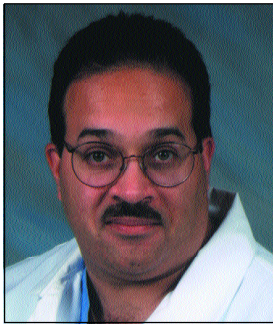


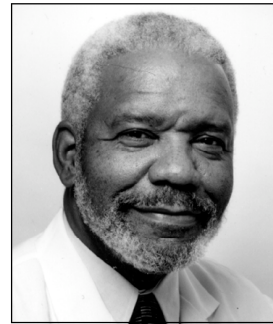
The Epidemiology of Esophageal Cancer in Minority Populations of the United States



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Esophageal cancer is a lethal disease world-wide and its incidence varies by region, gender, race and ethnicity. Two main histological types of esophageal cancer, squamous cell carcinoma and adenocarcinoma, share a dismal 5-year survival rate of 8-13 percent. By race and gender, African Americans have the highest incidence of esophageal cancer followed by whites and other minority groups (Hispanic, Native, Pacific Islander American). It is clear that esophageal cancer occurs more frequently in males than females (M:F, 3-4:1). Since 1987, the incidence of all esophageal cancers has decreased due primarily to a reduction in squamous cell carcinoma. However, among white males, the incidence of esophageal cancer has risen primarily due to a substantial increase in the incidence of adenocarcinoma of the esophagus that now has surpassed that of squamous cell carcinoma. Among African and Hispanic American males, squamous cell carcinoma is still the predominant histological type, but like in white males, the incidence of adenocarcinoma is rising.

Risk factors for squamous cell carcinoma include smoking, alcohol abuse, poor nutrition and poverty. The major risk factors for adenocarcinoma of the esophagus are long standing symptoms of gastroesophageal reflux and the development of Barrett's esophagus. Efforts to influence the epidemiology of esophageal cancer should focus on prevention of tobacco and alcohol abuse, poor nutrition, and lifestyle in squamous cell carcinoma of the esophagus and reduction of gastroesophageal reflux symptoms and subsequent Barrett's esophagus in adenocarcinoma of the esophagus.

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INTRODUCTION

Throughout the world, esophageal cancer is known for its variation by geographic area, gender, race and ethnicity (1). Although esophageal cancer in the United States accounts for about one percent of all diagnosed cancers, it is the seventh leading cause of death from cancer among men (2). The two histological types of esophageal cancer, squamous carcinoma (SCA) and adenocarcinoma (ADENOCA) of the esophagus, share a poor prognosis. Approximately, 75% of patients with this disease die within the first year after diagnosis and only 8%–13% are alive at five years.

During the past 15 years, the overall incidence of esophageal cancer has declined. However, the incidence of ADENOCA relative to that of SCA has significantly increased in the United States (2–9). This increase has been observed primarily in white men and those of high

socioeconomic status such that the incidence of ADENOCA has surpassed that of SCA in this group (3). Among African Americans, SCA remains the predominant type of esophageal cancer although the incidence of ADENOCA in this group is also rising (3). Limited data on Hispanic Americans suggest the same trend (4).

The epidemiological patterns of ADENOCA and SCA are influenced by gender, race, ethnicity and socioeconomic status. Therefore, it is important to define this disease in terms of the rapidly changing composition of the U.S. population. According to Census 2000, African, Asian, Hispanic and Native Americans accounted for 25% to 30% of the nation's population or 70 to 84 million persons (10). Our goal is to review the role of race, ethnicity, and gender on the epidemiology of esophageal cancer and thereby gain insight into approaches to prevent this deadly disease.

MORTALITY RATES

Mortality rates for esophageal cancer nearly doubled among minority groups (African American, Asian Americans, Pacific Islanders, Native Americans, and Alaskan Natives) between 1950 and 1984, reaching a high of 14.1/100,000 among nonwhite men and 3.6/100,000 among nonwhite women (Figure 1) according to the data from the National Cancer Institute (3). However, since 1985 the mortality rates of nonwhite men and women have fallen steadily to 9.8 and 2.5/100,000, respectively, in 1995–1996. During the period from 1950–1984, mortality rates among whites changed minimally, but a striking increase in ADENOCA among white men occurred during 1985–1996. Mortality rates of white men and women were 5.9 and 1.3/100,000, respectively, in 1995–1996. Compared with other minority groups, African American men and women had higher mortality rates, 12.3 and 3.1/100,000. It is also obvious that esophageal cancer occurs predominantly in males with a M:F ratio of about 3–4:1 across all racial/ethnic groups.

INCIDENCE RATES

As shown in Table 1, the age-adjusted incidence rates of all esophageal cancer by race/ethnicity and gender clearly indicated that African American men and women have the highest rates followed by whites;

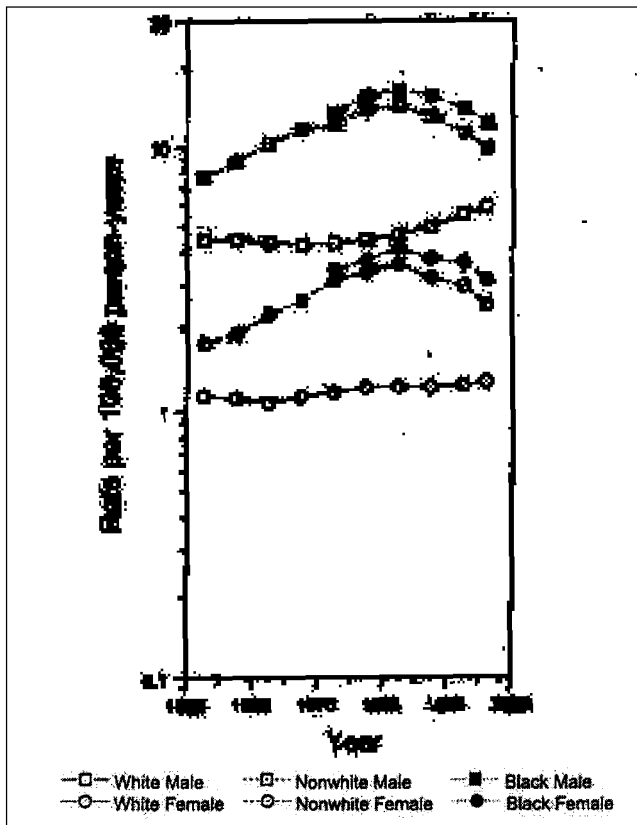


Figure 1. Esophageal cancer mortality rates (per 100,000 person-years, age-standardized to the 1970 United States population) in the United States by race and sex, 1950–1996. Data from SEER, National Cancer Institute (Ref 11).

Table 1.
Age-adjusted Esophageal Cancer SEER Incidence Rates,* 1990–1996, by Race/Ethnicity and Gender^a

Race/Ethnicity	Rate per 100,000 Persons		
	Total	Males	Females
All races	3.8	6.3	1.8
African American	8.2	13.5	4.2
White	3.6	5.8	1.7
Hispanic	2.4	4.4	—
Asian/Pacific Islander	2.5	4.5	0.8
American Indian	1.3	2.5	0.4

*Rates per 100,000 person-years, age-adjusted using 1970 U.S. standard.

^aSEER, National Cancer Institute. Based on data from population-based registries in Connecticut, New Mexico, Utah, Iowa, Hawaii, Atlanta, Detroit, Seattle-Puget Sound, and San Francisco-Oakland.

other minority groups—Hispanic, Asian/Pacific Islander and Native American—have incidence rates lower than that of whites (3).

Detailed information regarding histological type of esophageal cancer from the SEER registries is currently available only for whites and African Americans. As shown in Figure 2, rates of esophageal cancer among African American men peaked at 19.9/100,000 in 1985–1987 and then declined markedly, dropping to 13.3/100,000 in 1994–1996; rates among white men increased steadily during the same period, 1976–1996, with rates approaching 6.1/100,000. Rates among white women changed minimally, but declined among African American women after mid-1980.

The dramatic decrease in the overall esophageal cancer rate of African American males was associated with primarily a decrease in the rate of SCA. The rate of SCA in all race-gender groups decreased after 1987. Among white males, the overall incidence of esophageal cancer increased due to the rise of ADENOCA from 0.76/100,000 in 1976–1978 to 3.6/100,000 in 1994–1996 (>350% increase). Today, the incidence of ADENOCA has surpassed that of SCA among white males. The incidence of ADENOCA among white

females although lower than that of white males has increased >350% from 0.12/100,000 in 1976–1978 to 0.44/100,000 in 1994–1996. Among African American males, the incidence of ADENOCA has increased almost 200% from 0.29/100,000 in 1976–1978 to 0.83/100,000 in 1994–1996. Nonetheless, the incidence rate of SCA remains considerably higher than that of ADENOCA in African American males. The rate of ADENOCA for African American women over the same time period was variable and based on a small number of cases (3). In an epidemiological study in New Mexico, the incidence of ADENOCA among Hispanics rose during the period 1973–1997, although SCA remained the predominant histological type (4). This pattern paralleled the shift from SCA to ADENOCA observed among non-Hispanic whites (3,4).

RISK FACTORS FOR ESOPHAGEAL CANCER

Squamous Cell Carcinoma

Tobacco smoking is an established factor in the development of squamous cell carcinoma in both men and women. Multiple studies have documented a dose-dependent effect of tobacco smoking on the risk of developing SCA. Smoking, although declining in the overall population over the past 20 years, still remains at high levels among African, Hispanic and Native Americans compared with non-Hispanic whites (11–14). Little information exists for Asian Americans in regard to smoking.

It is also well known that alcohol consumption independently increases the risk of developing SCA. Although overall alcohol related mortality has decreased in the past 30 years, recent studies revealed a continued pattern of excess alcohol related mortality among African, Hispanic and Native Americans, the socially isolated and poor (15,16). Minimal data exist for Asian Americans on the subject of alcohol consumption and abuse.

Multiple investigators have identified that squamous cell carcinoma of the esophagus is the predominant type among African, Hispanic and Native Americans (4–9,11,17–20). The majority of data available on

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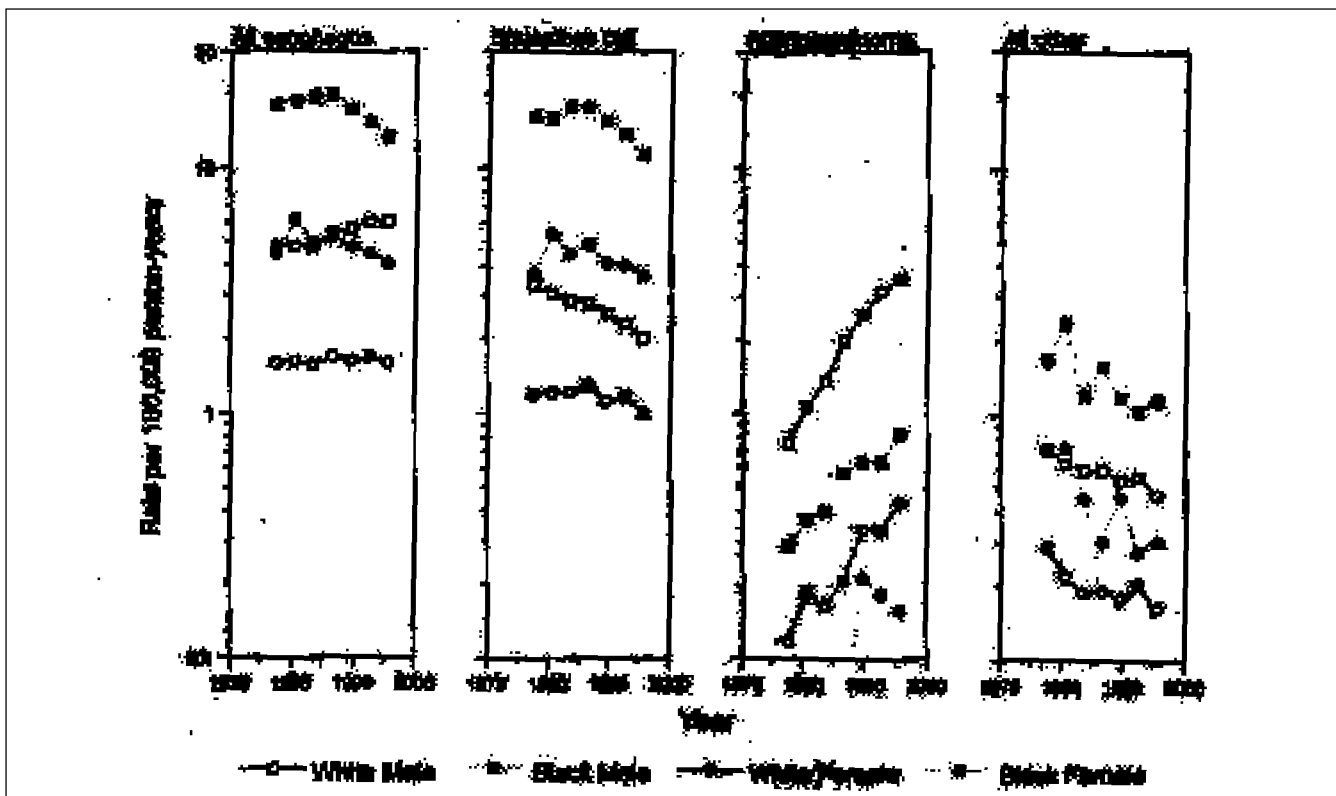


Figure 2. Esophageal cancer incidence rates (per 100,000 person-years, age-standardized to the 1970 United States population) in SEER selected sites by cell type, race and sex, 1976–1996. Data from SEER, National Cancer Institute (Ref 11).

SCA compared non-Hispanic whites with African Americans alone or in combination with Hispanic Americans. These studies indicated that African Americans have an increased incidence of SCA compared with non-Hispanic whites (3,5,8,17–20). A recent report on esophageal cancer in subjects in New Mexico indicated that Hispanic and Native Americans have similar incidence rates of SCA compared with non-Hispanic whites and that African Americans had the highest incidence rate of SCA (4). No incidence data were available for Asian Americans.

Recently the excess incidence of SCA in African Americans was evaluated by assessing smoking, alcohol, socioeconomic status and dietary intake in non-Hispanic whites and African Americans in Atlanta, Detroit and New Jersey. The combination of all risk factors (low income, moderate/heavy alcohol abuse, tobacco use and infrequent intake of fruits/vegetables) accounted for almost all of the SCA in both groups and for the increased incidence of SCA in African Ameri-

cans (20). These authors concluded that multiple lifestyle modifications, especially decreased alcohol intake, would decrease the overall incidence of SCA.

Adenocarcinoma

Gastroesophageal reflux disease (GERD) and its complication, Barrett’s esophagus, are the primary risk factors for ADENOCA. Until 2001, no data was available on the prevalence of GERD in any specific minority group. Eisen and coworkers addressed this issue by administering a previously validated GERD questionnaire via telephone to residents of the metropolitan Memphis, TN area (21). This region primarily consists of non-Hispanic whites and African Americans. The age and gender adjusted prevalence rates for any heartburn and/or acid regurgitation was 53.2 per 100 for non-Hispanic whites and 45.4 per 100 for African Americans. In regard to weekly or more frequent gastroesophageal reflux symptoms, non-Hispanic whites had a prevalence

of 22 per 100 and African Americans 12.9 per 100. The authors concluded that GERD was common, but its prevalence appeared lower in African Americans than whites. Similar evaluations have not been performed in Asian, Hispanic and Native Americans.

Severe complications of GERD, for example, erosive esophagitis, esophageal stricture and ulceration were present more frequently in a white than in a non-white VA population (22). This has not been assessed in the general population or in any specific US ethnic group. Barrett's esophagus occurred more frequently in Hispanics and non-Hispanic whites than in African Americans (23–24). No data regarding the frequency of Barrett's esophagus in Asian or Native Americans is available. With or without Barrett's esophagus, the incidence of ADENOCA is rising among minority groups (2–4).

SUMMARY

Esophageal cancer is a lethal disease that is influenced by gender and ethnicity. African American males have the highest mortality and incidence of SCA compared with other minority Americans—Hispanic, Native American, and Asian Pacific—as well as white Americans. As the incidence rate of SCA has decreased, that of ADENOCA has increased; this trend is best appreciated in white males in whom the incidence of ADENOCA has surpassed that of SCA. Among minority individuals, this pattern of a rising incidence of ADENOCA is also appreciated, although SCA remains the predominant histological type.

Risk factors for SCC are tobacco, alcohol, poor nutrition and poverty. For ADENOCA, risk factors relate to symptoms of gastroesophageal reflux disease and its complication, Barrett's esophagus. Based on these epidemiological data, life-style changes, especially among minority men will be important to prevent SCA. The treatment of gastroesophageal reflux disease will decrease the incidence of ADENOCA. ■

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