

# Racial Differences Pertaining to a Belief about Lung Cancer Surgery

## Results of a Multicenter Survey

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**Background:** Patients at the Philadelphia Veterans Affairs Medical Center frequently voice concern that air exposure during lung cancer surgery might cause tumor spread. Several African-American patients asserted that this belief was common in the African-American community.

**Objective:** To assess the prevalence of the belief that air exposure during lung cancer surgery might cause tumor spread and gauge the influence of this belief on the willingness of African-American and white patients to have lung cancer surgery.

**Design:** Prospective questionnaire survey.

**Setting:** Philadelphia Veterans Affairs Medical Center and University of Pennsylvania, Philadelphia, Pennsylvania; Los Angeles Veterans Affairs Medical Center, Los Angeles, California; and Medical University of South Carolina, Charleston, South Carolina.

**Patients:** 626 consecutive patients in pulmonary and lung cancer clinics.

**Measurements:** None.

**Results:** 38% of patients (61% of whom were African American and 29% of whom were white) stated that they believe air exposure at surgery causes tumor spread. The most significant predictor of belief was African-American race (odds ratio, 3.5 [95% CI, 1.9 to 6.5]), even after controlling for other relevant variables in a multivariable analysis. Nineteen percent of African Americans stated that this belief was a reason for opposing surgery, and 14% would not accept their physicians' assertion that the belief is false. These rates were also statistically significantly higher among African-American than white patients.

**Conclusions:** Belief in accelerated tumor spread at surgery is prevalent among general pulmonary outpatients and lung cancer clinic patients facing lung surgery, particularly among African-American patients. Our findings may pertain to key racial disparities in lung cancer surgery and survival rates and suggest that culturally sensitive physician training or outreach programs directed at disparate beliefs and attitudes may help to address racial discrepancies in health care outcomes.

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At the Philadelphia Veterans Affairs (VA) Medical Center in Philadelphia, Pennsylvania, we frequently encounter patients undergoing evaluation for lung lesions who have beliefs that might constrain acceptance of surgical options, including the notion that lung cancer spreads if exposed to air during surgery (referred to in this paper as the "study belief"). Several African-American veterans declined surgical evaluation on this basis and confided that this belief was common in the African-American community. We wondered whether this conviction could be disproportionately common among African-American patients, thereby more frequently undermining the best chance for cure in this population. To assess the origin, distribution, and importance of this belief, we surveyed outpatients attending 5 pulmonary or thoracic surgery practices located in 3 U.S. cities.

## METHODS

### Patient Recruitment

Patients were recruited from the outpatient clinics and medical practices of the Philadelphia and Los Angeles VA Medical Centers, University of Pennsylvania (Philadelphia), and Medical University of South Carolina (Charleston). When checking in at the clinic site, patients were given a 1-page survey and were asked to complete it while awaiting their physician encounter. Participation was voluntary, and health care entitlements were not altered or abridged if a patient declined to participate. The Commit-

tee on Studies Involving Human Beings at the University of Pennsylvania approved the study, and the institutional review boards of the study sites waived informed consent.

The study sites were chosen to include adequate numbers of African-American and white patients from the Northeast, South, and West Coast regions of the United States, including 2 VA sites; 3 non-VA sites; 3 clinics serving pulmonary outpatients, many at increased risk for lung cancer; and 2 clinics serving patients with lung tumors or cancer. The VA and university clinics comprised general pulmonary clinics with the following estimated distributions of patient conditions: chronic obstructive pulmonary disease, 40%; asthma, 20%; miscellaneous, 20%; sarcoidosis and interstitial disease, 15%; and lung cancer, less than 5%. The University of Pennsylvania surgical practice and Medical University of South Carolina lung cancer clinic comprised 90% of patients with lung cancer who were considered for or had undergone surgical biopsy or resection and 10% miscellaneous other patients.

### Data Collection

A multicenter, cross-sectional survey of consecutive clinic attendees was conducted between 1 July 1999 and 31 December 2000 by using anonymous, self-administered questionnaires distributed by clinic ancillary personnel to each patient at the time of a clinic visit. In 1 clinic, the surveys were distributed directly by the physicians. Clinic personnel at the 5 participating sites included 15 physicians (12 white people, 1 Pacific Islander, 1 Asian Ameri-

can, and 1 African American) and 28 nurses, respiratory therapists, and clerks (14 African Americans, 13 white people, and 1 Pacific Islander). Surveys were completed while the patient was waiting to be seen by a physician.

The survey instrument was tested and refined in a pilot study (1). The questionnaire was reviewed by an epidemiologist and a psychometrician and reflects a composite Flesch–Kincaid grade level of 5.9. It contains 6 key questions about the study belief near the beginning of the survey, 1 of which was intentionally phrased negatively to assess potential “yea sayers” biases among respondents.

### Statistical Analysis

The prevalence of individual beliefs was calculated with 95% CIs. In the univariable analysis, we assessed the association of African-American race with belief. Racial comparisons were made only between African Americans and white people, since the sum of Asian Americans, Hispanics, and others was less than 5% of the cohort. Responses did not include ethnic subgroups within the white category. In addition, we assessed the association of other baseline variables with individual beliefs, including age, sex, education level (less than eighth grade, eighth to twelfth grade, college, or more), household income (<\$20 000 per year, \$20 000 to \$50 000 per year, or >\$50 000 per year), religious affiliation, VA or non-VA site, surgical clinic versus general pulmonary clinic, urban versus rural residence, region of the country, marital status, and individual survey site.

To test the strength and independence of the association of each risk factor with individual beliefs, we performed a multivariable explanatory analysis. In this analysis, each demographic variable (for example, African-American race) was evaluated after adjustment for other potential confounding variables by fitting all covariables in a logistic regression model. A *P* value less than 0.05 after adjustment for all confounding variables was considered significant. All statistical analyses were performed by using Stata software, version 7.0 (Stata Corp., College Station, Texas).

### Role of the Funding Source

The funding source had no role in the collection, analysis, or interpretation of the data or in the decision to submit the manuscript for publication.

## RESULTS

We received 626 completed surveys of 652 that were distributed; 96% of respondents answered at least three quarters of the questions. Respondents included 251 VA patients (153 from Philadelphia and 98 from Los Angeles), 151 pulmonary outpatients and 127 thoracic surgery outpatients at the University of Pennsylvania, and 97 chest cancer clinic patients from the Medical University of South Carolina. Four percent of clinic attendees declined to participate.

The patients were predominantly middle-aged or el-

### Context

Some people believe that exposing the lungs to air during surgery for lung cancer causes tumor spread.

### Contribution

Of 626 outpatients seen in 5 pulmonary and lung cancer clinics in different parts of the United States, 38% believed that air exposure causes tumor spread. African Americans espoused the belief more often than did white people. Nineteen percent of African Americans said that it was a reason to decline surgery if they had a tumor.

### Cautions

These findings may help explain some apparent disparities in lung cancer care, but they don't elucidate underlying reasons for differences in beliefs and don't directly link beliefs to actions.

—The Editors

derly (mean age [ $\pm$ SD],  $60.4 \pm 14$  years), male, and white and lived in an urban setting, which reflected the geographic distribution of the clinics surveyed. **Table 1** lists patient demographic characteristics.

Regarding the 6 key questions, 45% of all patients had heard of the study belief and 37% believed it to be true. Although 49% thought most people they know believed it, only 12% knew of a case, 10% identified it as a reason to oppose lung surgery, and 9% would not believe their physician's advice that the belief was false. For each key question, highly significant differences were found in the relative proportions of responses from white people versus African Americans (**Figure**). For example, 29% of white people versus 61% of African Americans thought the study belief was true ( $P < 0.001$ ), 5% of white people versus 19% of African Americans would oppose surgery on the basis of the belief ( $P = 0.001$ ), and 5% of white people versus 14% of African Americans ( $P = 0.001$ ) would not believe their doctor on this issue.

The percentage of African-American respondents who thought the study belief was true (61% [86 of 142 patients]) was actually marginally higher than the percentage who had heard of it (57% [89 of 156 patients]). This apparent paradox was related to a smaller number of African-American patients responding to the “truth” question. No patient reported belief in a statement that he or she had never heard of.

Univariable analyses showed that African-American versus white race was a significant factor for each of the 6 key questions. Education (college education versus less than eighth grade), household income greater than \$50 000 per year versus \$20 000 to \$50 000 per year or less than \$20 000 per year, women versus men, and VA site versus non-VA site were significant for 3 or 4 of the questions. Urban versus rural residence, region of the United States,

and pulmonary versus surgical clinic were significant for 0 or 1 of the questions.

Multivariable analysis (Table 2) showed that most of the statistically significant differences by univariable analyses were no longer significant when confounding factors were considered. However, racial differences remained significant ( $P < 0.006$ ) for all questions despite adjustment for all covariables. Pulmonary clinic versus surgical clinic was the only factor to emerge as significant in the multivariable analysis; pulmonary clinic patients were significantly more likely to believe the study belief was true (odds ratio, 2.34 [95% CI, 1.24 to 4.44]). No significant first-order interactions were detected between race and other clinical variables about the study belief.

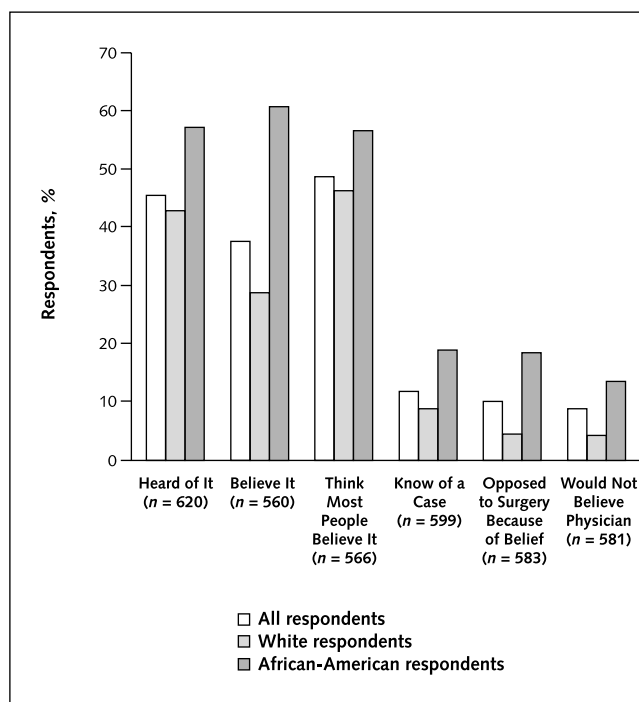
Only 21% of patients responded to the survey question asking where and when the study belief was first encountered; responses were generally vague (“don’t re-

Table 1. Patient Demographic Characteristics

Characteristic	Patients, n (%)
<b>Race or ethnicity</b>	
African American	157 (25)
White	409 (65)
Asian American	10 (2)
Hispanic	9 (1)
Unknown or other	41 (7)
<b>Sex</b>	
Women	202 (32)
Men	415 (66)
Unknown	9 (1)
<b>Age</b>	
>70 y	163 (26)
50–70 y	310 (50)
<50 y	144 (23)
Unknown	9 (1)
<b>Education</b>	
≤Eighth grade	32 (5)
High school	295 (47)
College	211 (34)
Unknown	88 (14)
<b>Income per year</b>	
\$0–\$20 000	159 (25)
\$20 000–\$50 000	169 (27)
>\$50 000	148 (24)
Unknown	150 (24)
<b>Residence</b>	
Urban	370 (59)
Rural	165 (26)
Unknown or other	91 (15)
<b>Region</b>	
South	84 (13)
West	91 (15)
Northeast	352 (56)
Unknown or other	99 (16)
<b>Religion</b>	
Baptist	110 (18)
Catholic	189 (30)
Unknown or other	327 (52)
<b>Clinic type</b>	
Pulmonary	402 (64)
Surgical	224 (36)
<b>Clinic site</b>	
VA	251 (40)
Non-VA	375 (60)

\* VA = Veterans Affairs.

Figure. Responses to survey questions by race.



member” or “from the gossip mill”) and did not differ appreciably between African-American and non-African-American respondents (data not shown).

## DISCUSSION

Using a questionnaire survey of patients attending 5 U.S. pulmonary or thoracic surgery outpatient clinics, we found widespread belief that exposure of lung cancer to air at the time of surgery promotes cancer spread. At all study sites, this belief was considerably more common among African Americans than white people. Nineteen percent of African-American respondents versus 5% of white respondents expressed opposition to lung cancer surgery on the basis of this belief, and 14% of African-American respondents versus 5% of white respondents indicated that they would reject physician advice to the contrary. Multivariable analyses showed that these racial differences were independent of income, education, sex, and other covariables.

It is unclear why these convictions are more common among African-American patients, but there is ample evidence that African Americans may have medical beliefs and attitudes that differ from those of white peoples (2–8); however, differences seemed less important in 1 study of VA cardiac care (9). Perhaps the legacy of racial discrimination against African Americans, mistrust and disenfranchisement from the current health care system, and misgivings about medical advice from non-African-American physicians contribute to the disparities we observed (10). Previous experience with inferior surgical or perioperative care could also play a role. Other major factors may be

rooted in Afro-centric cultural, religious, and folk beliefs, perceptions, and metaphors (11–13). Indeed, our results may reflect cultural differences determined by many factors; race may simply be a marker for the differences in attitude we observed.

Our results are highly compatible with those of previous studies in patients with breast cancer (11–13) and a national survey of African Americans (14), although we found no previous data about the study belief as it specifically pertains to lung cancer.

We could not find direct scientific evidence that tumors spread on contact with air when the chest is opened surgically. However, tumor *extirpation*, perhaps by removal of angiogenesis inhibitors, might lead to accelerated metastasis in some instances (15, 16). Many physicians can cite anecdotal cases in which metastatic disease seemed to “crop up” shortly after major pulmonary resection, despite negative findings on preoperative extrathoracic imaging. In addition, many patients in our survey recalled sorrowful personal experiences in which widespread tumor dissemination was definitively established only at thoracotomy. Thus, one can easily understand how belief in the study

notion has been somewhat accepted in lay and even scientific circles. Nevertheless, accelerated residual tumor growth after surgical resection seems to be distinctly uncommon clinically, and widespread acceptance of the study belief could undermine the best chance for cure of early-stage lung cancer.

The relationship between African-American race and lung cancer is complex and incompletely understood (17). Lung cancer is more prevalent and associated with overall lower 5-year survival rates among black people, with a notable lack of improvement between 1985 and 1998 (18). However, no such racial difference in survival exists for patients with advanced lung cancer, despite an unexplained disparity in chemotherapy use for metastatic disease (19). When similar treatment is provided, African Americans and white people have similar outcomes, both for patients with early-stage disease undergoing lung resection (20) and patients with late-stage disease receiving radiation therapy (21). Thus, the most important discrepancies relate to early-stage resectable disease, as evidenced by 2 recent disturbing papers. Greenwald and colleagues (22) found that among residents of Detroit, Michigan; San Francisco, Cal-

Table 2. Multivariate Analyses of Demographic Variables for 3 Key Survey Questions about the Study Belief\*

Variable	Patients Who Believe Tumors Spread when Exposed to Air		Patients Opposed to Surgery because of Belief		Patients Who Would Accept Physician's Advice that Belief Is False	
	Odds Ratio (95% CI)	P Value	Odds Ratio (95% CI)	P Value	Odds Ratio (95% CI)	P Value
Race or ethnicity						
African American	3.50 (1.89–6.49)	0.001	5.35 (1.66–17.3)	0.005	0.21 (0.07–0.64)	0.006
White	1.00		1.00		1.00	
Sex						
Women	0.69 (0.40–1.18)	0.173	0.96 (0.27–3.34)	>0.2	3.86 (1.13–13.2)	0.031
Men	1.00		1.00		1.00	
Age						
>70 y	0.54 (0.27–1.07)	0.075	1.27 (0.34–4.78)	>0.2	0.67 (0.19–2.34)	>0.2
50–70 y	0.83 (0.47–1.45)	>0.2	1.64 (0.51–5.25)	>0.2	1.02 (0.35–2.94)	>0.2
<50 y	1.00		1.00		1.00	
Education						
≤Eighth grade	2.28 (0.75–6.88)	0.145	3.24 (0.65–16.3)	0.153	0.96 (0.14–6.65)	>0.2
High school	1.34 (0.80–2.23)	>0.2	1.34 (0.48–3.75)	>0.2	1.08 (0.39–2.98)	>0.2
College	1.00		1.00		1.00	
Income per year						
\$0–\$20 000	2.31 (1.09–4.90)	0.028	5.37 (0.58–49.5)	0.138	0.93 (0.20–4.40)	>0.2
\$20 000–\$50 000	1.37 (0.71–2.67)	>0.2	2.47 (0.27–22.5)	>0.2	0.50 (0.13–1.97)	>0.2
>\$50 000	1.00		1.00		1.00	
Residence						
Urban	0.71 (0.42–1.22)	>0.2	0.49 (0.16–1.48)	>0.2	1.42 (0.52–3.85)	>0.2
Rural	1.00		1.00		1.00	
Region						
South	0.84 (0.37–1.86)	>0.2	0.73 (0.14–3.88)	>0.2	0.84 (0.22–3.23)	>0.2
West	1.35 (0.65–2.83)	>0.2	1.36 (0.45–4.10)	>0.2	1.41 (0.35–5.68)	>0.2
Northeast	1.00		1.00		1.00	
Religion						
Baptist	0.76 (0.34–1.69)	>0.2	0.51 (0.12–2.22)	>0.2	0.36 (0.70–1.87)	>0.2
Catholic	1.00		1.00		1.00	
Clinic type						
Pulmonary	2.34 (1.24–4.44)	0.009	1.34 (0.30–6.00)	>0.2	1.42 (0.39–5.21)	>0.2
Surgical	1.00		1.00		1.00	
Clinic site						
VA	0.48 (0.23–1.01)	0.052	1.61 (0.40–6.53)	>0.2	1.16 (0.31–4.40)	>0.2
Non-VA	1.00		1.00		1.00	

\* VA = Veterans Affairs.

ifornia; and Seattle, Washington with stage I non–small-cell lung cancer diagnosed between 1980 and 1982, African Americans were 20% less likely to undergo surgery and 31% less likely to survive 5 years. Bach and colleagues (23) reported a 13% lower rate of surgery and an 8% lower 5-year survival rate for African Americans among elderly patients with early-stage lung cancer in 10 U.S. sites.

The basis for the disparity in lung cancer surgery rates has been elusive. Various hypotheses have been suggested, including racial prejudice on the part of health care providers (24), inadequate access to medical care (22), excessive comorbid conditions among African Americans that preclude curative surgery (23), suboptimal patient–physician interactions (24), and patient preferences (23). Although prospective studies have been called for, little progress has been made in identifying the responsible factor(s). However, recent preliminary data suggest discrepancies arise from statistically significantly lower acceptance of surgical resection among African Americans compared with white people, rather than a lower likelihood of being offered surgery (25).

Our finding that 19% of African-American respondents (versus only 5% of white respondents) cite the study belief as the basis for opposing lung cancer surgery suggests that this disparity may contribute to the discrepant rates of early-stage lung cancer surgery and survival noted above (22, 23). If so, perhaps 1 factor related to these racial differences has now been identified. Alternatively, other beliefs may be important, or the study belief may simply be a marker for other factors; further research is warranted.

Our data also raise the question about whether lower rates of surgical treatment (and survival) may be remedied through additional culturally sensitive physician training or outreach programs targeted at African-American patients at risk for lung cancer. Such programs must respect African-American social and cultural models, be mindful of current mistrust and disenfranchisement of African-American patients in the current U.S. health care system, yet also reflect contemporary uncertainties about tumor biology and metastatic spread. Our findings also suggest that diverse attitudes and beliefs may underlie other racial differences in health care, by serving to polarize specific populations from advances in health care. Identifying and modifying harmful beliefs may be a realistic, practical, and promising means to tackle important racial discrepancies in health care outcomes.

Our study has several limitations. Patients who declined to participate could not be characterized, given the anonymous survey technique; however, the nonparticipation rate was less than 5% and unlikely to affect the results. Only 5 sites were surveyed, and all were located in urban, coastal areas of the United States. Thus, the surveyed sample may not fully represent the entire population at high risk for lung cancer in the United States or all patients facing lung cancer surgery. However, we surveyed a large number of African-American and non–African-American

patients, with and without lung cancer, and obtained results that were highly compatible with previous work and strikingly consistent across 2 large practices devoted to lung cancer surgery, 2 VA outpatient pulmonary practices, and 1 large university pulmonary practice. Another objection is that patients may act differently if actually confronted with the prospect of lung cancer surgery, not according to their responses in a hypothetical survey. Here it must be noted that the percentages of patients opposing surgery on the basis of the study belief are much lower than the percentages of patients espousing belief in its veracity. Furthermore, surgical clinic attendees were statistically significantly less likely than general pulmonary clinic patients to believe in the study notion. We obtained no insurance data, but racial differences persisted when we compared veterans with surgical outpatients in the private sector. Marital status can also influence the choice of surgery for lung cancer (26), but our marital data were insufficient for analysis because of the belated addition of the pertinent question to the survey instrument. In addition, responses were inadequate to allow us to comment meaningfully on the source of the study belief in our sample.

A final objection is that the paucity of African-American physicians staffing the clinics in our survey could have influenced the results, particularly among African-American respondents. African-American physicians care for statistically significantly more African-American patients than do other physicians (27). Moreover, patients in race-concordant relationships with their physicians rate their visits as statistically significantly more participatory, a key index of patient satisfaction (28). Thus, African-American patients might be more inclined to put aside their belief about air exposure and accept curative lung cancer surgery if so advised by an African-American physician. However, our data were obtained under conditions representative of the U.S. health care system, in which African Americans make up 5% or less of physicians (29). In addition, our surveys were anonymous within the limitations of our clinic settings; contained only 1 question about race in the identifying information; and were usually administered by ancillary clinic personnel, 50% of whom were African American. Therefore, we believe our patients probably answered honestly and not according to a racial agenda precipitated by test conditions or clinic staffing.

We conclude that the belief that air exposure at the time of lung cancer surgery causes tumor spread is prevalent, especially among African Americans, and that this finding may be helpful in approaching key racial disparities in lung cancer care.

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## References

- Margolis ML, Lindell K, Hansen-Flashen J. Fallacious beliefs about lung cancer surgery among pulmonary outpatients in Philadelphia [Abstract]. *Am J Respir Crit Care Med*. 2000;161:A766.
- Wilson RP, Freeman A, Kazda MJ, Andrews TC, Berry L, Vaeth PA, et al. Lay beliefs about high blood pressure in a low- to middle-income urban African-American community: an opportunity for improving hypertension control. *Am J Med*. 2002;112:26-30. [PMID: 11812403]
- Diala CC, Muntaner C, Walrath C, Nickerson K, LaVeist T, Leaf P. Racial/ethnic differences in attitudes toward seeking professional mental health services. *Am J Public Health*. 2001;91:805-7. [PMID: 11344893]
- Okvumabua JO, Glover V, Bolden D, Edwards S. Perspectives of low-income African Americans on syphilis and HIV: implications for prevention. *J Health Care Poor Underserved*. 2001;12:474-89. [PMID: 11688197]
- Friedman LC, Bruce S, Weinberg AD, Cooper HP, Yen AH, Hill M. Early detection of skin cancer: racial/ethnic differences in behaviors and attitudes. *J Cancer Educ*. 1994;9:105-10. [PMID: 7917894]
- Demark-Wahnefried W, Strigo T, Catoe K, Conaway M, Brunetti M, Rimer BK, et al. Knowledge, beliefs, and prior screening behavior among blacks and whites reporting for prostate cancer screening. *Urology*. 1995;46:346-51. [PMID: 7660510]
- Miller AM, Champion VL. Attitudes about breast cancer and mammography: racial, income, and educational differences. *Women Health*. 1997;26:41-63. [PMID: 9311099]
- Glanz K, Resch N, Lerman C, Rimer BK. Black-white differences in factors influencing mammography use among employed female health maintenance organization members. *Ethn Health*. 1996;1:207-20. [PMID: 9395565]
- Kressin NR, Clark JA, Whittle J, East M, Peterson ED, Chang BH, et al. Racial differences in health-related beliefs, attitudes, and experiences of VA cardiac patients: scale development and application. *Med Care*. 2002;40:172-85. [PMID: 11789634]
- Corbie-Smith G, Thomas SB, Williams MV, Moody-Ayers S. Attitudes and beliefs of African Americans toward participation in medical research. *J Gen Intern Med*. 1999;14:537-46. [PMID: 10491242]
- Gregg J, Curry RH. Explanatory models for cancer among African-American women at two Atlanta neighborhood health centers: the implications for a cancer screening program. *Soc Sci Med*. 1994;39:519-26. [PMID: 7973851]
- Mathews HF, Lannin DR, Mitchell JP. Coming to terms with advanced breast cancer: black women's narratives from eastern North Carolina. *Soc Sci Med*. 1994;38:789-800. [PMID: 8184330]
- Lannin DR, Mathews HF, Mitchell J, Swanson MS, Swanson FH, Edwards MS. Influence of socioeconomic and cultural factors on racial differences in late-stage presentation of breast cancer. *JAMA*. 1998;279:1801-7. [PMID: 9628711]
- Black Americans' attitudes toward cancer and cancer tests: highlights of a study. *CA Cancer J Clin*. 1981;31:212-8. [PMID: 6796215]
- O'Reilly MS, Holmgren L, Shing Y, Chen C, Rosenthal RA, Moses M, et al. Angiostatin: a novel angiogenesis inhibitor that mediates the suppression of metastases by a Lewis lung carcinoma. *Cell*. 1994;79:315-28. [PMID: 7525077]
- Weese JL, Ottery FD, Emoto SE. Do operations facilitate tumor growth? An experimental model in rats. *Surgery*. 1986;100:273-7. [PMID: 3738755]
- Stewart JH 4th. Lung carcinoma in African Americans: a review of the current literature. *Cancer*. 2001;91:2476-82. [PMID: 11413540]
- Gadgeel SM, Severson RK, Kau Y, Graff J, Weiss LK, Kalemkerian GP. Impact of race in lung cancer: analysis of temporal trends from a surveillance, epidemiology, and end results database. *Chest*. 2001;120:55-63. [PMID: 11451816]
- Earle CC, Venditti LN, Neumann PJ, Gelber RD, Weinstein MC, Potosky AL, et al. Who gets chemotherapy for metastatic lung cancer? *Chest*. 2000;117:1239-46. [PMID: 10807806]
- Akerley WL 3rd, Moritz TE, Ryan LS, Henderson WG, Zacharski LR. Racial comparison of outcomes of male Department of Veterans Affairs patients with lung and colon cancer. *Arch Intern Med*. 1993;153:1681-8. [PMID: 8333805]
- Graham MV, Geitz LM, Byhardt R, Asbell S, Roach M 3rd, Urtasun RC, et al. Comparison of prognostic factors and survival among black patients and white patients treated with irradiation for non-small-cell lung cancer. *J Natl Cancer Inst*. 1992;84:1731-5. [PMID: 1331484]
- Greenwald HP, Polissar NL, Borgatta EF, McCorkle R, Goodman G. Social factors, treatment, and survival in early-stage non-small cell lung cancer. *Am J Public Health*. 1998;88:1681-4. [PMID: 9807536]
- Bach PB, Cramer LD, Warren JL, Begg CB. Racial differences in the treatment of early-stage lung cancer. *N Engl J Med*. 1999;341:1198-205. [PMID: 10519898]
- King TE Jr, Brunetta P. Racial disparity in rates of surgery for lung cancer [Editorial]. *N Engl J Med*. 1999;341:1231-3. [PMID: 10519904]
- Artinian VS, Duhaime LA, McCann JL, Digiovione E. Racial disparity in lung cancer surgical rates: a closer look [Abstract]. *Chest*. 2002;122:7S-8S.
- Greenberg ER, Chute CG, Stukel T, Baron JA, Freeman DH, Yates J, et al. Social and economic factors in the choice of lung cancer treatment. A population-based study in two rural states. *N Engl J Med*. 1988;318:612-7. [PMID: 2830514]
- Komaromy M, Grumbach K, Drake M, Vranizan K, Lurie N, Keane D, et al. The role of black and Hispanic physicians in providing health care for underserved populations. *N Engl J Med*. 1996;334:1305-10. [PMID: 8609949]
- Cooper-Patrick L, Gallo JJ, Gonzales JJ, Vu HT, Powe NR, Nelson C, et al. Race, gender, and partnership in the patient-physician relationship. *JAMA*. 1999;282:583-9. [PMID: 10450723]
- Association of American Medical Colleges. Minority Students in Medical Education: Facts and Figures. No. 8. Washington, DC: Association of American Medical Colleges; 1994.

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