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The Incidence of Basal Cell Carcinoma in an Area of Stockholm County during the Period 1971–1980

PETER WALLBERG and ERIK SKOG

Department of Dermatology, Södersjukhuset, Stockholm, Sweden

A study was made of the incidence of basal cell cancer among a population of residents within a limited catchment area in Stockholm during the period 1971–1980. The age-standardized incidence of basal cell cancer increased by an average of 11.9% per year ($p<0.005$) and the incidence rate more than doubled during the ten-year period. There was no statistically significant difference in the rate of increase for men and women. Nor was any such difference noted between face, head and neck and other skin areas. ***Key words: Basalioma, Epidemiology.***

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P. Wallberg, Department of Dermatology, Södersjukhuset, S-100 64 Stockholm, Sweden.

Basal cell cancer is the most common malignant tumour found among members of the Caucasian race. It primarily afflicts persons in the older age groups. Several studies (1, 2, 3, 4) have shown a correlation with UV-radiation. Scotto et al. (5) observed a geographical correlation between low latitudes and high incidence of non-melanoma skin cancer. Vitaliano & Urbach (1) showed that exposure to the sun is the most important risk factor for both basal cell and squamous cell cancers.

Gordon et al. (6) presented Australian data encompassing only inhabitants of Nothern European or British Isles derivation. They found that almost all basal cell cancers were located on the head and neck. Increased age, the presence of keratoses, and out-of- doors work were factors associated with a high risk of non-melanoma cancer.

Freeman et al. (7) examined primarily European inhabitants of the Hamilton area in New Zealand and found that 2/3 of the investigated persons had basal cell cancer on the face, head and neck (FHN). The tumours were more common among men then among women.

Scotto & Fears (8) reported that non-melanoma skin cancer in Minneapolis-St. Paul, Iowa, San Francisco-Oakland and Dallas-Ft.Worth is as common as all other types of cancers combined – in Dallas-Ft.Worth it is in fact more common.

Information about incidence is quite sparse and most reports stem from the U.S.A. Lynch et al.(9) reported an age-standardized incidence per 100 000 for Minnesota in 1963 of 55.4 for men and 39.9 for women. The National Cancer Institute conducted a skin cancer survey at several locations in the U.S.A. in 1971–1972 (5). The observed incidence of basal-cell cancer per 100 000 in Dallas-Ft. Worth was 286 which was about twice as high as in other areas: Iowa at 93, Minneapolis-St Paul at 129, and San Francisco-Oakland at 153.

In a similar study from 1977–1978 (10), the National Cancer Institute found that the incidence had increased by 3% per year. It was shown that this increase was more pronounced in other skin areas than on the face, head and neck among men, but no difference was found among women.

A similarly high figure of 231 per 100 000 was reported in 1982 (7) for the crude incidence of basal cell cancer among the European population of New Zealand and 184 for the total population.

Recent data from Europe have provided the age-standardized incidence of basal cell cancer in Denmark (11) and West Glamorgan, South Wales, U.K. (12).

We have studied how the incidence of basal cell carcinoma has changed among men and women, taking age into consideration as well, over a 10-year period (1971–1980) among a limited population in the Stockholm area in Sweden.

PATIENTS AND METHODS

The patients are taken from among a population of residents of a limited catchment area in Stockholm containing about 320 000 individuals. Every medical report and every pathological examination of the tumours of the patients who visited our clinic during this ten-year (1971–1980) period and every pathological examination of biopsies, taken on patients living in this catchment area but by physicans

Table I. *Age-standardized incidence rate per 100 000, for men, women and combined, annually.*

Sex	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Men	20.8	14.8	14.7	20.8	30.5	29.0	44.1	41.3	46.1	48.8
Women	18.3	24.2	25.3	26.8	29.4	32.2	35.8	43.7	47.1	44.4
Total	19.5	19.5	20.1	23.7	29.9	31.6	39.6	42.4	46.5	46.6

working outside the hospital, were carefully scrutinized. The information on the number of inhabitants each year in the catchment area was obtained from the Stockholm office of reseach and Statistics (13), as well as from Statistics Sweden (14). These data are updated every year. The inhabitants are served by one dermatological clinic and one pathology laboratory. Nearly all the biopsies taken in this area are processed at this laboratory. A small number of biopsies from other physicians have been sent to private laboratories, but this number has remained constant during the period under study, according to checks with these laboratories.

In order to localize the tumours, the anatomical chart used was the same as that used in The Third National Cancer Survey (5, 8) and, in accordance with that model, sun-lit skin refers to tumours localized on the face, head and neck (FHN).

The number of tumours was determined for each patient for the period of one year. The presence of more than one tumour was categorized as multiple tumours. Exclusively clinical diagnoses were also accepted. Obviously recurrent tumours were not included. In the calculations of incidence on FHN and other skin areas, multiple tumours were not counted due to the fact that in many cases, these were spread over both areas in the same patient.

In order to calculate for the age-specific incidence, we redivided the six original age-groups, each covering ten years, into four groups. The two youngest groups, 0–39 and 40–49 years old, were merged into one group since there were too few cases in the youngest group. The two oldest groups, 70–79 years and 80 years and onwards, were combined into one group due to various different population accounts of these groups during the observation period.

Statistics

We defined the age-specific incidence rate as the annual number of cases with a certain diagnosis for each ten-year age-group per 100 000 of the mean population in that age-group. Incidence rates were directly standardized to the age distribution at 1975 for the target population.

We have not reported the incidence of cases with multiple tumours separately due to the low number of cases and the fact that the diagnoses were sometimes based on clinical observation only.

For evaluations of the incidence trends, a linear regression function was fitted to the data using the method of least squares (15). Slopes were tested with the two-tailed students *t*-test. Statistical significance was assigned to any $p<0.05$.

RESULTS

A total of 1050 patients was registered during the years 1971–1980. Of these, 18 cases evenly distributed during the period were dropped due to erroneous diagnoses or loss of medical records. Thus, 1032 patients were covered by the study, 555 women and 477 men, with a total of 1405 tumours. Of the patients, 846 (82.0%) had solitary tumours and of these 592 (70.0%) were located on FHN. Of all the

Table II. *Age-standardized incidence rate per 100 000 for patients with solitary tumours on face, head and neck (FHN) and on skin other than FHN, for men, women and combined, annually.*

Year	Men		Women		Total	
	FHN	Other skin	FHN	Other skin	FHN	Other skin
1971	10.3	5.8	13.4	2.6	12.3	4.2
1972	10.3	2.6	20.3	2.5	15.4	2.5
1973	6.7	4.0	16.2	6.6	11.2	5.3
1974	13.3	4.7	18.2	6.1	15.8	5.4
1975	15.2	8.6	20.4	7.2	18.0	7.9
1976	16.5	5.7	24.0	7.8	15.8	6.3
1977	19.5	13.3	22.8	6.0	22.7	9.4
1978	20.1	12.1	27.1	8.3	23.7	10.0
1979	20.3	12.6	26.9	14.5	24.1	11.9
1980	25.7	12.0	26.0	9.8	25.8	10.9

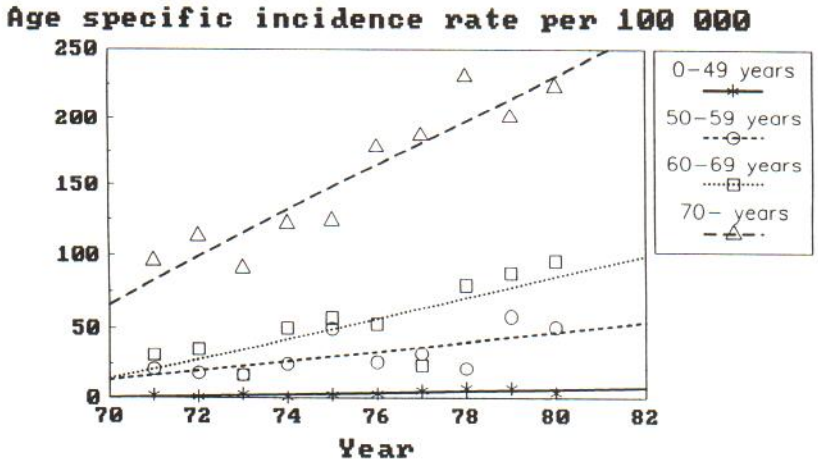

Fig. 1. Age specific incidence rate per 100 000 with respect to each age-group, annually. A linear time dependence is assumed.

tumours, 82.2% were histologically verified, including 94.3% of the solitary tumours and 62,5% of the multiple tumours.

The age-standardized incidence per 100 000 inhabitants in the total material during the period under study (see Table I) increased at a mean annual rate of 11.9% ($p<0.001$). For women this increase in incidence was 10.0% ($p<0.001$) and for men 14.0% ($p<0.001$). The difference between the sexes was not statistically significant.

During the period, the rate of incidence between men and women was on the average 1.00:1.05. The incidence of solitary tumours on FHN increased at a mean annual rate of 9.0% ($p<0.001$), and on skin other than FHN at 14.1% ($p<0.001$). There was no significant difference in mean annual rate between FHN and other skin areas.

For women with only solitary tumours on FHN (see Table II), the incidence increased at a mean annual rate of 6.7% ($p<0.001$) and on skin other than FHN at 14.3% ($p<0.003$). The difference between FHN and other skin areas was not statistically significant.

For men with only solitary tumours on FHN (see Table II), the incidence increased at a mean annual rate of 11.8% ($p<0.001$) and on other sites at 15.2% ($p=0.003$). Again, no statistically significant difference was noted between sites.

Fig. 1. shows the age-specific incidence of the total material. In all age-groups, a statistically significant increase in mean annual incidence rate was calculated for the period 1971–1980.

The incidence rates in the various groups increased as follows: 0–49 years by 18.0% ($p=0.01$), 50–59 years by 11.4% ($p=0.03$), 60–69 years by 14.9% ($p<0.001$), and 70 years and over by 11.1% ($p<0.001$). No significant differences in the increases were observed among the different age groups.

The number of new cases every year during the whole 10-year period, were below 10 for the youngest age-group and between 90 and 230 for the oldest group.

DISCUSSION

One difficulty with studies on incidence is the unreliability of the number of patients and the size of the population. As the population in the catchment area investigated was clearly defined and the migration pattern was well known, we did not need to use estimation in our study.

In this study, comprising the period 1971–1980, the current population is served by the same pathological and dermatological clinics, organized by the Swedish health and medical services. In the Stockholm area there were also three smaller pathology laboratories which processed a small but constant or slightly increasing number of biopsies of basal-cell cancers during the period.

In Sweden, basal-cell cancer is primarily dealt with by dermatologists. Only a few cases from surgeons or other physicians were registered at the pathology laboratory. We consider it possible that a small number of patients in the catchment area visited private doctors in other areas. Thus, we believe that our calculation of the number of cases of basal-cell cancer has not given rise to any systematic source of error, but rather that loss of cases is evenly spread over the time period.

There was no difference in the incidence rate between men and women.

Several other studies of non-melanoma cancer and basal-cell cancer from the U.S.A. and New Zealand, respectively, reveal completely different figures. They found variances of between 1.4–2.4:1 for men: women. These differences between our study and others are difficult to explain. They may be due to variations in climate, time spent out-of-doors, and/or recreational habits and life styles during various periods of time.

This study shows a rate of increase that implies a doubling of the incidence over the 10-year period, which is in accordance with American studies (5). Other studies (10) reveal an increase of 3% per year. On the other hand, our incidence-number is considerably lower, which could be explained by the difference in latitude and the number of hours of sunshine.

If the exposure to sun has any significance for the occurrence of basal-cell cancer, which is generally believed to be true (10,5), the increase can also be explained by changed recreational habits involving increased sun exposure.

There was no significant difference between the increase in cancer on FHN and on skin other than FHN, which should support the theory (16) that single pronounced exposures of the entire body are of equal significance as the continuing exposure of the FHN area. This also appear to be the case with malignant melanoma.

Corresponding American studies (10) reveal an increased incidence on skin other than FHN among men, while for women there was no correlation with localization.

The study shows that the increase in basal cell cancer is about the same as that found for malignant melanoma (17) during the same time period and the same geographical area. This indicates that similar factors are involved in the pathogenesis.

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