Fulfilling the dream: Towards reducing inequalities in lung cancer screening

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Editorial on: Racial Differences in Outcomes within the National Lung Screening Trial: Implications for widespread implementation by Tanner and colleagues.

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Martin Luther King Jr once said “We may have all come on different ships, but we're in the same boat now“. However, more than fifty years on, inequalities exist in healthcare and cancer outcomes vary greatly between different racial and socioeconomic groups[1]. This is largely due to late presentation leading to less radical treatment in these groups[2]. In the US, individuals from African---American populations are less likely to have medical insurance or a regular primary care physician[3,4]. Lung cancer Low Dose Computed Tomography (LDCT) screening in the National Lung Cancer Screening Trial (NLST)[5] had a clinically and statistically significant impact on lung cancer specific and all cause mortality when compared to chest radiograph (CXR) alone. However, whether LDCT screening has the same effect in all racial groups had not yet been evaluated.

Lung cancer LDCT screening aims to detect lung cancers earlier in order to improve radical treatment rates and in turn improve long term survival and quality of life. However, individuals from non---White racial groups have been shown to have a reduced likelihood of undergoing curative surgery even after racial segregation and insurance coverage are accounted for[6]. It is likely, therefore that in addition to tobacco use and socioeconomic status (SES), factors such as health beliefs, trust in healthcare and difficult access to healthcare may contribute to delayed presentation.

Tanner and colleagues, in this issue of the *Journal*, have shown that the reduction in lung cancer specific mortality caused by LDCT screening was more pronounced in Blacks than Whites (HR 0.61 in Blacks vs. 0.86 in Whites) though the risk of death from lung cancer was almost doubled in Black compared with White current smokers (HR 4.10 vs. 2.25). This improved benefit was seen despite the fact that Black NLST participants had more features

associated with socioeconomic deprivation such as lower education and unmarried status, though SES as a variable was not reported. They also show that when stratifying by race, all cause mortality was significantly reduced by LDCT compared with CXR in Blacks but not Whites.

The authors propose this to be primarily due to the improved access to healthcare brought about by screening in this group (and hence was more pronounced in LDCT group than CXR group as the former was more sensitive in picking up findings that would result in regular healthcare consultations). In fact, they note that death from infections and coronary disease was also reduced in the LDCT screening group compared with the CXR group. It is not clear whether this effect is related to particular strategies or protocols held by the different screening centres and further evaluation of this would be of utmost interest.

This study has obvious strengths in that it evaluates the impact of screening in different racial groups in a very powerful data set, and to date, NLST has the richest set of data in the field. However, the authors acknowledge that approximately 90% of NLST participants were White and this is clearly not representative of the US population as a whole. Certainly, the 2010 US national census data report an excess of 12% of the US population to be Black or African---American, three times the proportion within NLST participants[7]. It is also difficult to separate the deprivation effect from the race effect. The present study reports significantly increased correlates of deprivation within the Black study participants as compared with Whites, suggesting that most Blacks in the study were from low SES groups, whilst most Whites were not. Therefore, the differences in outcomes in the two groups may be subject to confounding from SES. A study comparing the effect of outcomes in different racial

groups after adjusting for SES is needed to distinguish such outcomes. Nonetheless, a study in lung cancer LDCT screening with these numbers of Black participants has not been done to date, and with these limitations in mind, much can be inferred from this study.

NLST used age and smoking criteria to determine eligibility to screening, though many risk prediction tools now exist that allow more sophisticated methods of selection of high---risk participants, and many of these place great value on race as a predictor of lung cancer risk[8]. Certainly, the $PLCO_{m2012}$ gives varying risk scores, depending on race. For example, a White 60 year old male, high school graduate, with emphysema, who smoked 20 cigarettes a day for 30 years until 10 years ago would have a lung cancer probability of 0.014. A Black male with the same risk factors would score 0.020 and would meet the risk entry criteria for screening, while the White male would not. Use of such scores may help to reduce inequalities by acknowledging the higher risk in some racial groups.

Selection is only one part of the problem, and improving uptake and adherence to screening is also of great importance. Certainly Blacks and current smokers are acknowledged to have lower risk perception of lung cancer[9] and smokers and individuals from low SES groups have shown poor participation in lung cancer screening studies[10]. Non---adherence to lung cancer screening has been shown to be associated with African---American race, less than high school education and false positive screening results[11]. Studies in prostate and bowel screening modalities have also shown an association between non---adherence and current smokers and individuals with chronic bronchitis[12].

Recruitment methods in NLST were highly variable across the different screening centres, particularly with respect to attempts to recruit participants from socioeconomically deprived communities by community outreach programmes[13]. Success with such programmes was poor with 53 out of 79 of such programmes failing to recruit or recruiting badly. Six centres implemented programmes to specifically target African---American minorities in a variety of ways and though success rate by ethnicity is not currently reported, it is acknowledged that some institutions used community outreach programmes to increase their recruitment of minority groups. However, 17 of the 23 community outreach programmes within these six institutions failed to recruit or recruited badly implying that limited success was achieved in minority groups. Furthermore it was noted that outreach programmes were very inexpensive at a median cost per recruit of $4 compared with mass media ($79 per recruit) and direct mail ($101 per recruit). Of these, television advertising has been reported to most significantly increase the cost of recruitment[14].

Tanner and Colleagues are to be commended on their study which demonstrates that Black NLST participants benefitted more from LDCT screening in terms of lung cancer specific and all cause mortality than White participants. The association between African---American participants and probable increased socioeconomic deprivation highlights the importance of good access to healthcare in low SES groups. The use of risk prediction scores and recruitment strategies that value racial origin are likely to gain increasing importance. By increasing our understanding of racial differences in the recruitment, adherence and efficacy of screening, we can not only improve the cost---effectiveness of lung cancer screening but also improve access to healthcare in individuals from minority groups.

References:

1 Zeng C, Wen W, Morgans AK, Pao W, Shu X---O, Zheng W. Disparities by Race, Age, and Sex in the Improvement of Survival for Major Cancers. *JAMA Oncol* 2015; **1**: 88–96.

2 Abel GA, Shelton J, Johnson S, Elliss---Brookes L, Lyratzopoulos G. Cancer---specific variation in emergency presentation by sex, age and deprivation across 27 common and rarer cancers. *Br J Cancer* 2015; published online March 3. DOI:10.1038/bjc.2015.52.

3 Schiller JS, Ward BW FG. Early release of selected estimates based on data from the national health interview survey: Usual place to go for medical care. 2014 http://www.cdc.gov/nchs/nhis/released201412.htm (accessed May 4, 2015).

4 Martinez RC and M. Health insurance coverage:Early release of estimates from the national health interview survey, 2013: US Department of Health and Human Services Centers for Disease Control and Prevention; 2014 http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201309.pdf (accessed May 4, 2015).

5 Aberle DR, Adams AM, Berg CD, *et al.* Reduced Lung---Cancer Mortality with Low---Dose Computed Tomographic Screening. *N Engl J Med* 2011; **365**: 1–15.

6 Neighbors CJ, Rogers ML, Shenassa ED, Sciamanna CN, Clark MA, Novak SP. Ethnic/racial disparities in hospital procedure volume for lung resection for lung cancer. *Med Care* 2007; **45**: 655–63.

7 An overview of race and Hispanic origin: 2010. United States Census Bureau. 2010 http://www.census.gov/prod/cen2010/briefs/c2010br---02.pdf (accessed May 4, 2015).

8 Tammemägi MC, Katki HA, Hocking WG, *et al.* Selection criteria for lung---cancer screening. *N Engl J Med* 2013; **368**: 728–36.

9 Park ER, Ostroff JS, Rakowski W, *et al.* Risk perceptions among participants undergoing lung cancer screening: baseline results from the National Lung Screening Trial. *Ann Behav Med* 2009; **37**: 268–79.

10 McRonald FE, Yadegarfar G, Baldwin DR, *et al.* The UK Lung Screen (UKLS): Demographic profile of first 88,897 approaches provides recommendations for population screening. *Cancer Prev Res* 2014; **7**: 362–71.

11 Ford ME, Havstad SL, Flickinger L, Johnson CC. Examining the Effects of False Positive Lung Cancer Screening Results on Subsequent Lung Cancer Screening Adherence. *Cancer Epidemiol Biomarkers Prev* 2003; **12**: 28–33.

12 Ford ME, Havstad SL, Fields ME, Manigo B, McClary B, Lamerato L. Effects of baseline comorbidities on cancer screening trial adherence among older African American men. *Cancer Epidemiol Biomarkers Prev* 2008; **17**: 1234–9.

13 Marcus PM, Lenz S, Sammons D, Black W, Garg K. Recruitment methods employed in the National Lung Screening Trial. *J Med Screen* 2012; **19**: 94–102.

14 Hinshaw LB, Jackson SA, Chen MY. Direct mailing was a successful recruitment strategy for a lung---cancer screening trial. *J Clin Epidemiol* 2007; **60**: 853–7.

15 Aberle DR, Adams AM, Berg CD, *et al.* Baseline characteristics of participants in the randomized national lung screening trial. *J Natl Cancer Inst* 2010; **102**: 1771–9.