

How I Teach about Race and PFTs

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Disclosures

- Privilege
- Educator

Needs Assessment

- Acknowledge problems with the use of race in medicine
 - GFR, obstetric risk, pulse oximetry^{1,2}
- Take opportunity to discuss a pulmonary-specific use of race
 - Include a discussion of social determinants of health
- Create a more inclusive environment

1. Vyas NEJM 2020
2. Sjoding NEJM 2020

Learning Objectives?

- Race is a social construct...but there are observable differences related to self-identified race
- Long tradition of racism in PFTs
- Pros and cons to using race-based correction
- Proper use of PFTs for clinician

- I advocate removing the use of race-correction from PFT interpretation

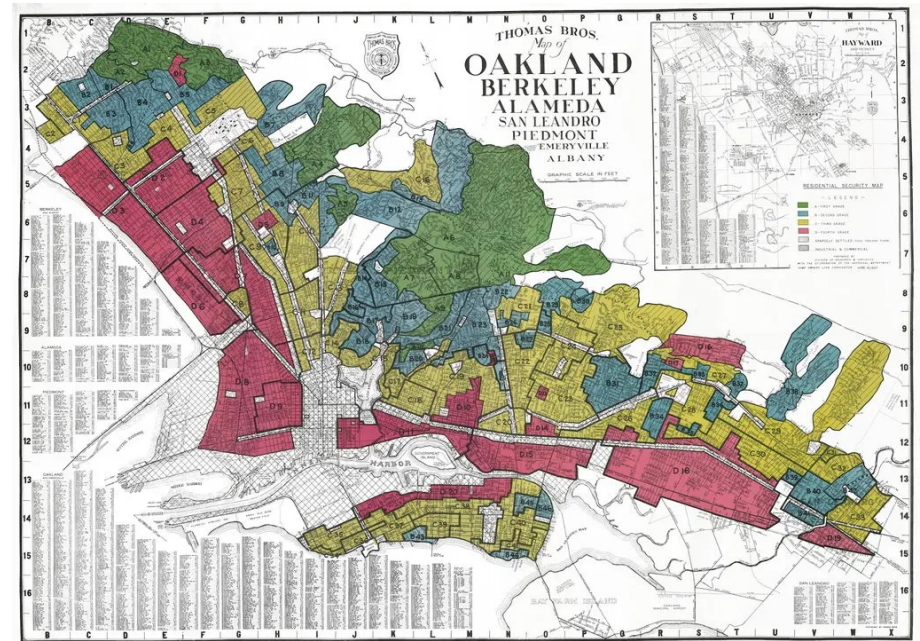
Observed differences

- Differences have been noted in lung volumes associated with self-identified race.
- Purported to reflect differences in thoracic height to total height ratio.
- Social determinants of health:
 - Early nutrition
 - Childhood infections
 - Air pollution exposure
 - Tobacco smoke exposure
 - Low birth weight
- Genetic differences¹ often collinear with social determinants of health

1. Kumar NEJM 2010

Social determinants of lung function

- Redlining has resulted in persistent geographic segregation



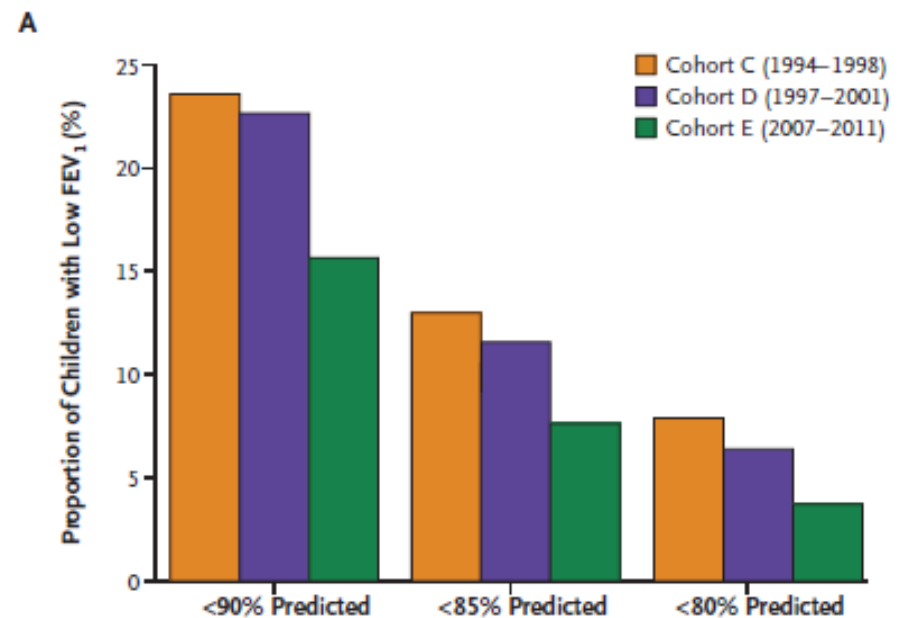
NYT 8/24/17

Social determinants of lung function

Lung development is influenced by air pollution exposure

- USC's California Children's Health Study
- Lung growth measured by PFTs improved among cohorts exposed to less air pollution over time
- No improvement in height

Differential exposure may account for differences in lung function



Gauderman NEJM 2015

History of Spirometry and race

- Spirometer used by John Hutchinson to screen for disease.¹
 - Differences based on age, height, sex
 - Occupation, socioeconomic status
- Adopted to justify slavery in US.²
- Differences attributed to inherent biological differences.³
- White was presented as reference value
- Early correction equations simply reduced white values

1. Hutchinson Med Chir Trans 1846
2. Cartwright. Slavery in the light of ethnology 1860
3. Braun Chest 2020

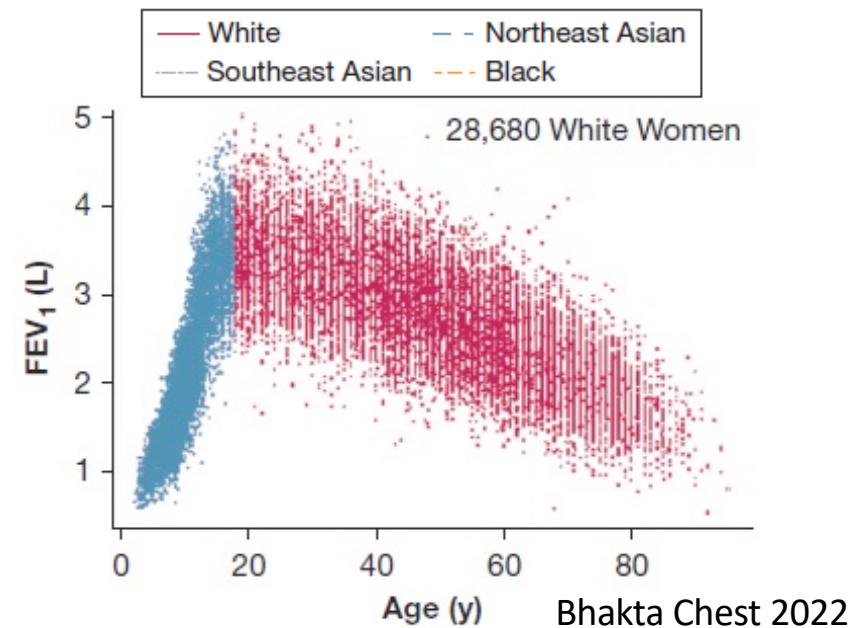
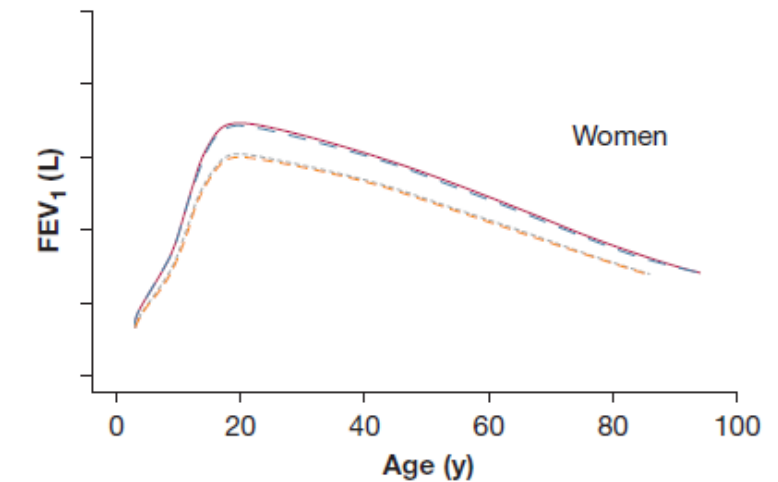
History of Spirometry and race

- Race-specific measurements introduced w NHANES.¹
- Limited socioeconomic info linked to measurements
- Global Lung Initiative reference values.²
 - Spirometry: white, African-American, N East Asia, S East Asia, “Mixed/Other”
 - GLI African-American is NHANES based; no data for African populations
 - GLI Other is combination of all GLI data
 - Lung volumes, DLCO primarily drawn from white populations
- New ERS/ATS technical standards continue to recommend race correction³

1. Hankinson AJRCCM 1999
2. Quanjer ERJ 2012
3. Stanojevic ERS 2022 (early access)

Race correction may harm

- Furthers narrative that white is normal
- Normalizes reduced lung function in Black population
 - May mask modifiable exposures that worsen lung health



Race correction may harm

- Race-specific equations underestimate COPD outcome severity among Blacks in SPIROMICS longitudinal cohort compared to GLI white reference or GLI Other¹
 - Observed differences related to discrimination may be judged normal variation
 - White subjects had improved lung function with higher socioeconomic status while Black subjects did not
- No evidence that race-specific equations improved ability to predict chronic lung disease events or mortality in MESA Lung Study cohort²

1. Baugh AJRCCM 2022

2. Elmaleh-Sachs AJRCCM 2022

Pros and Cons

- Self-reported race is subjective
 - Doesn't capture exposures
 - Poorly aligns with genetics, ancestry
 - Supports structural racism
- Use of race-specific equations:
 - May lead to underdiagnosis
 - Under treatment
 - Reduced access to transplant
 - Inability to qualify for disability
- Ignoring race-specific equations:
 - Will lower average lung function for population at large while increasing distribution
 - Reduced lung function may result in decreased access to therapies
 - Chemotherapy, lung resection
 - May affect employment eligibility
 - Impact on patients' perception of disease

How should we use PFTs in medicine?

- PFTs should not be used as binary Health vs Disease
- Must be used in context

60 yo runner with mild cough

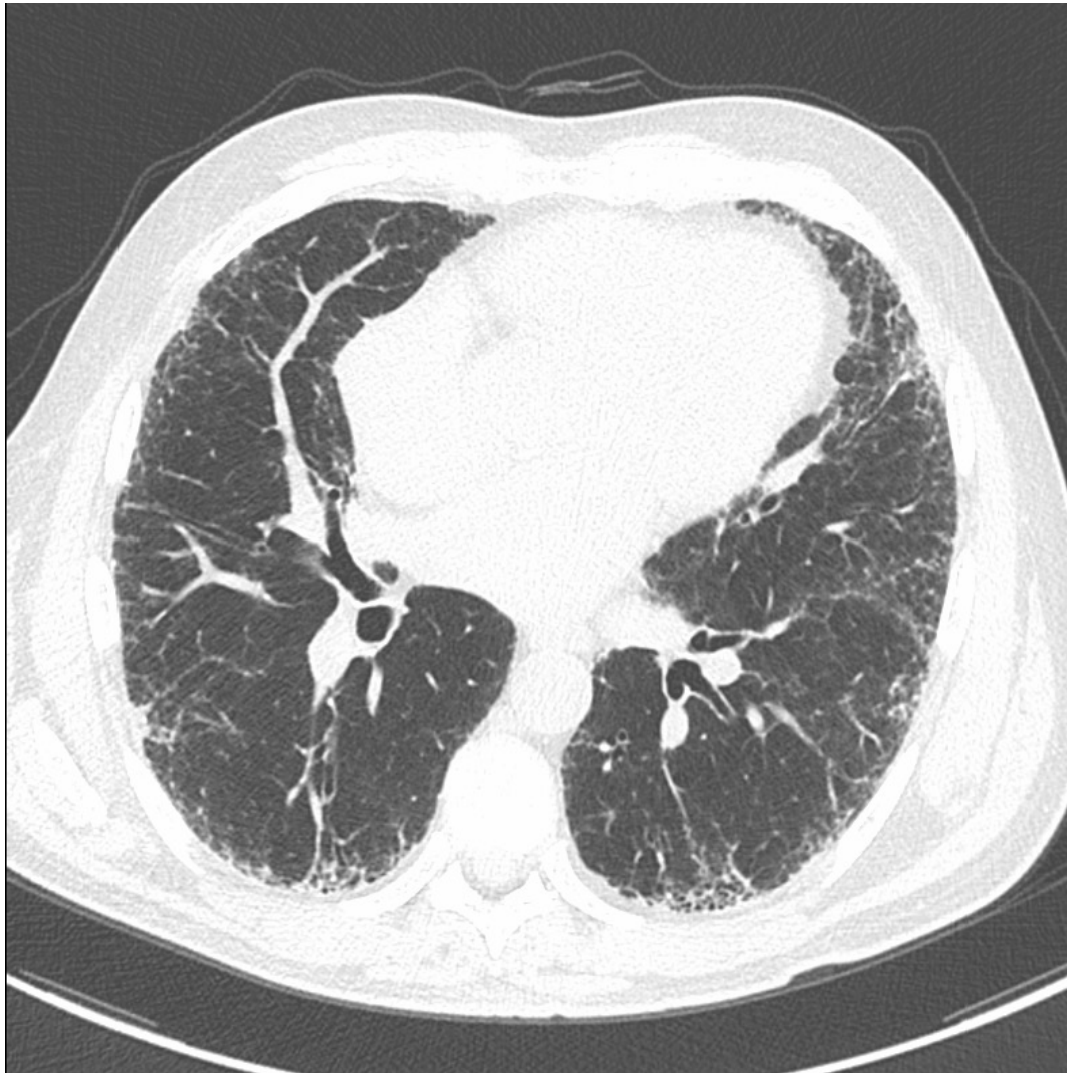
FVC 3.79, 90% pred

FEV1 3.33, 102% pred

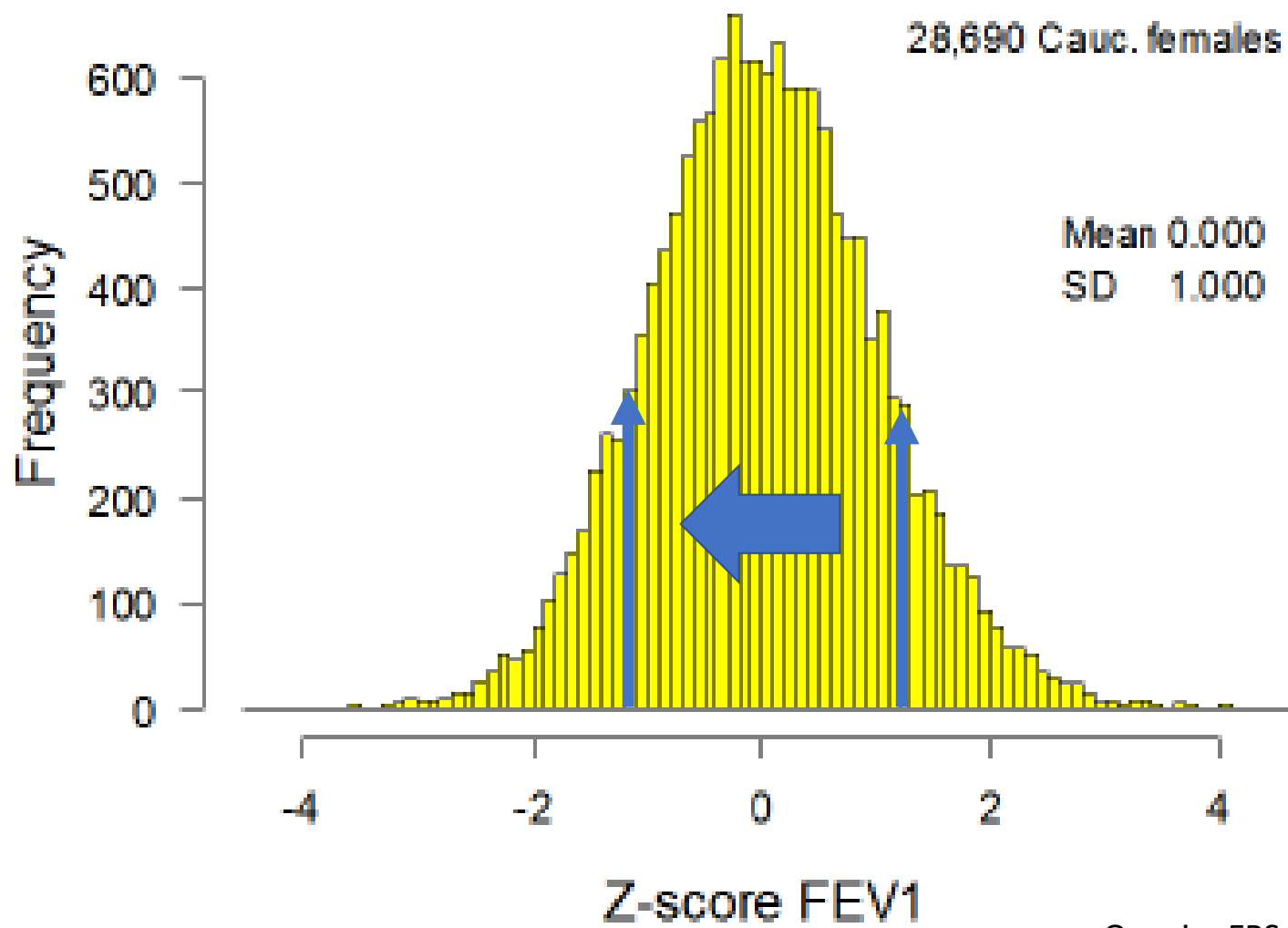
Ratio 88%

TLC 5.98L, 99% pred

DLCO 18.75, 74% pred



FVC 3.79, 90% pred
FEV1 3.33, 102% pred
Ratio 88%
TLC 5.98L, 99% pred
DLCO 18.75, 74% pred



How should we use PFTs in medicine?

- Values near thresholds are most susceptible to misinterpretation
- Bayesian approach provides value
- Longitudinal data is most helpful for prognosis, response

Recommendations

- Recognize limitations regarding race and medicine
 - Particularly ways that this furthers inequity
- Consider use of GLI Other as spirometry reference value for all

Conclusions

- We should be skeptical of the use of race in medicine
- Recognize that racial differences generally reflect differential exposure to harm and not inherent biologic differences
- As educators we must be willing to engage in discussions that improve care