Rising Incidence of Renal Cell Cancer in the United States

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Rising Incidence of Renal Cell Cancer in the United States

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Context Clinical surveys have revealed that incidental detection of renal cell carcinoma is rising because of increased use of imaging procedures.

Objective To examine incidence, mortality, and survival trends of renal cell and renal pelvis cancers by age, sex, race, and tumor stage at diagnosis.

Design Calculation of age-adjusted incidence and mortality rates, along with 5-year relative survival rates, using data from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program.

Setting and Participants Patients diagnosed as having kidney cancer from 1975 through 1995 in the 9 geographic areas covered by tumor registries in the SEER program, which represent about 10% of the US population.

Main Outcome Measures Incidence, mortality, and 5-year relative survival rates by time periods.

Results The age-adjusted incidence rates for renal cell carcinoma between 1975 and 1995 for white men, white women, black men, and black women were 9.6, 4.4, 11.1, and 4.9 per 100 000 person-years, respectively. The corresponding rates for renal pelvis cancer were 1.5, 0.7, 0.8, and 0.5 per 100 000 person-years. Renal cell cancer incidence rates increased steadily between 1975 and 1995, by 2.3% annually among white men, 3.1% among white women, 3.9% among black men, and 4.3% among black women. Increases were greatest for localized tumors but were also seen for more advanced and unstaged tumors. In contrast, the incidence rates for renal pelvis cancer declined among white men and remained stable among white women and blacks. Although 5-year relative survival rates for patients with renal cell cancer improved among whites but not among blacks, kidney cancer mortality rates increased in all race and sex groups.

Conclusions Increasing detection of presymptomatic tumors by imaging procedures, such as ultrasonography, computed tomography, and magnetic resonance imaging, does not fully explain the upward incidence trends of renal cell carcinoma. Other factors may be contributing to the rapidly increasing incidence of renal cell cancer in the United States, particularly among blacks.

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MALIGNANT TUMORS OF THE kidney account for more than 2% of cancer incidence and mortality in the United States, with nearly 30 000 new cases and 12 000 deaths estimated for 1998.[1] More than 80% of kidney cancers arise in the renal parenchyma, with the remainder in the renal pelvis.[2] Nearly all kidney cancers originating in the renal parenchyma are adenocarcinomas (renal cell carcinomas), whereas the vast majority of renal pelvis cancers are transitional cell carcinomas.

Recent clinical surveys have revealed that incidental detection of renal cell carcinomas is rising, partly because of increased use of imaging procedures, such as ultrasonography, computed tomography, and magnetic resonance imaging (MRI).[3-5] This observation is consistent with epidemiological data from the United States and other countries suggesting that renal cell cancer may be on the rise.[2,6] To further clarify these trends, we examined the incidence, mortality, and survival data from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program. For comparison, we also analyzed trends for renal pelvis cancer.

METHODS

Persons diagnosed as having kidney cancer from 1975 through 1995 were identified from 9 population-based cancer registries in the SEER program.[7] The registries, accounting for approximately 10% of the US population, are located in the states of Connecticut, Hawaii, Iowa, New Mexico, and Utah, as well as the San Francisco–Oakland, Calif, Seattle–Puget Sound, Wash, Detroit, Mich, and Atlanta, Ga, metropolitan areas.

The study included microscopically confirmed cases of invasive cancers of the kidney parenchyma or kidney, not otherwise specified (*International Classification of Diseases for Oncology, Second Edition*[8] [*ICDO-2*] site code C64.9) and renal pelvis (*ICDO-2* site code C65.9), excluding nonepithelial tumors (ie, melanomas, sarcomas, and lymphomas). The proportion of cases microscopically con-

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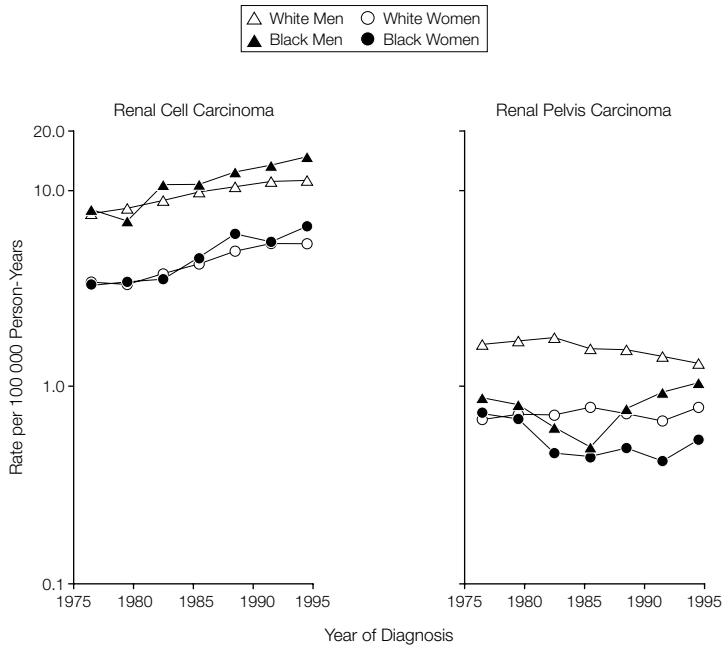
firmed was more than 90% and varied little during the study period. Cases with racial origin other than black or white were excluded because their numbers were too small for detailed analysis.

For analysis, cancer cases with anatomical site coded as kidney, not otherwise specified, and histological codes of transitional cell, squamous cell, or other papillary carcinomas (*ICDO-2* morphology codes 8050-8130) were recoded to renal pelvis cancer. The cases were classified by age (in 5-year age groups up to >85 years), sex, and race. Incidence rates were calculated by summing the number of cases diagnosed during each 3-year period from 1975-1977 to 1993-1995, dividing by the sum of the corresponding midyear population estimates provided by SEER, and multiplying by 100 000 (ie, per 100 000 person-years). Rates were age-adjusted to the 1970 US population using direct adjustment. Trends in incidence rates were evaluated for the seven 3-year periods, along with annual US mortality rates from 1975 to 1995. Figures were prepared by plotting the rates at the midpoint of each 3-year interval on the x-axis and using a logarithm scale for the y-axis so rates of change could be compared visually.[9]

RESULTS

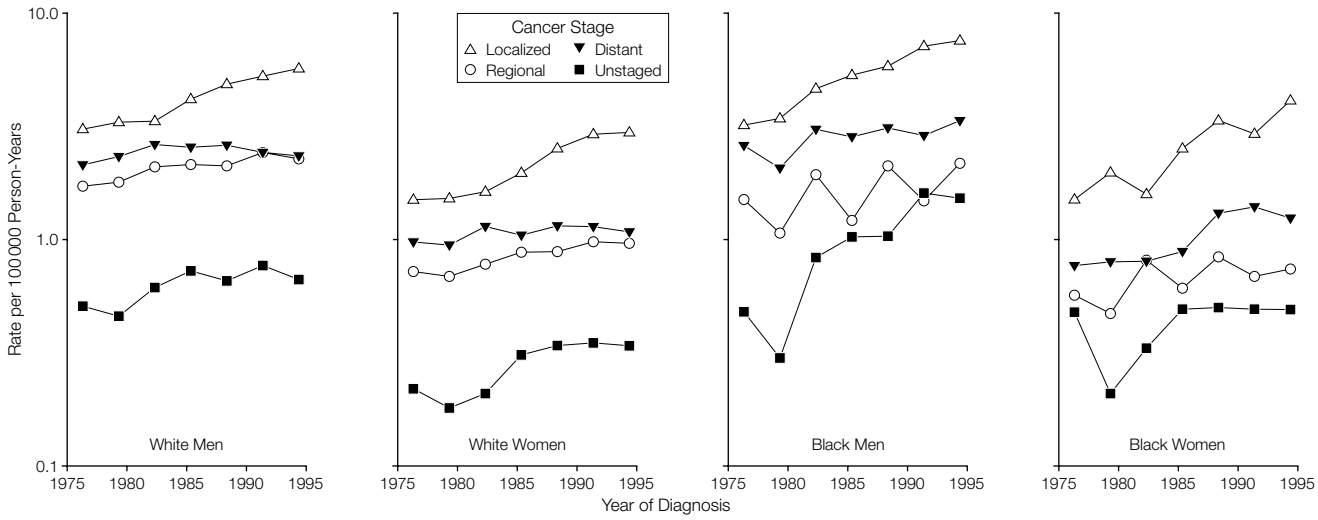
From 1975 to 1995, there were 31 105 invasive cancers of the renal parenchyma and/or kidney, not otherwise specified, and 4985 cancers of the renal pelvis diagnosed among whites and blacks in the 9 SEER study areas. During the study period, the age-adjusted incidence rates for renal cell cancer among white men and women were lower than those among black men and women, with rates of 9.6, 4.4, 11.1, and 4.9 per

Figure 1. Age-Adjusted (1970 US Standard) Incidence Rates for Renal Cell Carcinoma and Renal Pelvis Carcinoma Per 100 000 Person-Years by Sex and Race—SEER, 1975-1977 to 1993-1995



SEER indicates Surveillance, Epidemiology, and End Results program.

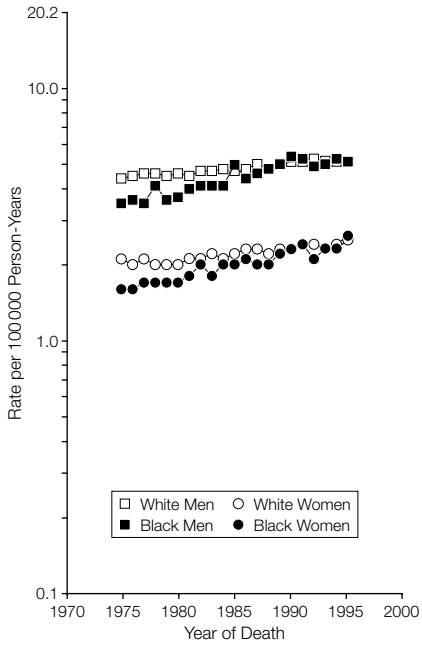
Figure 2. Age-Adjusted (1970 US Standard) Incidence Rates Per 100 000 Person-Years for Renal Cell Carcinoma by Sex, Race, and Tumor Stage at Diagnosis—SEER, 1975-1977 to 1993-1995



SEER indicates Surveillance, Epidemiology, and End Results program.

100 000 person-years, respectively. The corresponding rates per 100 000 person-years were 1.5, 0.7, 0.8, and 0.5 for renal pelvis cancer, respectively. In contrast with renal cell cancer, incidence rates for renal pelvis cancer were higher among whites than blacks.

Figure 3. Age-Adjusted (1970 US Standard) Kidney Cancer Mortality Rates by Sex and Race—United States, 1975-1995



Renal cell cancer incidence rates increased between 1975-1977 and 1993-1995 by 2.3% annually among white men, 3.1% among white women, 3.9% among black men, and 4.3% among black women (FIGURE 1). Since the mid-1980s, the incidence rates for blacks have surpassed those for whites in both sexes. The increases in renal cell cancer incidence have occurred in all age groups (data not shown). In contrast, the incidence rate for renal pelvis cancer has declined slightly among white men and remained stable among white women. The numbers of renal pelvis cancer among blacks were too small for stable estimates of trends.

The greatest increase in renal cell cancer incidence rates occurred for localized tumors, rising annually by 3.8% among white men, 4.7% among white women, 5.0% among black men, and 5.6% among black women (FIGURE 2). However, rates for more advanced tumors, including those with regional extension and distant metastasis, as well as unstaged tumors, also showed increases in all race and sex groups.

In addition, mortality rates for kidney cancer (subsite specification unavailable) rose between 1975 and 1995 (FIGURE 3). The increases were more rapid among blacks than whites, consistent with the upward incidence trends and the lack of improvement in survival rates for renal cell cancer among blacks (TABLE). In contrast, the 5-year relative survival rates for whites generally improved over time. For renal pelvis cancer, the 5-year relative survival rate declined slightly over time among whites, while the survival trend among blacks was unstable due to small numbers.

COMMENT

It has been shown that incidental detection of renal cell carcinoma has risen with increased use of imaging procedures, such as ultrasonography, computed tomography, and MRI.[3-5] Based on our analysis of unpublished data from the Health Care Financing Administration, the use of abdominal or pelvic computed tomography scans or MRI increased steadily from 2622 to 4536 per 100 000 Medicare beneficiaries between 1986 and 1994, a 73% rise during this period. The incidence trends by tumor stage suggest an effect of early detection because the increases in renal cell cancer were most pronounced for localized tumors. However, upward trends were also apparent for more advanced and unstaged tumors. This pattern, along with an increase in the mortality rates for kidney cancer, suggests that the detection of presymptomatic tumors can-

Table. Relative 5-Year Survival Percentage Rate for Patients With Renal Cell Carcinoma or Renal Pelvis Carcinoma by Sex, Race, and Time Period—SEER, 1975-1995*

Cancer Stage	No. of Cases	5-Year Survival, %							
		White Men		White Women		Black Men		Black Women	
		1975-1985	1986-1995	1975-1985	1986-1995	1975-1985	1986-1995	1975-1985	1986-1995
Renal Cell Carcinoma									
Total Invasive	**31 105**	50	61	49	59	50	51	55	58
Localized	14 605	82	89	82	86	82	75	83	84
Regional	6384	54	62	48	59	52	52	49	44
Distant	7890	7	9	5	7	10	7	6	8
Unstaged	2226	35	31	27	21	24	21	33	35
Renal Pelvis Carcinoma									
Total Invasive	**4985**	64	58	58	50	57	70	51	48
Localized	2132	85	87	81	70	. . .	. . .	. . .	. . .
Regional	1907	52	48	48	49	. . .	. . .	. . .	. . .
Distant	608	10	4	1	4	. . .	. . .	. . .	. . .
Unstaged	338	49	46	30	43	. . .	. . .	. . .	. . .

*SEER indicates Surveillance, Epidemiology, and End Results program; ellipses, the number of cases and the number who died were too small for meaningful assessment of survival.

not fully explain the rising incidence of renal cell carcinoma.

We considered the possibility that improvements in subsite specification for kidney cancers may have contributed to the rising incidence of renal cell cancer. This explanation seems unlikely because renal pelvis cancer declined only among white men and the magnitude of change could not have compensated for the increase in renal cell cancer in all race and sex groups. Furthermore, tumor classification also was based on histology, and microscopic confirmation surpassed 90% and changed little over time.

Reasons for the racial disparity in incidence and mortality trends, with more rapid increases among blacks than whites, are not entirely clear. Obesity and hypertension are established risk factors for renal cell cancer[10-12] and are more prevalent among blacks than whites in the United States.[13,14] However, the upward trends in the prevalence of obesity have varied little among race and sex groups.[13] In addition, the prevalence of hypertension has remained stable since the 1960s,[14] although the number and variety of antihypertensive prescriptions have risen steadily in recent decades.[15,16] While black-white differences exist in the incidence and prognosis of hypertension and patterns and effectiveness of therapy,[17-20] there are few data available by race on trends in the use of diuretics and other antihypertensive drugs, which has been related in some studies to the risk of renal cell cancer.[10] Smoking is also an established risk factor for renal cell cancer, but the prevalence of smoking has declined since the mid-1960s.[21] However, given the long latency of tumor development and the possibility of difference in smoking behavior for those who have not quit, the upward smoking prevalence in earlier decades might have contributed to the continuing increases in renal cell cancer, particularly at older ages.

The declining incidence of renal pelvis cancer among white men and relatively stable trends among white women and blacks may be explained in part by the decreasing prevalence of 2 major risk factors, cigarette smoking and the use of phenacetin-containing analgesics.[10] The diverse incidence trends for renal pelvis and renal cell cancers underscore the importance of distinguishing between these types of tumors in future descriptive and analytical epidemiological studies.

In summary, the rapidly rising incidence of renal cell cancer in the United States may be due in part to the increasing detection of presymptomatic tumors, but a real increase is suggested by the upward incidence trend for more advanced tumors and by a corresponding increase in kidney cancer mortality. The increases in incidence and mortality have been greater among blacks than whites, providing clues for further research into the causes and prevention of these tumors.

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