

Racial Variation in Colorectal Polyp and Tumor Location

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Objectives: The incidence and mortality from colorectal cancer among whites have decreased, but they have remained unchanged among African Americans. To explain this disparity, we used the multicenter endoscopy database of the Clinical Outcomes Research Initiative to compare the prevalence of proximal polyps and tumors among asymptomatic African Americans and whites undergoing routine screening colonoscopy.

Methods: African Americans and whites undergoing colonoscopy between January 1, 2002 and September 30, 2003 were considered for analysis.

Results: There were 145,175 index colonoscopy reports on unique patients. After applying exclusion criteria, 46,726 patients remained for analysis. Adjusting for age, gender, American Society of Anesthesiologists level, bowel preparation and endoscopic setting, African Americans were less likely to have polyps [adjusted odds ratio (OR)=0.77; 95% confidence interval (CI)=0.70-0.84]. However, the odds of having proximal polyps was higher in African Americans (OR=1.30; 95% CI: 1.11-1.52) compared to whites. In regards to tumors, African Americans were more likely to have tumors (OR=1.78; 95% CI: 1.14-2.77) and more likely to have proximal tumors than whites (OR=4.37; 95% CI: 1.16-16.42).

Conclusions: After adjusting for confounders, African Americans undergoing screening colonoscopy in multiple practice settings had higher odds of proximal polyps and tumors than whites, suggesting current colorectal cancer screening recommendations in African Americans should be expanded.

Key words: colon ■ cancer ■ polyps ■ race/ethnicity ■ prevention

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INTRODUCTION

Colorectal cancer is the second overall cause of cancer death in the United States. In 2005, the American Cancer Society projected that 145,290 new cases would be diagnosed and 56,290 deaths would occur. While the incidence of colorectal cancer among whites has decreased since 1985, it has remained unchanged among African Americans.^{1,2} In 2005, it was estimated that 16,090 cases of colorectal cancer occurred among African Americans, and 7,080 African-American patients died.³ Equally concerning is the fact that the five-year survival rate following a diagnosis of colorectal cancer is greater in whites than in African Americans.^{2,4} According to the Surveillance, Epidemiology and End Results (SEER) database, African Americans more frequently present with metastatic disease than whites (25% vs. 19%) and less often with disease localized to the colon (39% vs. 42%), which may account for at least part of the difference in mortality.⁵ These data suggest that colon cancer is more severe in African Americans than in whites and that the difference may be due to less screening. However, another possible explanation may be that the currently endorsed recommendations for colorectal cancer screening may be inadequate for African Americans.

Colonoscopy has a therapeutic potential to identify and remove precancerous polyps throughout the entire colon, effectively decreasing colon cancer incidence and mortality.⁶⁻⁸ In two large prospective studies of screening colonoscopy, approximately half of patients with advanced proximal neoplasms (lesions found proximal to

the splenic flexure) had no distal colonic neoplasms.^{9,10} These lesions would likely have been missed if flexible sigmoidoscopy alone had been performed.

The screening method used may be particularly important if anatomic polyp location varies by race.¹¹ Several studies have suggested that African Americans are more likely to have developed proximal polyps and tumors beyond the reach of the flexible sigmoidoscope that, if missed, can progress to advanced disease.¹²⁻¹⁶ These studies were potentially biased due to small sample size, lack of a control group and/or restriction of patient populations to those visiting a single center. This study uses the Clinical Outcomes Research Initiative (CORI),^{17,18} a national multicenter endoscopy database, to compare the prevalence of proximal polyps and tumors in a national cohort of asymptomatic African Americans and whites undergoing routine screening colonoscopy.

MATERIALS AND METHODS

Setting

CORI is the largest national prospectively collected database used to measure endoscopic outcomes, with multiple sites across the United States. It collects data from community healthcare facilities, academic medical centers, VA hospitals, health maintenance organizations

and military medical centers. Participating sites agree to use a structured computerized report generator to produce all endoscopic reports and comply with quality-control requirements. The site's data files are transmitted electronically to a central data repository—the National Endoscopic Database. Patient and physician identifiers are removed from the data file before transmission from the local site to protect both patient and physician confidentiality. The data are subjected to computerized quality-control audits to identify missing fields. After completion of quality-control audits, data from all sites are merged in the data repository for analysis. During the time period for this study, CORI received endoscopic reports from 67 practice sites in 27 states. Site compliance is assessed annually. To ensure inclusion of all reports, sites manually count procedures at least once a year, and these counts are compared to procedure counts received at the data repository. If sites fail to record >95% of endoscopic reports using CORI software, they are given an opportunity to improve compliance. Failure to do so results in exclusion of site data from analyses.¹⁹ This study was approved by the institutional review board at the University of Washington, Seattle, WA.

Study Population

The purpose of this study was to examine all Afri-

Table 1. Characteristics of patients undergoing index colonoscopy

	Whites (n=43,531)	African Americans (n=3,195)	P Value
Age (Years)			<0.001
50-59	19,047 (44%)	1,735 (54%)	
60-69	14,107 (32%)	916 (29%)	
70-79	8,725 (20%)	384 (12%)	
>80	1,652 (4%)	160 (5%)	
Gender			<0.001
Male	22,445 (52%)	1,300 (41%)	
Region of Country (n=43,531)		(n=3,195)	<0.001
North central	5,097 (12%)	48 (2%)	
Northeast	8,255 (19%)	666 (21%)	
Northwest	5,192 (12%)	900 (28%)	
South central	2,074 (5%)	212 (7%)	
Southeast	7,063 (16%)	1,189 (37%)	
Southwest	15,841 (36%)	171 (5%)	
Practice Setting (n=43,531)		(n=3,195)	<0.001
Community/HMO	34,685 (80%)	2,528 (79%)	
University	6,089 (14%)	439 (14%)	
VA	2,384 (5%)	209 (7%)	
Military	373 (1%)	19 (1%)	
ASA Level (n=40,549)		(n=2,911)	<0.001
Class I	15,491 (38%)	663 (23%)	
Class II	23,383 (58%)	2,090 (72%)	
Class III	1,629 (4%)	152 (5%)	
Class IV	44 (0.1%)	6 (0.2%)	
Class V	2 (0)	0 (0)	
Bowel Preparation (n=38,208)		(n=2,665)	<0.001
Fair	6,721 (18%)	654 (25%)	
Good	17,943 (47%)	1,190 (45%)	
Excellent	13,544 (35%)	821 (31%)	

can-American and white patients who underwent routine index screening colonoscopy between January 1, 2002 and September 30, 2003 in the CORI database. Patients who met the American College of Gastroenterology criteria for screening were included.⁶ Patients were excluded if they ever had a prior colonoscopy recorded in the CORI database or were aged <50 years (n=21,178). We excluded patients if the cecum was not reached, the bowel preparation was poor or the examination was compromised because of the bowel preparation (n=11,187). Patients were also excluded if the indication for the procedure was for a history of prior polyps or if a polyp was found at an anastomosis location (n=765), as this would suggest patients had some type of prior bowel surgery, potentially biasing the results of finding polyps. Patients with inflammatory bowel disease (n=1,699) and those with a family history of colon cancer or gastrointestinal symptoms such as bleeding or change in bowel habits were also excluded (n=63,442). Procedures performed with an indication listed as research, gastrointestinal symptoms in an immunocompromised patient or graft versus host disease (n=170) were also excluded. Finally, patients whose race, or polyp or tumor location was unknown were excluded (n=8). Since African-American and white patients were the predominant racial groups in the CORI database, patients of other races were not analyzed.

Variables

We examined race as the primary predictor of polyp and tumor location as well as total number of polyps, and specifically compared African-American patients to non-Hispanic white patients. The CORI system first began coding race in 1997 and mandated that participating centers code race in 1999. Race and ethnicity were assessed by the endoscopist, with or without consulting the patient. The primary outcome of interest was polyp location. Polyps found in the cecum, ascending colon, hepatic flexure and transverse colon were considered proximal. Distal polyps, which generally would be considered within reach of a flexible sigmoidoscope, were defined as polyps occurring in the splenic flexure, descending colon, sigmoid colon and rectum. Thus, the categories proximal and distal were mutually exclusive

in our analyses. Secondary outcomes of interest were total polyp number, defined as the total number of polyps in the proximal and distal colon, and tumor location.

We adjusted for the American Society of Anesthesiologists (ASA) level as a proxy for severity of illness to be able to compare patients with similar severity of illness, as it is conceivable that severity of illness may differ by race. The ASA classification system of preoperative risk predicts mortality based on a patient's severity of systemic illness on a scale of 1 (healthy patient with no disease outside the surgical process) to 5 (moribund patient not expected to survive 24 hours with or without an operation).^{20,21}

Statistical Analysis

Demographic categorical variables were compared between whites and African Americans using Chi-squared analysis. Ordinal demographic variables were compared using the Chi-squared test for trend. The Student's t test was used to compare means of continuous variables. The Mantel-Haenszel estimator of the common odds ratio was used to calculate odds ratios. Incomplete or missing data were excluded from analysis. Logistic regression was used to calculate odds ratios for the association between polyp or tumor presence and race. Multivariate ordinal logistic regression was used to calculate the odds of association of proximal compared to distal polyps (or tumors) and race, after adjusting for the potential confounders of age, gender, bowel preparation, ASA status of the patient, region of the country and practice setting where the procedure was performed. The CORI database classifies bowel preparation using six categories (excellent, good, fair, fair-adequate exam, fair-exam compromised, poor). We excluded patients with poor and compromised bowel preparations. We substratified the other categories of bowel preparation and included them in the analysis. We adjusted for these other categories of bowel preparation because the ability to detect polyps and tumors depends on the quality of bowel mucosa visualization. Linear regression and proportional odds assumptions were used to confirm the ordinal logistic regression results. Multivariate linear regression was used to assess the association of the total number of polyps or tumors and race after adjusting for

	Whites	African Americans	P Value
Polyp Characteristics			
Total number of polyps	16,731 (38%)	1,119 (35%)	<0.001
Mean number of polyps	1.62	1.49	0.004
Polyps >9 mm	3,402 (8%)	268 (8%)	0.2
Polyp Location			
Distal	8,024 (49%)	455 (43%)	<0.001
Proximal	8,513 (51%)	607 (57%)	
Proximal polyps only	5,042 (30%)	442 (42%)	<0.001

potential confounding variables. All potential confounders used in the regression analyses were included based on their hypothesized associations with the exposure (race) and outcome of interest. In addition, these potential confounders were found to have statistically significant associations with exposure and outcomes in univariate analyses. Statistical analyses were performed with STATA® version 7 software.²²

RESULTS

Between January 1, 2002 and September 30, 2003 there were 145,175 index colonoscopy reports for CORI on unique patients. After applying the exclusion criteria listed previously, 46,726 patients remained for analysis. Demographic characteristics of the study population are shown in Table 1. African-American patients were younger, more likely to be female and more likely to be located in the southeast than whites. White patients were older, more likely to be male and more likely to be located in the southwest. African Americans also had a higher ASA level (suggesting greater severity of illness) and

poorer quality of bowel preparation than whites.

In the unadjusted analysis, 38% of whites had polyps compared with 35% of African Americans ($P<0.001$) (Table 2). Whites had a higher mean number of polyps than African Americans (1.62 vs. 1.49, $P=0.004$). African Americans were, however, more likely to have polyps limited to the proximal colon compared with whites (42% vs. 30%, $P<0.001$). There was no difference between whites and African Americans in the proportion with polyps >9 mm in size. A greater proportion of African Americans had tumors than whites (0.9% vs. 0.6%, $P=0.02$), and African Americans also had a greater mean number of tumors than whites (1.13 vs. 1.02, $P=0.006$) (Table 3). There was a nonstatistically significant trend toward a greater prevalence of proximal tumors among African Americans compared with whites in this unadjusted analysis.

After adjusting for age, gender, ASA level, bowel preparation and endoscopic setting, African Americans remained less likely than whites to have polyps (adjusted OR=0.77; 95% CI: 0.70–0.84) (Table 4). The

Table 3. Tumor characteristics and location

	Whites	African Americans	P Value
Tumor Characteristics			
Total number of tumors	248 (0.6%)	29 (0.9%)	0.02
Mean number of tumors	1.02	1.13	0.006
Tumor Location			
Distal	100 (41%)	8 (28%)	0.17
Proximal	146 (59%)	21 (72%)	
Proximal tumors only	142 (58%)	21 (72%)	0.13

Table 4. Predictors of polyps

Predictor	Odds Ratio	P Value	95% CI
Predictors of Polyps			
African American	0.77	<0.001	0.70–0.84
Age	1.05	<0.001	1.03–1.08
Male	1.59	<0.001	1.53–1.66
Predictor	Coefficient	P Value	95% CI
Predictors of Polyp Number			
African American	-0.18	<0.001	-0.26–0.10
Age	0.04	0.001	0.02–0.06
Male	0.18	<0.001	0.11–0.25
Predictor	Odds Ratio	P Value	95% CI
Predictors of Polyps >9 mm			
African American	1.05	0.52	0.90–1.22
Age	0.99	0.65	0.95–1.03
Male	0.99	0.79	0.92–1.07
Predictors of Proximal Polyps			
African American	1.30	0.001	1.11–1.52
Age	1.17	<0.001	1.12–1.22
Male	0.93	0.04	0.86–1.00

Adjusted for race, gender, age, American Society of Anesthesiology (ASA) classification, practice setting, region of the country, bowel preparation

significant predictors of having polyps were male gender (OR=1.59; 95% CI: 1.53–1.66) and advanced age (OR=1.05, 95% CI: 1.03–1.08). African Americans also had fewer overall polyps (adjusted coefficient -0.18; $P < .001$ 95% CI: -0.26–0.01). Other predictors of having an increased number of polyps also included male gender and increasing age. There were no statistically significant predictors of having polyps >9 mm in the adjusted analysis. The odds of having proximal polyps remained higher in African Americans (adjusted OR=1.30; 95% CI: 1.11–1.52). The other significant predictors of having proximal polyps were increasing age and female gender. In summary, after adjusting for other potential confounders, race remained a significant predictor for having proximal polyps but not for the presence of polyps or total polyp number.

In regards to tumors, African Americans were more likely than whites to have colonic tumors (adjusted OR=1.78; 95% CI: 1.14–2.77) (Table 5). African Americans were also more likely than whites to have proximal tumors (adjusted OR=4.37; 95% CI: 1.16–16.42).

DISCUSSION

In this study, after adjusting for confounding variables, African Americans with average risk screening indications who underwent colonoscopy in multiple practice settings across the United States had a higher risk of proximal polyps and proximal tumors than did whites. These data suggest that African Americans are at moderately higher risk of developing proximal polyps and cancers than are whites. In this adjusted analysis, however, the overall risk of tumor development was only modestly increased. These results are consistent with previously published data on colon cancer incidence.¹

Different epidemiologic methodologies have been used to explore racial differences in colorectal polyp and tumor location. Several small retrospective studies using data from one hospital or practice setting have described a predisposition in African-American patients towards proximal polyps.^{13,23} Rex et al. performed screening colonoscopies in 121 asymptomatic, average-risk 55–70-year-old African Americans and found that African Americans had at least as high or higher

prevalence of adenomas compared to historical data on screening colonoscopy from previous studies involving whites. In an additional study, African Americans also had a predominance of proximal adenomas compared to white historical control groups.¹⁶ Several studies involving cancer registries have also demonstrated a greater incidence of proximal colorectal cancer among African-American patients.^{11,14–16} These studies, however, provided no information regarding polyp number and location, thus leaving open the question of whether timely colonoscopy would have changed outcomes.

There are a number of strengths to this study. First, the cohort was drawn from a large, national prospectively collected endoscopy database to evaluate polyp and tumor location, size and number in African Americans and whites. The high number of participating centers is also a unique feature of this study, making the results more generalizable than data obtained from a single hospital practice or geographic region. We were able to compare different types of practices and patient populations, thus reflecting real-life practice. This study expands upon existing medical literature in that it is the first large colonoscopic study showing a proximal distribution of both polyps and tumors in asymptomatic African-American and white patients >50 years old after adjusting for common confounders.

Potential limitations of this study should also be recognized. First, the CORI database does not consistently obtain pathologic data from all of its participating sites; therefore, identification of polyps as adenomatous or hyperplastic cannot be ascertained, and some hyperplastic polyps were likely included in the analysis. This may be reflected in the fact that African Americans had fewer polyps but more tumors. However, this study did include information on both the total number of polyps and the polyp size, both of which have been demonstrated to correlate with the risk of dysplasia.⁷ Furthermore, the concordant findings of both an increased number of proximal colon polyps and proximal tumors among African Americans suggest that African Americans have more proximal precancerous polyps and suggest that our findings regarding racial differences apply to both precancerous lesions and colorectal cancer.

The colonoscopist may have coded the outcome variables of polyp and tumor location inaccurately. However, the data obtained from CORI also serves as the endoscopy report for the patient's medical record and procedure billing, providing an incentive for accuracy and completeness. Race, the primary predictor of polyp and tumor location in the study, may have been misclassified because the healthcare provider may have entered the data without asking the patient. Misclassification of race, however, would bias the results toward showing no difference between African Americans and whites in polyp and tumor location, number and size. Because our results did show a significant difference between Afri-

Table 5. Predictors of tumors

Predictor	OR	P Value	95% CI
Predictors of Tumors			
African American	1.78	0.01	1.14–2.77
Male	1.44	0.01	1.08–1.90
Predictors of Proximal Tumors			
African American	4.37	0.03	1.16–16.42
Male	0.35	0.002	0.19–0.68

Adjusted for race, gender, age, American Society of Anesthesiology (ASA) classification, practice setting, region of the country, bowel preparation; OR: odds ratio; CI: confidence interval

can-American and white patients in regards to polyp and tumor location, the actual magnitude of the difference is not only significant but may have been underestimated.

There are many possible reasons that African Americans may have more proximal polyps and tumors than whites, including genetic predisposition; underutilization of screening; unequal access to the medical care system; an increased prevalence of modifiable risk factors such as diet, physical activity, tobacco and alcohol use; and other unrecognized confounders.²⁴⁻³² Clearly, further investigation is needed to determine the relationship between these modifiable factors and polyp formation.

In summary, while the specific reasons for racial variations in polyp and tumor sites are unknown, our study suggests that African Americans may benefit more from routine screening with colonoscopy than with flexible sigmoidoscopy because this population appears to be at greater risk of developing proximal polyps and proximal colon cancer.

REFERENCES

1. Jemal A, Murray T, Ward E, et al. Cancer statistics, 2005. *CA Cancer J Clin.* 2005;55:10-30.
2. Ries LA, Wingo PA, Miller DS, et al. The annual report to the nation on the status of cancer, 1973-1997, with a special section on colorectal cancer. *Cancer.* 2000;88:2398-2424.
3. Society AC. Cancer facts and figures for African Americans 2005-2006. Atlanta: American Cancer Society; 2005:1-28.
4. Clegg LX, Li FP, Hankey BF, et al. Cancer survival among US whites and minorities: A SEER (Surveillance, Epidemiology, and End Results) Program population-based study. *Arch Intern Med.* 2002;162:1985-1993.
5. Weir HK, Thun MJ, Hankey BF, et al. Annual report to the nation on the status of cancer, 1975-2000, featuring the uses of surveillance data for cancer prevention and control. *J Natl Cancer Inst.* 2003;95:1276-1299.
6. Winawer S, Fletcher R, Rex D, et al. Colorectal cancer screening and surveillance: clinical guidelines and rationale-Update based on new evidence. *Gastroenterology.* 2003;124:544-560.
7. O'Brien MJ, Winawer SJ, Zauber AG, et al. The National Polyp Study. Patient and polyp characteristics associated with high-grade dysplasia in colorectal adenomas. *Gastroenterology.* 1990;98:371-379.
8. Winawer SJ, Zauber AG, Ho MN, et al. Prevention of colorectal cancer by colonoscopic polypectomy. The National Polyp Study Workgroup. *N Engl J Med.* 1993;329:1977-1981.
9. Lieberman DA, Weiss DG, Bond JH, et al. Use of colonoscopy to screen asymptomatic adults for colorectal cancer. Veterans Affairs Cooperative Study Group 380. *N Engl J Med.* 2000;343:162-168.
10. Imperiale TF, Wagner DR, Lin CY, et al. Risk of advanced proximal neoplasms in asymptomatic adults according to the distal colorectal findings. *N Engl J Med.* 2000;343:169-174.

11. Mayberry RM, Coates RJ, Hill HA, et al. Determinants of black/white differences in colon cancer survival. *J Natl Cancer Inst.* 1995;87:1686-1693.
12. Johnson H Jr, Carstens R. Anatomical distribution of colonic carcinomas. Interracial differences in a community hospital population. *Cancer.* 1986;58:997-1000.
13. Ozick LA, Jacob L, Donelson SS, et al. Distribution of adenomatous polyps in African Americans. *Am J Gastroenterol.* 1995;90:758-760.
14. Nelson RL, Dollear T, Freels S, et al. The relation of age, race, and gender to the subsite location of colorectal carcinoma. *Cancer.* 1997;80:193-197.
15. Thomas CR Jr, Jarosz R, Evans N. Racial differences in the anatomical distribution of colon cancer. *Arch Surg.* 1992;127:1241-1245.
16. Rex DK, Khan AM, Shah P, et al. Screening colonoscopy in asymptomatic average-risk African Americans. *Gastrointest Endosc.* 2000;51:524-527.
17. Fearon ER, Vogelstein B. A genetic model for colorectal tumorigenesis. *Cell.* 1990;61:759-767.
18. Demers RY, Severson RK, Schottenfeld D, et al. Incidence of colorectal adenocarcinoma by anatomic subsite. An epidemiologic study of time trends and racial differences in the Detroit, MI area. *Cancer.* 1997;79:441-447.
19. Lieberman DA, De Garmo PL, Fleischer DE, et al. Patterns of endoscopy use in the United States. *Gastroenterology.* 2000;118:619-624.
20. McCashland TM, Brand R, Lyden E, et al. Gender differences in colorectal polyps and tumors. *Am J Gastroenterol.* 2001;96:882-886.
21. Schoenfeld P, Cash B, Flood A, et al. Colonoscopic screening of average-risk women for colorectal neoplasia. *Obstet Gynecol Surv.* 2005;60:582-584.
22. StataCorp. Statistical Software. College Station, TX, 2005.
23. Offerhaus GJ, Giardiello FM, Tersmette KW, et al. Ethnic differences in the anatomical location of colorectal adenomatous polyps. *Int J Cancer.* 1991;49:641-644.
24. Gapstur SM, Potter JD, Folsom AR. Alcohol consumption and colon and rectal cancer in postmenopausal women. *Int J Epidemiol.* 1994;23:50-57.
25. Thun MJ, Peto R, Lopez AD, et al. Alcohol consumption and mortality among middle-aged and elderly U.S. adults. *N Engl J Med.* 1997;337:1705-1714.
26. Shimizu N, Nagata C, Shimizu H, et al. Height, weight, and alcohol consumption in relation to the risk of colorectal cancer in Japan: a prospective study. *Br J Cancer.* 2003;88:1038-1043.
27. Cho E, Smith-Warner SA, Ritz J, et al. Alcohol intake and colorectal cancer: A pooled analysis of 8 cohort studies. *Ann Intern Med.* 2004;140:603-613.
28. Sturmer T, Glynn RJ, Lee IM, et al. Lifetime cigarette smoking and colorectal cancer incidence in the Physicians' Health Study I. *J Natl Cancer Inst.* 2000;92:1178-1181.
29. Chao A, Thun MJ, Connell CJ, et al. Meat consumption and risk of colorectal cancer. *JAMA.* 2005;293:172-182.
30. Chao A, Thun MJ, Jacobs EJ, et al. Cigarette smoking and colorectal cancer mortality in the cancer prevention study II. *J Natl Cancer Inst.* 2000;92:1888-1896.
31. Colangelo LA, Gapstur SM, Gann PH, et al. Cigarette smoking and colorectal carcinoma mortality in a cohort with long-term follow-up. *Cancer.* 2004;100:288-293.
32. Agrawal S, Bhupinderjit A, Bhutani MS, et al. Colorectal cancer in African Americans. *Am J Gastroenterol.* 2005;100:515-523;discussion 514. ■

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