Does Cancer Survival Differ for Older Patients?

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The relation of age to 5-year relative survival rates was examined for leading sites of cancer resulting in death among 127,554 patients; data from 1978 to 1982 were studied for four areas of the Surveillance, Epidemiology and End Results program of the National Cancer Institute. Overall and stage-stratified relative survival rates declined with advancing patient age for cancer of the lung, prostate, pancreas, bladder, oral cavity, uterus, cervix, ovary, and large bowel (women only). In men, this trend was not explained by age differences in stage of diagnosis, whereas, among women, age was associated with more advanced disease for most sites examined. Although overall survival rates were lower in black patients compared with white patients, the age–survival and age–stage trends were similar in the two racial groups. *Cancer* 1992; 70:2734–40.

Key words: age, cancer survival, elderly, stage at diagnosis.

Cancer is a major cause of death and morbidity in elderly people, with more than 50% of incident cancers and more than 60% of cancer deaths occurring in people older than 65 years of age.[1] In view of projections for an expanding segment of the United States population that is 65 years of age and older and the increasing cancer burden associated with advancing age,[2,3] the relation of age to cancer survival is an issue of considerable importance. The literature is limited on whether relative survival rates differ with age. A preliminary report on survival of patients with cancer, from the Surveillance, Epidemiology and End Results (SEER) program (1973–1979) of the National Cancer Institute, indicated that relative survival rates decreased with increasing patient age for most of the sites examined.[4]

This study further examined the relation of age to relative survival rates for selected cancer sites using data from the SEER program (1978–1982). The relationship between age and stage at diagnosis of cancer also was examined.

Methods

The data analyzed for this article were from four areas of the SEER program. The purpose and procedures of the SEER program have been described previously.[5] Because we were interested in examining the age–survival relation in both black and white patients, we used all cancer cases diagnosed from 1978 to 1982 in the metropolitan areas of Detroit, Atlanta, San Francisco–Oakland, and the state of Connecticut. These areas accounted for 58% and 93%, respectively, of the total cases in white and black patients in the SEER program. Patients were observed through 1986 and included men and women who were 19 years of age or older (total: 127,554 cases; 53,350 white men, 57,502 white women, 9211 black men, and 7491 black women). Tables 1 and 2 list the number of cases analyzed for this article by site and age for men and women, respectively.

The cancer sites discussed in this article are lung and bronchus, colon and rectum, prostate gland, pancreas, urinary bladder, oral cavity, female breast, uterine corpus (including uterus not otherwise specified), ovary, and cervix uteri. These 10 sites account for approximately 70% of all cases of cancer resulting in death in men and women. In situ cancers have been excluded because they rarely cause death.

We analyzed the stage distribution of the cases at

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Table 1. Stage Distribution at Diagnosis According to Race, Site, and Age for Male Patients From Four Surveillance, Epidemiology, and End Results Areas for 1978–1982

Site*	Age of white patients (yr)			*P* value for trend	Age of black patients (yr)			*P* value for trend
	< 65	*65–74*	*≥ 75*		*< 65*	*65–74*	*≥ 75*	
Lung & bronchus (n)	8169	5572	2778		2060	1015	281	
Local (%)	20.8	26.1	31.7	< 0.01	21.3	27.1	37.0	< 0.01
Regional (%)	32.8	30.1	24.3	< 0.01	30.5	30.1	18.5	< 0.05
Distant (%)	44.0	40.2	37.3	< 0.01	44.8	39.4	38.1	NS
Other (%)	2.4	3.6	6.7	< 0.05	3.3	3.3	6.4	NS
Colon & rectum (n)	4596	4000	3381		693	396	301	
Local (%)	34.9	37.8	36.9	NS	31.7	34.6	27.9	NS
Regional (%)	38.7	37.3	38.2	NS	35.5	34.3	35.9	NS
Distant (%)	22.3	20.8	18.6	NS	26.1	26.3	25.9	NS
Other (%)	4.1	4.0	6.4	NS	6.6	4.8	10.3	NS
Prostate gland (n)	2839	4993	5239		849	1294	875	
Local (%)	63.1	65.0	64.7	NS	59.2	60.9	60.1	NS
Regional (%)	13.7	11.7	10.6	NS	10.6	9.6	8.8	NS
Distant (%)	19.7	18.9	19.3	NS	28.7	28.0	28.3	NS
Other (%)	3.5	4.4	5.5	NS	1.4	1.5	2.7	NS
Pancreas (n)	882	594	361		190	110	49	
Local (%)	8.3	10.1	11.9	NS	8.4	7.3	10.2	NS
Regional (%)	18.5	16.8	18.6	NS	27.4	20.0	18.4	NS
Distant (%)	67.8	67.0	63.2	NS	58.4	65.5	65.3	NS
Other (%)	5.4	6.1	6.4	NS	5.8	7.3	6.1	NS
Urinary bladder (n)	2592	2004	1761		162	134	76	
Local (%)	78.4	71.9	69.4	< 0.01	62.3	53.0	61.8	NS
Regional (%)	15.3	21.1	21.2	< 0.05	27.2	32.1	28.9	NS
Distant (%)	2.2	2.9	3.6	NS	5.6	6.7	5.3	NS
Other (%)	4.1	4.0	5.7	NS	4.9	8.2	3.9	NS
Oral cavity (n)	2149	967	473		587	112	27	
Local (%)	36.4	35.2	37.4	NS	21.0	20.5	18.5	NS
Regional (%)	42.1	41.3	41.2	NS	51.3	54.5	63.0	NS
Distant (%)	14.5	16.4	11.6	NS	21.5	18.8	11.1	NS
Other (%)	7.0	7.1	9.7	NS	6.3	6.3	7.4	NS

NS: not significant ($P > 0.05$).

* Age–stage regression slope of black patients was not significantly different ($P \leq 0.05$) from that of white patients for any of the sites examined.

diagnosis as a potential explanation for observed age–survival trends. The staging classification used in this article is derived from the data on anatomic extent of disease contained in the SEER record and corresponds to definitions used by the National Cancer Institute in the End Results Program during the 1970s and 1960s.[1] The three stages are "localized," "regional," and "distant." Localized disease is confined to the site or organ of origin. Regional disease has spread by direct extension to adjacent organs or structures, or regional lymph nodes. Distant disease involves distant organs or lymph nodes either by direct extension or through discontinuous metastasis. The "other" stage in this article refers to cases whose codes for extent of disease could not be recoded into one of the local, regional, or distant stages. This includes cases that were medically unstaged, had coding errors, or for which staging information was missing in the medical records.

Statistical Methods

The proportion of cases in a stage at diagnosis in a particular cancer site was obtained by dividing the number of cases diagnosed within each of the listed stages (local, regional, distant, or other) for an age group by the total number of cases in that age group (Tables 1 and 2).

The relative survival rates for age groups (younger than 65, 65–74, and 75 years of age or older) were computed by the actuarial method[6] (Tables 3 and 4). Standard errors of relative survival rates were based on a binomial distribution. The median patient age at diagnosis for all cancers combined is approximately 65 years. Therefore, many patients with cancer die of completely unrelated causes. The relative survival rate takes this into account.[6,7] The observed survival rate is an estimate of the proportion of a patient cohort surviving for the period of time under analysis among those in

Table 2. Stage Distribution at Diagnosis According to Race, Site, and Age for Female Patients From Four Surveillance, Epidemiology, and End Results Areas for 1978–1982

Site*	Age of white patients (yr)			*P* value for trend	Age of black patients (yr)			*P* value for trend
	< 65	*65–74*	*≥ 75*		*< 65*	*65–74*	*≥ 75*	
Breast (n)	13,968	5209	4144		1960	530	323	
Local (%)	47.0	49.0	49.4	NS	43.1	40.2	41.2	NS
Regional (%)	44.5	40.5	39.7	< 0.01	45.5	43.6	38.7	NS
Distant (%)	6.4	8.4	7.9	NS	9.5	14.3	15.2	NS
Other (%)	2.0	2.0	2.9	NS	1.8	1.9	5.0	NS
Lung (n)	4335	2371	1092		696	264	89	
Local (%)	23.1	27.9	30.5	< 0.01	24.4	27.3	37.1	NS
Regional (%)	32.8	29.9	21.8	< 0.01	32.8	27.7	29.2	NS
Distant (%)	41.9	39.5	41.2	NS	39.7	40.9	29.2	NS
Other (%)	2.1	2.7	6.5	NS	3.2	4.2	4.5	NS
Colon & rectum (n)	3707	3559	4543		667	449	414	
Local (%)	34.3	37.3	35.7	NS	30.0	33.2	30.9	NS
Regional (%)	41.1	39.3	40.2	NS	40.2	35.9	35.0	NS
Distant (%)	21.2	20.5	19.1	NS	25.2	24.9	24.6	NS
Other (%)	3.4	3.0	5.0	NS	4.6	6.0	9.4	NS
Corpus & uterus, NOS (n)	4020	1983	1073		301	158	98	
Local (%)	78.7	73.3	65.9	< 0.01	58.8	43.0	49.0	NS
Regional (%)	8.9	11.2	12.5	NS	14.6	19.0	12.2	NS
Distant (%)	5.9	9.6	14.2	< 0.01	16.3	25.9	21.4	NS
Other (%)	6.6	6.0	7.5	NS	10.3	12.0	17.3	NS
Ovary (n)	2148	806	603		247	74	45	
Local (%)	29.3	15.3	14.9	< 0.01	27.1	14.9	15.6	NS
Regional (%)	7.1	7.1	7.6	NS	9.7	9.5	4.4	NS
Distant (%)	61.0	73.7	74.0	< 0.01	61.5	75.7	75.6	NS
Other (%)	2.7	4.0	3.5	NS	1.6	—	4.4	NS
Pancreas (n)	608	504	496		147	108	58	
Local (%)	8.4	7.7	12.5	NS	11.6	12.0	10.3	NS
Regional (%)	22.2	18.1	19.6	NS	23.8	25.0	17.2	NS
Distant (%)	63.7	65.9	57.1	NS	56.5	59.3	63.8	NS
Other (%)	5.8	8.3	10.9	NS	8.2	3.7	8.6	NS
Cervix uteri (n)	1734	345	254		622	143	98	
Local (%)	46.4	27.0	12.2	< 0.01	40.0	19.6	14.3	< 0.01
Regional (%)	26.1	43.8	47.2	< 0.01	33.1	41.3	48.0	NS
Distant (%)	7.1	13.3	17.3	NS	7.2	14.7	15.3	NS
Other (%)	20.4	15.9	23.2	NS	19.6	24.5	22.4	NS

NS: not significant ($P > 0.05$).

* Age–stage regression slope of black patients was not significantly different ($P \leq 0.05$) from that of white patients for any of the sites examined.

whom a specific cancer is diagnosed.[8] The relative survival rate, the measure used in this article for analysis of the survival experience of a patient group, is the ratio of the observed survival rate to the expected or "normal" survival rate for a group of people in the general population similar to the patient group with respect to race, sex, age, and calendar year of observation. Thus, because it is derived by adjusting the observed survival rate of a cohort of patients with cancer for the normal life expectancy of the general population of the same age, the relative survival rate measures the chances of surviving as if cancer were the only cause of death.[9] For calculation of normal life expectancy, life tables[6] were created for each sex and race (white and black) on the basis of 1980 life tables obtained from the National Center for Health Statistics. The 1980 life table was used because it represented the middle of our study period and, therefore, represented the survival experience of the general population during the time of this study.

Cases with death certificates only, autopsy cases, secondary cancers, and all cancer cases other than the first primary cancers were excluded from the survival analysis.

We tested the significance of the linear trend in 5-year relative survival rates and stage at diagnosis across

Table 3. Five-Year Relative Survival Rates (Proportion) According to Age, Race, Site, and Stage of Diagnosis for Male Patients From Four Surveillance, Epidemiology, and End Results Areas for 1978–1982

Site	Age of white patients (yr)			*P* value for trend	Age of black patients (yr)			*P* value for trend
	< 65	*65–74*	*≥ 75*		*< 65*	*65–74*	*≥ 75*	
Lung & bronchus (%)	14.6	11.8	7.0	< 0.01	11.1	7.6	6.3	< 0.05
Local (%)*	39.4	28.2	13.7	< 0.01	27.8†	17.2†	15.1†	< 0.01
Regional (%)	16.2	12.3	8.6	< 0.01	13.5	9.0	3.2†	< 0.01
Distant (%)	1.8	1.3	0.8	< 0.05	1.4	0.6	0.0	< 0.01
Other (%)	11.7†	5.8	4.7	< 0.05	12.9†	0.0	0.0	< 0.01
Colon & rectum (%)*	54.5	52.9	53.0	NS	48.0	39.5†	35.0†	< 0.01
Local (%)	84.8	81.4	81.2†	NS	77.0†	67.7‡	59.6‡	NS
Regional (%)*	56.0	52.3	53.0	NS	55.7	37.2†	32.6†	< 0.01
Distant (%)	5.9	5.5	3.6	NS	4.4	8.9†	9.1†	NS
Other (%)	48.7†	33.7†	31.7†	< 0.01	41.8‡	21.2‡	42.7‡	NS
Prostate gland (%)	73.6	73.9	63.9	< 0.01	66.1	67.1	57.0†	< 0.01
Local (%)	90.1	86.4	74.1	< 0.01	86.3†	84.6†	72.0†	< 0.01
Regional (%)	69.7†	72.7†	55.4†	< 0.01	68.0‡	69.9‡	56.8‡	NS
Distant (%)	23.2	31.1	29.3	< 0.05	23.2†	27.4†	22.3†	NS
Other (%)	77.7‡	78.9†	80.1‡	NS	88.4‡	79.3‡	82.2‡	NS
Pancreas (%)	3.2	1.8	1.0	< 0.05	5.0	2.6	0.0	< 0.01
Local (%)	5.9†	2.1	0.0	< 0.05	0.0	0.0	0.0	NS
Regional (%)	6.6	3.8	2.6†	NS	7.7†	0.0	0.0	NS
Distant (%)	1.5	0.6	0.8	NS	3.1	3.7†	0.0	NS
Other (%)	9.5†	0.0	0.0	< 0.05	20.4‡	0.0	0.0	NS
Urinary bladder (%)	86.1	72.8	64.2	< 0.01	72.3†	54.4‡	47.4‡	< 0.01
Local (%)	93.2	83.8	80.6†	< 0.01	91.9†	81.1‡	69.1‡	NS
Regional (%)	61.3†	44.0†	25.6†	< 0.01	45.0‡	21.3‡	8.2‡	< 0.01
Distant (%)	16.0†	10.7†	5.8†	NS	12.9‡	14.6‡	0.0	NS
Other (%)	80.5†	72.0‡	43.3‡	< 0.01	55.6‡	47.5‡	53.5‡	NS
Oral cavity	49.8	44.7	39.1†	< 0.01	28.4	23.0†	31.8‡	NS
Local (%)	71.6	75.6†	68.6‡	NS	50.3†	39.8‡	32.8‡	NS
Regional (%)	44.2	32.5†	21.9†	< 0.01	24.4†	22.8‡	41.4‡	NS
Distant (%)	16.7	12.4†	16.3‡	NS	15.2†	6.2‡	0.0	< 0.01
Other (%)	39.2†	38.1‡	24.9‡	NS	33.7‡	19.3‡	0.0	< 0.01

NS: not significant ($P > 0.05$).

* Age-survival regression slope of black patients was significantly different from that of white patients ($P \leq 0.05$).

† Standard error of the estimate is between 5 and 10%.

‡ Standard error of the estimate is more than 10%.

For estimates without † or ‡, the standard error of the estimate is less than 5%.

the three age groups in the following manner. The linear trend across the three points, y_1, y_2, and y_3, is estimated by $t = (y_3 - y_1)/2$, which has a standard error of

$$se(t) = \sqrt{(se(y_3)^2 + se(y_1)^2)/4}.$$

Therefore, with an assumed normality of y_1, y_2, and y_3, the significance of t/SE(t) can be determined from a standard normal table. Results of significance testing of age differences in black patients should be interpreted with caution because of smaller numbers.

The racial differences in the relation of age to relative survival rates and stage at diagnosis were tested for statistical significance by the statistic $d = t_{\text{white patients}} - t_{\text{black patients}}$, which has a standard error of

$$se(d) = \sqrt{se(t_{\text{whites}})^2 + se(t\text{blacks})^2}.$$

Results

Age Differences in Stage at Diagnosis

Among men, age differences in the proportion of patients with various stages of disease were significant only for cancer of the lung and urinary bladder in white patients and lung cancer in black patients (Table 1). Among white women, age differences in stage distribu-

Table 4. Five-Year Relative Survival Rates (Proportion) According to Age, Race, Site, and Stage of Diagnosis for Female Patients From Four Surveillance, Epidemiology, and End Results Areas for 1978–1982

Site	Age of white patients (yr)			*P* value for trend	Age of black patients (yr)			*P* value for trend
	< 65	*65–74*	*≥ 75*		*< 65*	*65–74*	*≥ 75*	
Breast (%)	75.0	76.4	73.5	NS	65.3	64.1†	60.5†	NS
Local (%)	89.1	91.8	89.3	NS	85.2	97.1†	79.4‡	NS
Regional (%)	68.9	71.9	66.2	NS	57.0	51.9†	54.2‡	NS
Distant (%)	18.3	15.0	20.1†	NS	15.0†	8.9†	29.7‡	NS
Other (%)	60.1†	52.4‡	51.9‡	NS	59.7‡	67.2‡	51.9‡	NS
Lung (%)	19.5	16.4	12.2	< 0.01	19.0	10.6	14.6†	NS
Local (%)	53.0	39.4	27.1†	< 0.01	43.6†	26.0‡	17.8‡	< 0.01
Regional (%)	19.1	14.8	12.6†	< 0.05	20.3†	12.3‡	21.1‡	NS
Distant (%)	2.3	1.8	1.7	NS	3.2	0.0	0.0	0.01
Other (%)	3.9	10.3†	4.4†	NS	15.7‡	0.0	35.4‡	NS
Colon & rectum (%)	57.8	55.4	53.9	< 0.01	51.3	46.6†	49.0†	NS
Local (%)	86.5	82.7	81.3	< 0.05	84.9†	71.2‡	77.7‡	NS
Regional (%)	59.4	57.3	55.8	NS	56.6†	54.3‡	59.2‡	NS
Distant (%)	10.0	4.8	7.1	NS	3.2	6.2†	4.4†	NS
Other (%)	48.7†	37.7‡	23.4†	< 0.01	47.6‡	30.8‡	33.1‡	NS
Corpus & uterus, NOS (%)*	87.9	78.2	65.1†	< 0.01	65.2†	43.5†	27.3‡	< 0.01
Local (%)*	94.0	87.4	77.8†	< 0.01	81.3†	65.6‡	43.7‡	< 0.01
Regional (%)	73.0†	72.6†	57.2‡	< 0.05	41.1‡	22.9‡	24.8‡	NS
Distant (%)	31.5†	16.8†	17.0†	< 0.01	17.7‡	17.5‡	0.0	< 0.01
Other (%)	85.8†	74.6†	55.0‡	< 0.01	81.9‡	49.2‡	16.9‡	< 0.01
Ovary (%)	45.9	23.3	21.5	< 0.01	47.6†	20.7‡	9.4‡	< 0.01
Local (%)*	84.0	75.7†	84.0‡	NS	88.4†	70.3‡	32.8‡	< 0.05
Regional (%)	62.0†	40.1‡	34.0‡	< 0.01	53.3‡	66.3‡	0.0	< 0.01
Distant (%)	25.2	11.2	7.9	< 0.01	28.5†	4.4†	5.0†	< 0.01
Other (%)	53.5‡	21.1‡	21.4‡	< 0.05	52.5‡	—	0.0	< 0.05
Pancreas (%)	3.6	2.4	0.0	< 0.01	8.9†	3.3	2.6†	NS
Local (%)	8.9†	5.8†	0.0	< 0.05	18.8‡	9.1‡	0.0	NS
Regional (%)	7.3†	10.1†	0.0	< 0.01	12.3‡	4.4†	14.8‡	NS
Distant (%)	1.9	0.2	0.0	< 0.01	2.7	1.9	0.0	NS
Other (%)	0.0	0.0	0.0	—	27.0‡	0.0	0.0	< 0.05
Cervix uteri (%)	71.4	57.7†	38.9†	< 0.01	65.0	46.1†	34.7‡	< 0.01
Local (%)	87.8	78.1‡	94.9‡	NS	86.9†	65.6‡	93.7‡	NS
Regional (%)	52.2†	60.3†	34.0‡	< 0.01	47.4†	47.3‡	20.0‡	< 0.01
Distant (%)	17.8†	9.8†	6.9†	NS	12.3‡	5.7‡	19.3‡	NS
Other (%)	77.3†	57.2‡	44.1‡	< 0.01	68.9†	52.9‡	37.5‡	NS

NOS: not otherwise specified; NS: not significant ($P > 0.05$).

* Age–survival regression slope of black patients was significantly different from that of white patients ($P \leq 0.05$).

† Standard error of the estimate is between 5 and 10%.

‡ Standard error of the estimate is more than 10%.

For estimates without † or ‡, the standard error of the estimate is less than 5%.

tion at diagnosis were observed for every site examined except the colon and rectum and the pancreas (Table 2). Among black women, similar trends were observed but were significant only for cancer of the cervix (Table 2). For lung cancer, the proportion of patients in whom local stage disease was diagnosed increased with increasing age in all sex–race groups (Tables 1 and 2). Conversely, for the gynecologic malignant neoplasms examined here, there was a trend for a decline in the diagnosis of local disease and an increase in the diagnosis of distant disease with increasing age in both black and white women (Table 2).

There were no significant differences between races in the effect of age on the stage of cancer at diagnosis for the sites examined in this article.

Age Differences in Survival Rates

The 5-year relative cancer survival rates for men and women, according to age, race, site, and stage of diag-

nosis, are listed in Tables 3 and 4, respectively. In general, the 5-year relative survival rates were lower in patients who were 75 years of age or older compared with the patients who were younger than 65 years of age. The magnitude of differences in relative survival rates with increasing age was greater in women compared with men.

Among men, the 5-year relative survival rates declined with advancing age for cancers of the lung, colon and rectum, prostate, pancreas, bladder, and oral cavity for one or more or each stage of diagnosis.

Among women, poorer survival with increasing age was observed for cancers of the lung, colon and rectum, corpus uteri, ovary, pancreas, and cervix uteri. For breast cancer, the relationship of age to relative survival rates was not significant in either white or black women (Table 4).

Race Differences in Relative Survival

The age–survival trends were roughly similar in white and black patients; however, black patients tended to have lower survival rates than white patients. The racial differences in the age–survival association did not reach statistical significance in men with cancer of the prostate, pancreas, and urinary bladder and in women with cancer of the breast, lung, colon and rectum, pancreas, and cervix uteri. The relative survival rates were affected less adversely by age among black men compared with white men for local stage lung cancer and regional stage oral cancer. Black men with regional stage and all stages combined colorectal cancer showed a greater reduction in survival by age than did white men. Black women with localized ovarian cancer, in all stages combined, and localized uterine corpus cancer were affected more adversely by age than were white women.

Discussion

The results presented here indicate that relative survival rates for cancer were lower for older compared with younger patients for most of the sites examined (breast being an exception), even within the stage of diagnosis.

Three possible explanations for the observed age–survival relations should be considered: age-related differences in (1) stage of presentation, (2) treatment, and (3) tumor behavior.

Stage of Presentation

Among men, there were no age-related differences in the stage of cancer at presentation for sites other than the lung and bladder (Table 1). Only in cases of urinary bladder cancer did older men receive diagnoses at later stages than did younger men. For lung cancer, advanced age was associated with earlier presentation of disease. Thus, for the cancer sites examined in this article, more advanced disease at diagnosis cannot explain the reduced survival rates for cancer at sites other than the bladder. In women, however, advanced disease at presentation remains a possible explanation for the observed inverse age–survival association for all sites except the pancreas and large bowel (Table 2). It is noteworthy that the trends reported here for stage distribution of various cancers with age are generally in accord with those reported by others.[10,11]

Some older patients in whom localized or regional disease is diagnosed actually may have more advanced disease and, as a result, a poorer observed survival rate within the designated stage than younger patients. Because older as opposed to younger patients may have fewer histologically confirmed diagnoses,[10] possibly because of differences in the use of invasive diagnostic procedures according to age, such relative stage misclassification appears possible among older patients. This possibility is supported further by the observed increase in the proportion of older patients with the diagnosis of "other" stage, in both sexes, for every site. The other stage in this article includes unstaged cases.

Treatment Differences

Age-related differences in treatment may stem from clinician behavior, patient refusal, or certain social barriers to access. Differences in cancer treatment with age, even after adjustment for comorbid conditions, have been reported[12–14] and have prompted the suggestion[15] that clinical status, not age, be used in making treatment decisions. It is remarkable that elderly patients with cancer were found to rate their own quality of life significantly higher than did their physicians.[16] Moreover, it is conceivable that the lower survival rate in older versus younger patients with cancer reflects differences in the treatment of comorbid conditions as well as the malignant neoplasms per se. Certainly, a strong case can be made for including older as well as younger people in cancer treatment trials. The possible social and economic barriers faced by older patients in obtaining cancer treatment need to be explored further.

Biologic Differences

The existing evidence for differences in tumor behavior with age is limited and controversial. It has been believed that some cancers are more aggressive in older as opposed to younger patients,[17] but lung cancer has

been suggested to be less aggressive in elderly patients[18] and colorectal cancer has been thought to be similar in aggressiveness in older and younger patients.[17] Although tumor behavior is not a likely explanation for decreased survival rates in elderly patients, at least for some major cancers, our database provides no information on the biologic behavior of various cancers with age.

Breast cancer is the one major malignant neoplasm for which survival rates were observed to be similar among older and younger patients. The lack of significant age trends in survival for breast cancer in this report is contrary to the findings of others.[19,20] In an examination of survival data from 1960 to 1978 from the National Swedish Cancer Registry,[19] it was found that 45–49-year-old women had the best prognosis, with 5-year relative survival rates 12.2% higher than those of women older than 75 years of age; and relative survival rates were roughly 7% lower in women older than 75 years of age compared with those younger than 65 years of age.[19] Furthermore, a clear age–stage trend for breast cancer also was not observed in the current analysis. Goodwin et al.[10] and Holmes and Hearne[21] have reported a trend for advanced presentation of breast cancer in older patients, whereas Chu et al.[22] reported no relationship between age and stage at diagnosis of breast cancer. Estrogen-receptor–positive breast tumors, which generally carry a more favorable prognosis than estrogen-receptor–negative tumors, have been reported to occur more frequently in older versus younger patients.[23] More data are needed to clarify the age–survival picture for breast cancer.

In conclusion, the data presented here underscore the need for additional examination of factors contributing to poorer cancer survival rates among older people. Cancer control efforts directed specifically at elderly people may be warranted.

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