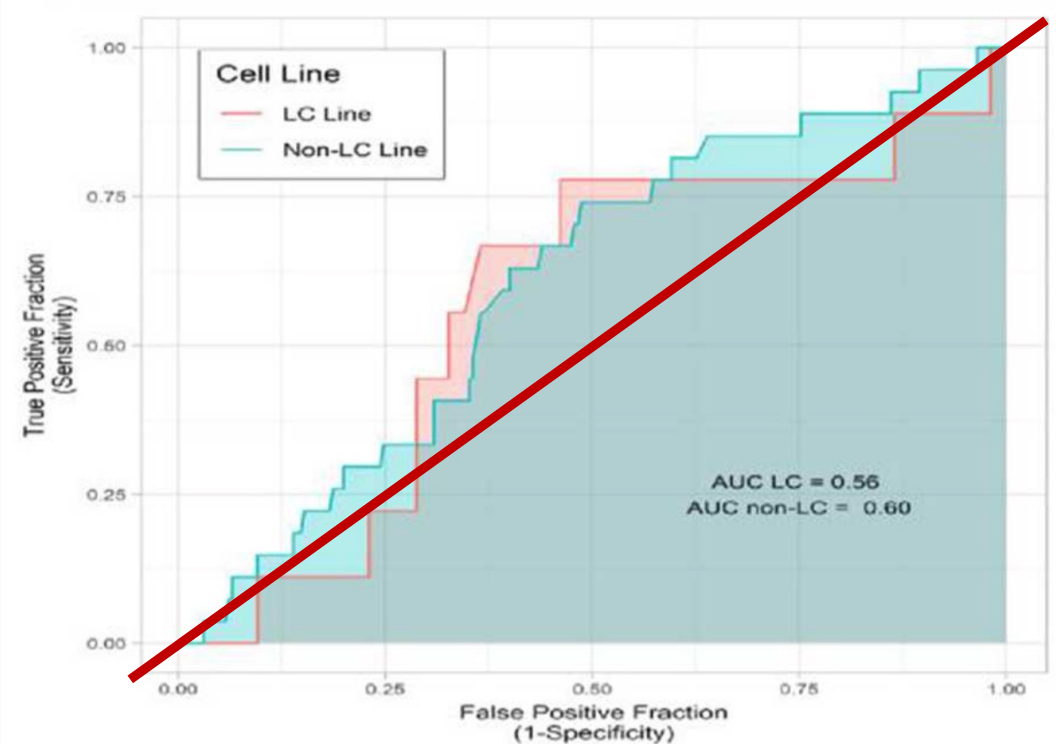


Preclinical Research Challenges

Lack of Diversity in Cell Lines

- 800 Lung Cancer Cell Lines
- Most are isogenic or derived from multiple sites on same patients
- 30/230 cell lines from Black patients (ranging from 56-91% African ancestry)

Lack of Prediction of Drug Success



Conclusions

- Good News! Disparities in cancer outcomes are improving!
- Causes of disparities may be financial, biological or structural
- Those of us who treat cancer should recognize when we are building systems and structures that have the potential to worsen disparities.

Thank You!