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Long-term survival in 406 males with breast cancer

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Summary Survival was analyzed during a follow-up period of up to 20 years in 406 (97%) of all 420 males in whom breast cancer was diagnosed in Sweden in 1960–1978. After correction for the expected mortality in the general population, cumulated survival rates (with 95% confidence limits) of 66 (58.7–72.5)% and 52 (42.0–62.1)% at 5 and 10 years respectively were found. These figures and the general pattern of relative survival rates were in close accordance with those noted in a concomitant series of female breast cancer. There was a trend toward slightly improved survival rates during the period of study and the median survival times were 3.9, 4.8 and 7.2 years for patients diagnosed in 1960–64, 1965–69 and 1970–74 respectively. Age at diagnosis was seemingly unrelated to the long-term relative survival. We conclude that, except for a slightly higher mean age at diagnosis in males, there is a striking similarity in the natural history of breast cancer between men and women after initial treatment, with an excess death rate which still persists at long-term observation.

Breast cancer in the male is a rare tumour, a fact which has hindered establishment of its long-term prognosis. Thus, the number of reports including a reasonable number of patients is small (Holleb *et al.*, 1968; Norris & Taylor, 1969; Ribeiro, 1977; Morgan, 1979; Carlsson *et al.*, 1981; van Hazel *et al.*, 1981 (unpublished); The Cancer Registry of Norway, 1975) and some of them are based on selected material (van Hazel *et al.*, 1981 (unpublished)).

There is a great need for correction of survival rates in male breast cancer for deaths due to other causes in order to permit comparison between materials with differing age distributions, and with survival figures for female breast cancer. These requirements have only been met in a small number of studies, however, from which corrected 5-year survival rates of 43% to 60% (Norris & Taylor, 1969; Mausner, 1969; Ribeiro, 1977; Morgan, 1979; The Cancer Registry of Norway, 1975) and 10-year survival rates of 26% to 28% (Ribeiro, 1977; Morgan, 1979) have been reported. A relative survival rate of 25% at 15 years has been found in Norway (The Cancer Registry of Norway, 1975).

Breast cancer in the male has traditionally been considered to carry a worse prognosis than that in the female (Norris & Taylor, 1969; Peltokallio & Kalima, 1969; Crichlow *et al.*, 1972*a*), but this concept has been contradicted in some recent communications (Langlands *et al.*, 1976; Morgan, 1979; Hakulinen *et al.*, 1981). The validity of these comparisons, however, was generally low, because of the limited number of male patients available for analysis.

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The aim of this study was to analyze the long-term survival in virtually all cases of male breast cancer diagnosed in Sweden in 1960–1978, with special reference to temporal trends, late excess death rate, age as a prognostic factor and possible differences in prognosis between males and females. The availability of computerized registers covering the whole population facilitated a nearly complete follow-up and permitted acquisition of reliable data from the general population concerning the expected mortality.

Materials and methods

The National Swedish Cancer Registry was started in 1958. Physicians are under obligation to report all cases of diagnosed cancer to The Cancer Registry. Furthermore, pathologists and cytologists separately have to notify every cancer diagnosis made on surgically removed tissues, biopsies and cytological specimens, and at autopsies. Hence, the registry receives reports from both these sources in 95% of the cases. The incompleteness in registration to The Cancer Registry has been estimated to be ~5% (Mattsson, 1977).

The cancer file is annually linked to The Causes of Death Registry and the dates of death and causes of death are transferred. In addition, a last date of contact is obtained by linking the registry data with an updated living registry covering the total Swedish population. On the other hand, there has been no attempt to follow up all patients actively.

For all cases the closing date of this analysis was December 31, 1979. In the 19-year period from 1960 to 1978, 420 cases of malignant male first

breast cancers were diagnosed in Sweden. Of these, 6 (1.4%) cases were excluded from the survival analyses, since the diagnosis was made incidentally on autopsy. Furthermore, 8 (1.9%) did not have any follow-up and were excluded from the calculations. As a result a total of 406 patients, with the age distribution shown in Table I, were available for follow-up and included in the analyses. A review of the original reports to the Cancer Registry for men aged 45 or less at diagnosis revealed that in 15 out of 16 cases the tumour was unequivocally invasive according to the histopathologic examination.

Table I Age distribution

Age at diagnosis, years	*No.*	%
<15	1	0
15–24	1	0
25–34	3	1
35–44	10	3
45–54	48	12
55–64	86	21
65–74	154	38
≧75	103	25
Total	406	100

For calculating the survival rates, the actuarial or life-table method was used (Ederer *et al.*, 1961). The observed survival rate is the proportion of persons alive at a specified time after diagnosis. The relative survival rate is the ratio between the observed survival in the patient group and the expected survival for that group if they had the same mortality as the total Swedish population with respect to age, sex and calendar time. The relative survival thus estimates the probability of escaping the risk of dying from breast cancer.

The expected survival rates were calculated on the basis of death rates from life tables distributed by sex, 1-year age groups and 5-year calendar periods (The Swedish National Central Bureau of Statistics, 1962–1981). The expected figures are based on the mortality in the total Swedish population. No correction was made for breast cancer mortality which is negligible in the male population.

The survival measures may have been influenced by sampling errors. Therefore, the standard error is given as a measure of the confidence that must be taken into account when interpreting the results. The standard error was computed from Greenwood's formula (Greenwood, 1926), assuming that the expected survival has no variance.

Results

The overall relative 5- and 10-year survival rates for all patients were 66 and 52% respectively (Table II). After 10 years of observation, the number of individuals available for analysis was small and the estimates uncertain. The survival curve showed a continuing decline, however, not only of observed but also of relative survival (Figure 1), indicating a persistent excess death rate in males with breast cancer 10 and 15 years after diagnosis.

The relative survival among all 12,319 female patients with first breast cancers in Sweden in 1959–63, determined in a concomitant study (Adami *et al.*, 1985), is shown in Figure 1. The patterns of the survival curves are strikingly similar and the data do not indicate a more unfavourable prognosis in males than in females with breast cancer.

The number of patients was too small to allow an evaluation of possible significant changes in relative survival related to year of diagnosis during the period of registration (Table II). There was a consistent trend, however, toward improved

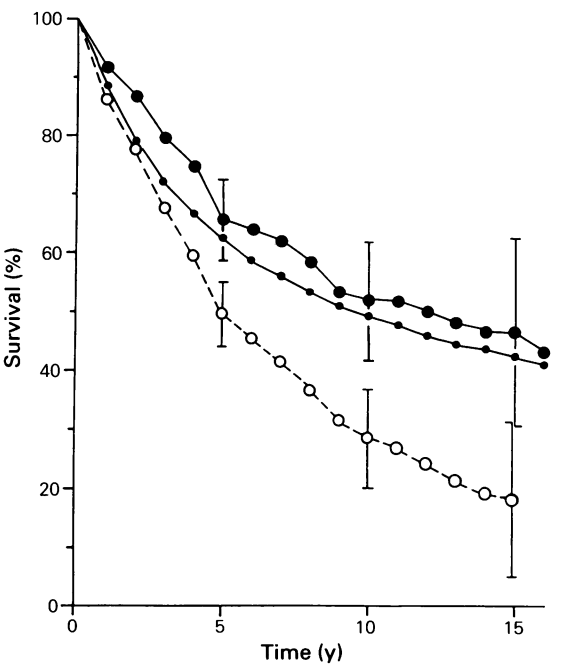

Figure 1 The cumulated observed (○) and relative (●) survival with 95% confidence limits in 406 men with breast cancer diagnosed in Sweden in 1960–1978. For comparison the RS is given for 12,087 women with breast cancer diagnosed in Sweden in 1960–1964 (●) (Adami *et al.*, 1985).

Table II Number of male patients with breast cancer at risk (n), cumulated observed survival (OS) in per cent and cumulated relative survival (RS) in per cent with corresponding 95% confidence limits (RS 95% CL) at defined periods of observation by year of diagnosis. The Swedish Cancer Registry

Observation time, years	*Year of diagnosis*											
	1960–64				*1965–69*				*1970–74*				*1975–78*			
	n	*OS*	*RS*	*RS 95% CL*	*n*	*OS*	*RS*	*RS 95% CL*	*n*	*OS*	*RS*	*RS 95% CL*	*n*	*OS*	*RS*	*RS 95% CL*
1	91	82	87	78.4–94.9	88	91	96	89.7–102.3	135	87	91	84.8–96.8	92	87	93	85.7–100.4
5	45	43	56	42.5–69.0	56	47	62	48.2–75.9	87	56	72	61.1–82.8				
10	24	23	40	25.1–47.8	24	26	48	31.3–65.2								
15	14	14	35	17.1–51.9												

Observation time, years	*Total*			
	n	*OS*	*RS*	*RS 95% CL*
1	406	87	92	88.0–95.0
5	201	50	66	58.7–72.5
10	58	29	52	42.0–62.1
15	16	18	47	31.3–63.2

survival in more recently diagnosed patients (Figure 2). Thus, the 5-year relative survival rates were 56% (42.5–69.0), 62% (48.2–75.9) and 72% (61.1–82.8) for patients diagnosed in 1960–64, 1965–69 and 1970–74 respectively. The corresponding median observed survival times were 3.9, 4.8 and 7.2 years.

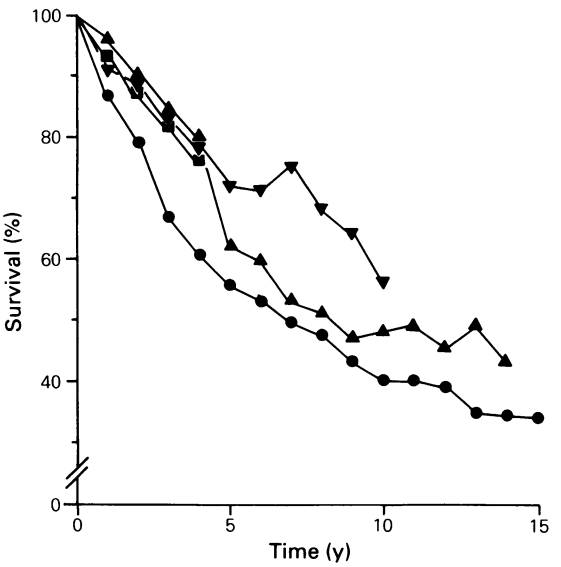

Figure 2 Cumulated relative survival by period of diagnosis. (●) 1960–64, $n=91$; (▲) 1965–69, $n=88$; (▼) 1970–74, $n=135$; (■) 1975–78, $n=92$. Male breast cancer, Swedish Cancer Registry.

There was no tendency suggesting any prognostic impact of age at diagnosis (Table III; Figure 3).

Discussion

The present results were based on complete follow-up of virtually all male patients with breast cancer diagnosed in the whole of Sweden during a 19-year period. The calculation of relative survival was based on figures for the expected mortality which were derived from the same population and adjusted for changes with time. We therefore consider the validity of the study as acceptable, and accordingly regard the results as representative for the Swedish population. Although the results are based, as far as we know, on the largest material published hitherto, the number of patients available for analysis after more than 10 years was so small that the possible influence of a sampling error

Table III Number of male patients with breast cancer at risk (n), cumulated observed survival (OS) in per cent and cumulated relative survival (RS) in per cent with corresponding 95% confidence limits (RS 95% CL) at defined periods of observation by age at diagnosis. The Swedish Cancer Registry

Observation time, years	*Age at diagnosis, years*															
	45–54				*55–64*				*65–74*				*75+*			
	n	*OS*	*RS*	*RS 95% CL*	*n*	*OS*	*RS*	*RS 95% CL*	*n*	*OS*	*RS*	*RS 95% CL*	*n*	*OS*	*RS*	*RS 95% CL*
1	48	96	96	90.7–102.1	86	84	85	77.1–92.9	154	87	91	85.1–96.2	103	83	95	86.5–103.4
5	27	68	70	55.9–85.0	52	57	62	50.0–74.5	79	52	66	55.8–76.8	33	28	61	40.1–82.4
10	10	51	57	38.1–74.9	16	38	48	32.5–63.7	20	27	52	34.8–70.1	8	9	52	9.7–94.0
15	5	51	62	42.1–82.7	5	22	35	11.7–58.7	—	—	—	—	—	—	—	—

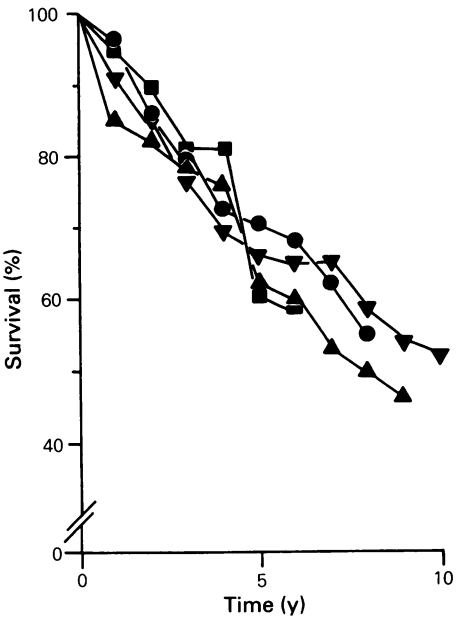

Figure 3 Cumulated relative survival by age at diagnosis. (●) 45–54y, $n=48$; (▲) 55–64y, $n=86$; (▼) 65–74y, $n=154$; (■) ≧75y, $n=103$. Male breast cancer, Swedish Cancer Registry.

prevented definite conclusions concerning long-term survival from being drawn.

The traditionally held view that male breast cancer carries a poorer prognosis than breast cancer in the female is contradicted by the fact that relative survival and late excess death rate in the 406 patients reported here do not exceed those of female patients. This view has been explained in some studies (Peltokallio & Kalima, 1969; Norris & Taylor, 1969; Crichlow 1972*a,b*; Robison & Montague, 1982) by the assumption that the necessarily more central location and earlier invasion of the surrounding tissues in male breast cancer implies earlier regional and distant spread. Our data do not indicate that these anatomic factors lead to a more aggressive clinical course than in female breast cancer.

A Swedish series of male breast cancer collected in 1968–73 (Carlsson *et al.*, 1981) included 135 of the patients reported here. A comparison of presenting symptoms, distribution into stages, and treatment, with those reported in earlier studies (Mausner 1969; Crichlow *et al.*, 1972*b*; Langlands *et al.*, 1976; Ribeiro, 1977; Morgan, 1979; Robison & Montague, 1982) showed that the Swedish patients had approximately the same clinical picture at presentation and included the same proportion of cases in stage I. However, there were somewhat

more patients in stage II, whereas in other series there have been more stage III and IV patients. As a consequence, more patients could be treated with primary surgery in the Swedish study and fewer patients were treated with radiotherapy alone. These differences are not large, however, and in the studies on patients with a somewhat more unfavourable stage distribution both a long-term survival similar to ours (Mausner, 1969; Morgan, 1979) as well as a worse prognosis (Crichlow *et al.*, 1972*b*; Ribeiro, 1977) have been found.

The tendency for the survival rates to be better among the male patients diagnosed in the later part of the study parallels identical observations on female breast cancer in Sweden (Adami *et al.*, unpublished). In females the possibility has been discussed that better relative survival rates in later years may have been a result of increased diagnostic activity. There is no screening or other specific diagnostic measure directed against cancer of the male breast.

Another explanation might be that a more benign subgroup of the disease is increasing in incidence (Fox, 1979). Delay in diagnosis has also been pointed out as a factor influencing prognosis and has been reported to be a common occurrence in male breast cancer (Mausner, 1969; Peltokallio & Kalima, 1969; Crichlow, 1972*a*). The question whether these two latter factors have changed over the years was not elucidated in our study. It is thus difficult to explain the trend toward a more favourable course. This finding should be interpreted with reservation, as the numbers are small and the observation time short for the latest period.

A higher age at diagnosis does not entail a worse prognosis, according to our study and several others in which survival figures corrected for age have been compared (Morgan, 1969; Mausner, 1969; Peltokallio & Kalima, 1969; The Cancer Registry of Norway, 1975; Robison & Montague, 1982). The finding contrasts with the regular trend toward a more favourable course in younger patients, which was recently established for female breast cancer in Sweden (Adami *et al.*, 1985).

Except for a slightly higher mean age at diagnosis in the males, we conclude that there is a striking similarity in the natural history of breast cancer between men and women after initial treatment, with an excess death rate which still persists at long-term observation.

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