

# ORIGINAL COMMUNICATIONS

## THE PROGNOSTIC SIGNIFICANCE OF RACE AND SURVIVAL FROM LARYNGEAL CARCINOMA

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Surveillance, Epidemiology, and End Results (SEER) program data suggest that blacks with laryngeal carcinoma have a significantly lower 5-year survival rate than whites. Most of this difference persists despite adjustment for "crude stage." To evaluate possible factors contributing to this residual survival deficit, 190 white and 23 black patients treated at the Martinez Veterans Administration Hospital between 1968 and 1988 were studied. The independent impact of race on survival rate was analyzed with respect to various prognostic factors including treatment delay, elapsed time (diagnosis to treatment), age, stage, cancer subsites, and type of therapy. No independent prognostic significance could be attributed to race. The differences noted in SEER data probably reflect a tendency for the use of crude stage to underestimate the impact of prognostic groups within the categories of "local" and "regional" disease, the independent prognostic significance of subsites (glottic versus supraglottic), and the variable distribution of these subsites in different populations. This study suggests that when stage, subsite, and quality of care are adequately considered,

survival from laryngeal cancer in blacks is comparable to that of whites. (*J Natl Med Assoc.* 1992;84:668-674.)

**Key words** • cancer survival rates • laryngeal carcinoma  
• quality of care

For more than 20 years, statistics documenting the excess cancer incidence and mortality in black Americans compared with whites have been published.<sup>1</sup> The preponderance of evidence suggests that the increased incidence is the result of environmental factors and not genetics.<sup>2,3</sup> Black males, for example, have continually maintained a smoking rate approximately 25% higher than white males over the last 25 years.<sup>1</sup> The tendency for black Americans to present with more advanced disease compared with whites is the most common explanation offered for the differences in mortality.<sup>4</sup> However, even after correcting for the extent of disease, several studies continue to demonstrate excess mortality in blacks.<sup>5,6</sup> For selected sites, differences in socioeconomic status have been proposed as an explanation for differences in survival.<sup>6,7</sup> Other studies, however, have failed to demonstrate that socioeconomic status is a cause of excess mortality when the quality of care was comparable.<sup>8,9</sup>

The possibility that the differences in cancer-related mortality might be the result of factors such as the quality of the medical care received or biologic differences in the tumor or the host have not been adequately evaluated. That quality of care differences might exist is supported by several studies documenting differences in initial treatment,<sup>10</sup> patterns of care,<sup>11,12</sup> and the intensity of services provided<sup>13</sup> as well as a tendency for racial bias in the inpatient setting.<sup>14</sup> One recent report suggests that black Americans' satisfaction with and access to medical care is significantly less than that of white Americans.<sup>15</sup> The implication is that

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**TABLE 1. PRETREATMENT PROGNOSTIC FACTORS AT THE MARTINEZ VETERANS ADMINISTRATION MEDICAL CENTER (MVA) BY RACE**

Factor	Median (Range)	
	Blacks	Whites
Age at treatment (years)	61.9 (38.8-73.6)	61.1 (43.4-90.8)
Elapsed time*	15 (0-70)	15 (0-386)
Delay†	3 (0-18)	3.5 (0-36)

\*Time from diagnosis to treatment (days).  
 †Time from onset of symptoms to diagnosis (months).

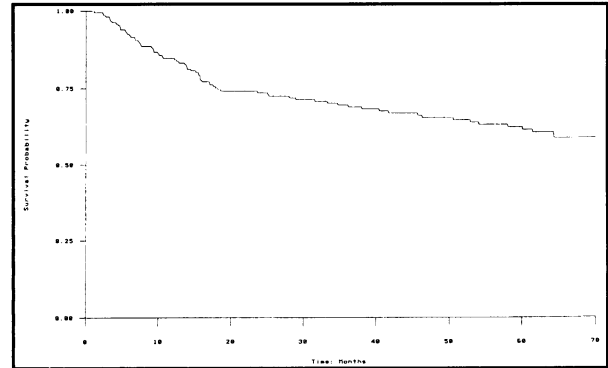
blacks receive lower quality care and are thus less satisfied.

One type of cancer for which a significant difference in 5-year survival rates between blacks and whites has been noted is laryngeal cancer. Based on SEER data from 1974 to 1986, the 5-year survival rate for laryngeal cancer was 56% for blacks versus 68% for whites.<sup>1</sup> This difference represents a 38% higher mortality risk for blacks compared with whites. Even when adjusted for “crude stage” (referring to the staging used for SEER program data consisting of local, regional, and distant disease categories), most of this difference persists. This relatively unfavorable outcome in blacks is supported by at least one single-institution study.<sup>16</sup>

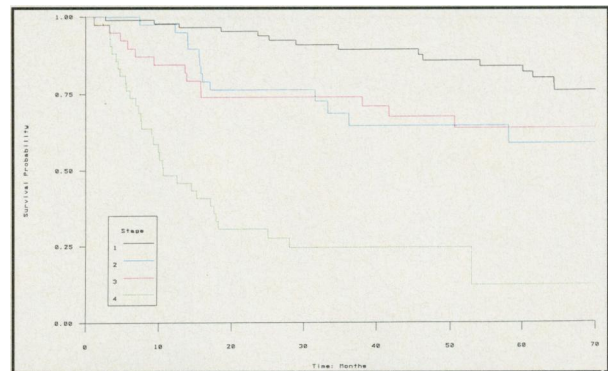
To evaluate the factors responsible for these differences, a retrospective study of patients with laryngeal cancer treated at the Martinez Veterans Administration Medical Center (MVA) was undertaken. Various prognostic factors were analyzed for their independent impact on outcome. The major focus of this study was to evaluate the possible independent prognostic significance of race on survival from laryngeal carcinoma.

**METHODS**

From 1968 through 1988, 229 patients were treated for laryngeal cancer at the MVA. Of these patients, 15 (6%) were excluded from this analysis—seven because of metastatic disease at presentation, one because information was not available for evaluation and follow-up, six because they presented with simultaneous second primary tumors, and one because he died of unrelated causes prior to completion of therapy. The study sample, therefore, consisted of 214 patients. Using information provided by the hospital tumor registry, all available records were reviewed, and patients were staged using the American Joint Commis-



**Figure 1. Survival rates from laryngeal cancer at the Martinez Veterans Administration Medical Center, 1968-1988.**

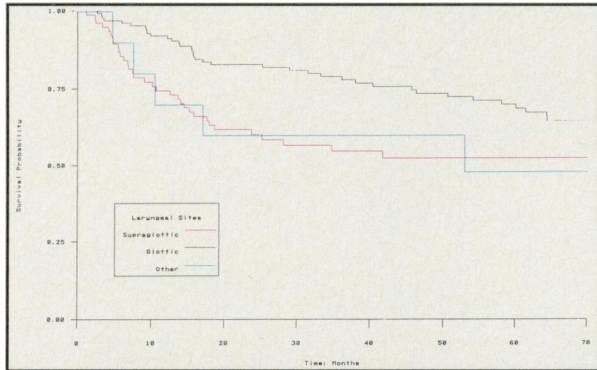


**Figure 2. The impact of stage on survival rates from laryngeal cancer at the Martinez Veterans Administration Medical Center, 1968-1988.**

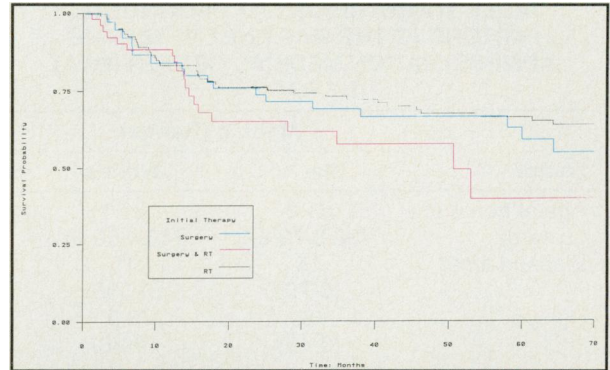
sion (AJC) staging system.<sup>17</sup> For patients treated initially with radiation alone, the clinical stage was used, while for those treated with surgery, the pathologic stage was generally used. The median follow-up was >3 years.

Patients were analyzed by prognostic factors for survival from laryngeal cancer. Survival was calculated from the date of the initiation of treatment to death from laryngeal cancer. Age, stage, site, type of therapy, delay from onset of symptoms, and elapsed time from diagnosis to treatment were analyzed as independent prognostic factors.

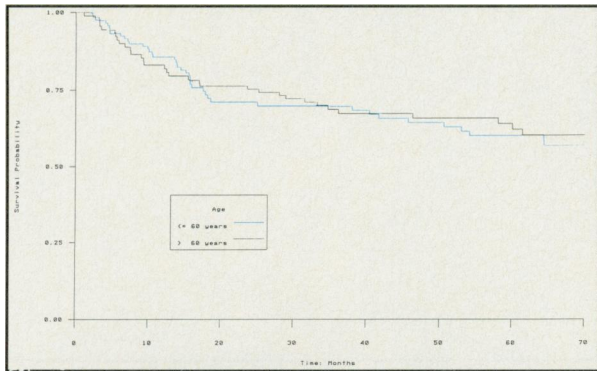
Twenty-three patients were black, 190 patients were white, and one patient was Filipino. Three patients were female, and the remaining 211 patients were males. One hundred thirty-one patients had primary tumors arising from the glottic larynx, 76 from the supraglottic larynx, 2 from the subglottic larynx, and 5 from unspecified



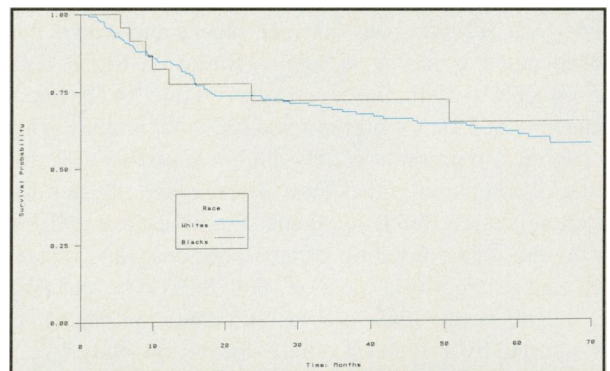
**Figure 3. Laryngeal cancer survival rates by site at the Martinez Veterans Administration Medical Center, 1968-1988.**



**Figure 4. Overall survival rate for laryngeal cancer by treatment modality at the Martinez Veterans Administration Medical Center, 1968-1988. (Abbreviation: RT=radiation therapy.)**



**Figure 5. Survival rates for laryngeal cancer by age at the Martinez Veterans Administration Medical Center, 1968-1988.**



**Figure 6. Survival rates for laryngeal cancer by race at the Martinez Veterans Administration Medical Center, 1968-1988.**

sites. Initial treatment consisted of radiation therapy alone in 122 (57%) patients, surgery alone in 52 (24%) patients, and either surgery followed by radiation therapy or preoperative radiation therapy followed by surgery in 40 (19%) patients. Survival was analyzed using the product-limit estimate of survivorship function (Kaplan-Meier estimate). The log rank test was used to assess the comparability of survival between the prognostic factors.<sup>18</sup> These results were then compared with those reported by others.<sup>1,16-21</sup> A detailed comparison was conducted between blacks treated at MVA and blacks treated at Harlem Hospital (HH), the only large series of blacks treated for laryngeal cancer that we are aware of.

**RESULTS**

Table 1 summarizes data on delay, elapsed time, and age at treatment for black and white larynx cancer patients. No significant difference was found in the

delay time from the onset of symptoms, the elapsed time from diagnosis to the start of treatment, or age between black and white patients. The 5-year survival rate for the entire group was 62% (Figure 1). The impact of stage on survival rate is shown in Figure 2. As expected, stage I patients had the most favorable survival rate, and those with stage IV had the least favorable. Stage II and III patients had a similar probability of survival.

Figure 3 demonstrates laryngeal survival rates by site. As expected, patients with glottic primary tumors did significantly better than those with supraglottic primary tumors.<sup>16,19-21</sup> Figure 4 shows the overall survival rate by treatment modality, demonstrating that patients did equally well whether treated initially with radiation therapy alone or surgery alone. Those patients requiring treatment with surgery and radiation (gener-

**TABLE 2. COMPARISON OF MARTINEZ VETERANS ADMINISTRATION MEDICAL CENTER (MVA) PATIENTS AND HARLEM HOSPITAL (HH) PATIENTS BY LARYNGEAL CANCER STAGE, SITE, AND INITIAL TREATMENT MODALITY**

Stage/Site/Initial Treatment	MVA Series		HH Study
	No. of Whites (%)	No. of Blacks (%)	No. of Blacks (%)
<b>Stage*</b>			
I	75 (40)	8 (35)	15† (19)
II	35 (18)	4 (17)	28 (35)
III	34 (18)	4 (17)	28 (35)
IV	36 (19)	6 (20)	6 (8)
Unknown	10 (5)	1 (4)	2 (3)
<b>Site‡</b>			
Glottic	114 (60)	14 (61)	47 (62)
Supraglottic	67 (35)	9 (39)	17 (26)
Subglottic	2 (1)	—	1 (2)
<b>Initial Treatment§</b>			
Surgery ± radiation therapy	81 (43)	10 (43)	70 (74)
Radiation therapy	109 (57)	13 (57)	24 (56)
Median dose	69	69	60
Range	52-84	60-78	40-70

\*n = 190 (MVA whites), n = 23 (MVA blacks), and n = 79 (HH blacks). For HH blacks, data were taken from Wasfie and Newman<sup>16</sup> and included seven stage II, three stage III, and five stage IV pyriform sinus primary tumors.

†Includes two in situ cases.

‡n = 186 (MVA whites), n = 23 (MVA blacks), and n = 65 (HH blacks). For HH blacks, patients with <1 year follow-up and patients for whom data were not available were excluded.

§n = 190 (MVA whites), n = 23 (MVA blacks), and n = 94 (HH blacks). For HH blacks, 15 patients with pyriform sinus primary tumors were included.

ally a more unfavorable group) did worse. Black and white patients were comparable with regard to stage, age, sites of laryngeal involvement, and treatment modality. Figures 5 and 6 show survival by age and race, respectively. Age was not found to be a significant prognostic factor for survival from laryngeal cancer for the age groups ≤60 years and >60 years. No difference was seen in the outcome as a function of race.

The relatively favorable survival rate observed for blacks in our study differs from the survival rate for blacks treated at HH.<sup>16</sup> Table 2 compares cancer stage, site, and initial treatment modality for the patients in our series with HH patients. The HH series consisted of 94 black patients treated during a similar period to patients treated at the MVA. Fewer stage I and stage IV patients were noted in the HH series. Harlem Hospital patients were somewhat younger (50 to 60 years old for HH patients versus 39 to 74 years old for MVA patients; the median age was 62 for blacks in the MVA series), and a higher percentage was treated by surgery compared with patients in the MVA series. Among those patients treated with radiation alone, the median

dose was approximately 15% higher in the MVA series than in the HH series.

Table 3 compares the 1-, 3-, and 5-year survival rates by cancer stage, site, and initial treatment modality for blacks treated in the MVA study and the HH study. A trend for higher 1-, 3-, and 5-year survival rates was noted for blacks treated at the MVA compared with those treated in the HH series.

## DISCUSSION

In this retrospective study, no differences were found in patient characteristics or survival rates between black and white patients treated for laryngeal carcinoma over the last 20 years. The failure to identify a difference in survival rate as a function of race for patients treated in the Veterans Administration system is consistent with the study by Page and Kuntz.<sup>9</sup> These investigators found no significant difference in survival rates between black and white patients treated for sites including stomach, colon, rectum, lung, and prostate cancer but found differences for survival rates for bladder cancer. Head and neck cancer sites were not included in their study.

**TABLE 3. PERCENTAGES FOR 1-, 3-, and 5-YEAR SURVIVAL RATES FOR MARTINEZ VETERANS ADMINISTRATION MEDICAL CENTER (MVA) PATIENTS AND HARLEM HOSPITAL (HH) PATIENTS BY LARYNGEAL CANCER STAGE, SITE, AND INITIAL TREATMENT MODALITY**

Stage/Site/Initial Treatment	1 Year		3 Years		5 Years	
	MVA	HH	MVA	HH	MVA	HH
<b>Stage*</b>						
I	100	50	86	45	86	30†
II	100	72	75	38	75	16
III	100	63	100	23	50	4
IV	33	44	33	33	33	0
<b>Site</b>						
Supraglottic	67	64	56	32	56	16‡
Glottic	92	59	84	35	72	8§
<b>Initial Treatment</b>						
Surgery ± radiation therapy	90	68	68	38	45	15
Radiation therapy	77	48	77	30	77	14

\*Data for HH patients were taken from Wasfie and Newman<sup>16</sup> and include seven stage II, three stage III, and five stage IV pyriform sinus primary tumors.

†*P*<.05 (analysis for stage I patients only).

‡*P*<.06.

§*P*<.001.

The slightly lower 5-year survival rate in our series compared with SEER data may reflect the fact that a higher percentage of our patients had supraglottic laryngeal involvement than is usually seen (2:1 glottic to supraglottic ratio versus the expected 3:1).<sup>19</sup> Differences in TNM stage on presentation or treatment also could have contributed to differences in the 5-year survival rate. Furthermore, considering site and T stage, our results are similar to those reported elsewhere.<sup>19-21</sup> Although this series is relatively small, the data suggest that when delay, elapsed time, age, stage, site, and therapy are comparable, there are no differences in the survival rates between blacks and whites with laryngeal cancer.

The use of the SEER “crude staging system” can underestimate differences in the site and extent of disease. These differences become more obvious when using a more detailed system such as the TNM system.<sup>17</sup> Within the category of “local,” it is possible to find tumors ranging from very small lesions with an expected long-term cure rate of approximately 90% to large lesions with an expected cure rate of less than 50%.<sup>19,21</sup> The tendency for blacks to present with more advanced disease in general would make it more likely that within the category of “local” disease, more extensive lesions would be found. This explanation is supported by a recent report in which a larger

percentage of blacks had more extensive local laryngeal lesions than whites when pathologic specimens were compared following laryngectomy.<sup>22</sup> The tendency for “crude stage” to underestimate differences in the extent of disease between blacks and whites also has been reported for other sites.<sup>23,24</sup>

Interhospital differences in cancer survival is a well-described phenomena and appears to be primarily a function of patient characteristics rather than the type of facility.<sup>25</sup> Why blacks treated at the MVA had a somewhat better survival than those treated at HH is uncertain. When compared by stage, site, and therapy, differences persisted. The higher doses of radiation delivered in the MVA series could have affected the outcome of patients treated with radiation alone,<sup>26</sup> but a higher survival rate also was seen in those patients treated with surgery ± radiation therapy. Whether lower dose radiation was also used in the postoperative setting or whether some patients who would have benefited from radiation didn’t receive it is unknown. The poor outcome in the HH series also could be explained by the inclusion of 15 patients with pyriform sinus primary tumors, which is a more unfavorable site.<sup>19</sup> Furthermore, in the HH series as many as 21% of the patients who were observed for 5 years or less were lost to follow-up. Very few of the MVA patients were lost to follow-up during the first 5 years.

To what extent treatment differences, the inclusion of pyriform sinus primary tumors, or the lack of accurate follow-up information contributed to the differences in outcome is uncertain. Whether socioeconomic status could explain the poor survival of blacks in the HH series, as suggested by Wasfie and Newman, is uncertain. Polednak found no difference in survival between blacks of lower and upper socioeconomic status for lung and breast cancer.<sup>27</sup> Furthermore, others reported no difference in survival between lower and higher socioeconomic status when the quality of treatment was comparable.<sup>8,9</sup>

Fortunately, there is no reason to believe that cancer discriminates on the basis of socioeconomic status once it develops and reaches a particular stage. On the other hand, socioeconomic status is probably related to "quality care." Quality cancer care includes the initial workup, diagnosis, and treatment. Quality cancer care requires establishing such rapport that the patient will cooperate fully with the treatment regimen even if it requires a total laryngectomy and/or intensive radiation therapy. Quality of care varies from one hospital to the next and probably accounts for a significant portion of the excess mortality observed in black Americans.<sup>10-15,25</sup>

## CONCLUSION

Despite the lower 5-year survival rate reported for black Americans with laryngeal cancer, race does not appear to be an independent prognostic factor. Accurate staging of disease at presentation and quality of treatment received likely account for any observed differences in survival. Caution should be used in interpreting the results of epidemiologic studies that use "crude stage" and include patients unmatched for other significant prognostic factors.<sup>23,24</sup>

## Acknowledgments

The authors thank Marcia Djahanban and Barbara Clecak, RN, for their cooperation in using the Martinez Veterans Administration tumor registry; Dr Deborah Roach for the preparation of this manuscript; and Drs S. Leonard Syme and William Satariano from the University of California at Berkeley for their comments and support.

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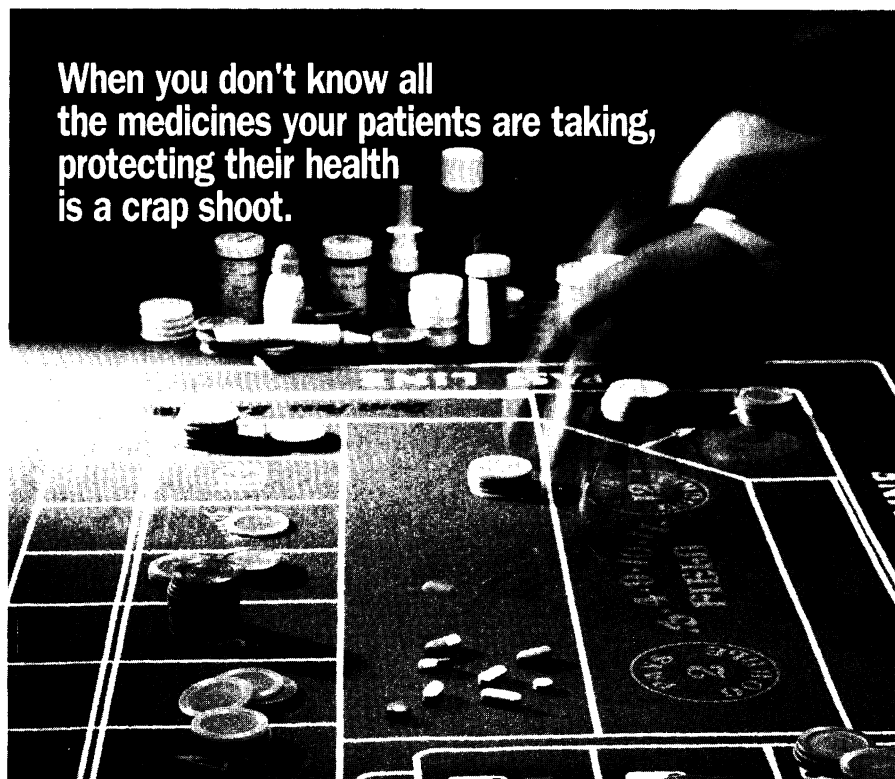
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