OBJECTIVE: To study trends of nonmelanoma skin cancer in Finland.

DESIGN: Descriptive analysis of incidence and mortality rates for basal cell skin carcinoma (BCC) and other nonmelanoma skin cancers (NMSCs) from 1966 and 1956, respectively, through 1995 in relation to sex, age, anatomical distribution, place of residence, and occupation.

SETTINGS: Data were obtained from the nationwide Finnish Cancer Registry, to which reporting of skin cancer is compulsory.

PATIENTS: Inhabitants of Finland (5.1 million in 1998).

MAIN OUTCOME MEASURES: Age- and sex-specific incidence and mortality rates and overall rates adjusted for age to the world standard population; occupation-specific standardized incidence ratios, with the total Finnish population as reference.

RESULTS: The age-adjusted incidence rate in 1991 through 1995 for BCC was 49 per 100,000 person-years in men and 45 in women. For NMSC it was 8.7 in men and 5.3 in women. Both cancer types showed an increasing trend in incidence rates. The proportion of tumors in the face, scalp, and neck was 59% for BCC and 67% for NMSC. The incidence rate of NMSC increased from north to south, while there was no great urban-rural or occupational variation in the occurrence of NMSC. The incidence rate for BCC was higher in urban than in rural regions. Farmers, forestry workers, and fishermen showed low incidence of BCC, whereas occupations with a high level of education or compulsory health checkups and medical care occupations appeared to have an increased incidence of BCC. The mortality rate for BCC in 1991 through 1995 was 0.08 per 100,000 person-years in men and 0.05 in women, and for NMSC, it was 0.38 in men and 0.23 in women. The mortality trend was decreasing for both cancer types.

CONCLUSIONS: The incidence of NMSC is fairly low in Finland, accounting for 3.5% of all new cancer cases. Conversely, BCC is the most common cancer type. The incidence trend is increasing for both skin cancer types, but mortality remains low.

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Although basal cell skin carcinoma (BCC) is the most common type of malignant skin tumor, there are few data on its incidence in different populations. Since many cancer registries do not collect information on BCC, its incidence is often determined on the basis of clinical surveys. The incidence of other nonmelanoma skin cancers (NMSCs) is better documented, but data are less satisfactory than, for instance, those for cutaneous malignant melanoma.1

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The Finnish Cancer Registry collects nationwide information on BCC and other NMSCs. The incidence rates are reported annually, and the Cancer Registry has submitted several analytic and descriptive studies on skin cancer.2-5 We present herein the incidence and mortality rates for BCC and NMSC in Finland in relation to calendar time, age, sex, histological characteristics, anatomical site, place of residence, and occupation.

RESULTS


The incidence of BCC increased throughout the study period (Figure 1). Basal cell skin carcinoma was about 2.4 times as frequent from 1991 through 1995 (age-adjusted incidence rate, 49 and 45 per 100,000 person-years in men and women, respectively) as from 1966 through 1970 (Table 1). The incidence of NMSC remained fairly constant until the early 1970s, when it started to increase (Figure 1). The incidence rate increased by about 70% from 1966 through 1970, being 8.7 per 100,000 in men and 5.3 per 100,000 in women from 1991 through 1995 (Table 1). The incidence of squamous cell skin carcinoma
SUBJECTS AND METHODS

THE FINNISH CANCER REGISTRY

The Finnish Cancer Registry was founded in 1952. Reporting of cancer has been compulsory since 1961. The reports come on a standardized form from hospitals, pathology laboratories, and general practitioners. The Central Statistical Office submits information whenever cancer is mentioned on a death certificate. The registry covers more than 99% of the solid tumors diagnosed in Finland. Information has been collected on NMSC since 1953 and on BCC since 1964. Basal cell skin carcinoma is registered separately from other cutaneous and noncutaneous malignant neoplasms because many other countries do not record it at all. All invasive skin neoplasms except BCC and cutaneous malignant melanoma are coded as NMSC. Only histologically verified skin carcinomas are registered, whereas in situ tumors are not. If more than 1 skin cancer of the same histological type occur at the same anatomical site within 20 years, they are all coded as 1 primary tumor at the subsite in question. If the time interval is longer than 20 years, the cancers are coded as separate tumors. If several tumors of the same histological type are reported at different skin sites within 1 year, they are all coded as one occurrence at “multiple skin sites.” If several tumors of the same histological type are reported at different skin sites 1 year or more apart, each of them is coded as a separate primary tumor at the subsite in question.

STUDY POPULATION

The Finnish Cancer Registry covers the whole of Finland: 5.1 million inhabitants of mixed origin, including Baltic, Scandinavian, and probably eastern elements. Finns have a white complexion and are usually of skin types II or III. Finland is situated in Northern Europe between 60° and 70°N and 20° and 30°E. More than 76 percent (76.4%) of Finns live in urban and 23.6% in rural communities. Sixty-five percent work in services, 28% in secondary production, and 7% in primary production.

INCIDENCE OF NMSC

Age- and sex-specific incidence and mortality rates were calculated for 5-year periods from 1956 through 1995 for NMSC and from 1966 through 1995 for BCC. The world standard population was used for age adjustment. All classifications except place of residence and occupation were based on the cancer notifications routinely stored in the Cancer Registry database. The exact place of residence before the cancer diagnosis was taken from the national population register. The methods for calculating the standardized incidence ratios (SIRs) in relation to occupation have been described in detail in an earlier study by Pukkala. Briefly, Statistics Finland organized an official census of the whole Finnish population on the last day of 1970. The questionnaire included information on occupation, which was coded into more than 400 occupational categories. The occupational data of persons born in 1906 through 1945 were linked with the records of the Finnish Cancer Registry for 1971 through 1995, producing SIRs by occupation adjusted for age and sex.

ANATOMICAL DISTRIBUTION

Basal cell skin carcinoma and NMSC were most common in the face. The proportion of tumors in the face, scalp, and neck was 58.6% for BCC and 67.4% for NMSC from 1991 through 1995. The incidence rates from 1991 through 1995 for BCC were 23.9 in men and 23.3 in women in the face, 7.9 in men and 5.9 in women in the trunk, 3.2 in men and 2.7 in women in the scalp and the neck, 1.2 in men and 0.9 in women in the upper limbs, and 0.7 in men and 1.1 in women in the lower limbs. The incidence rates for NMSC from 1991 through 1995 were 4.9 in men and 3.1 in women in the face, 0.9 in men and 0.6 in women in the trunk, 0.7 in men and 0.3 in women in the scalp and the neck, 0.7 in men and 0.4 in women in the upper limbs, and 0.6 in men and 0.4 in women in the lower limbs. Nonmelanoma skin cancer was 17 times more frequent on the earlobe in men than in women. The registration of BCC at an unspecified site increased throughout the study (Figure 3). Otherwise, there were few changes in the distribution of tumor sites during the study period (Figure 3).
Administrative and clerical work, technical occupations, and health care occupations showed high SIRs for BCC in both sexes. Farming, forestry, and fishing were associated with a low risk of BCC (Table 2). Table 2 shows the SIRs for the main occupational branches (first digit of the 3-digit occupation code). Two-digit codes indicated the occupational branch, which was divided into specific occupations (3 digits). The top 5 on the list of 2-digit occupational branches with the highest statistically significant SIRs for men were pilots, flight engineers, and other air traffic personnel, excluding control (SIR, 2.6); stenographers and typists (2.3); medical work and nursing (1.7); legal professions (1.6); and engine drivers (1.6). The 5 categories with highest risks of BCC in women were public administration (SIR, 1.5), teaching (1.5), humanistic and social work (1.4), stenographers and typists (1.2), and medical work and nursing (1.2). Of specific occupations (3 digits), leather tanning and finishing workers had an especially low incidence of BCC in both men (SIR, 0.27) and women (0.35).

The traditional outdoor occupations, such as farming and forestry work, did not increase the risk of NMSC. There was little variation between the main occupational branches (Table 3). The specific occupations (3 digits) with the highest statistically significant SIRs for men were authors (SIR, 6.2), veterinary surgeons (4.1), launderers (4.0), teletechnicians (3.2), and textile finishers and dyers (2.6); for women, they were senior officers of commercial and nonprofit associations (9.2), computer bookkeepers (5.7), truck drivers (5.0), and machine and engine greasers (3.9).

**MORTALITY**

The age- and sex-adjusted mortality rates for both BCC and NMSC were very low and decreased during the study period. The rate for BCC was 0.08 per 100,000 in men and 0.05 in women, and that for NMSC was 0.38 in men.
and 0.23 in women from 1991 through 1995 (Figure 4). Deaths occurred mostly in the age groups of 65 years and older.

**COMMENT**

Nonmelanoma skin cancer accounted for 3.5% of all cancers (excluding BCC, papillomas of the urinary organs, and carcinoma in situ lesions of the cervix) in both sexes in Finland in 1995. Basal cell skin carcinoma was the second most common neoplasm after prostate cancer in men and after breast cancer in women. The incidence rates for BCC and NMSC in Finland were well comparable with the rates in the other Nordic countries, but less than half of the highest rates in British Columbia and Tasmania. The incidence rates showed a mean annual increase of 1.3% for BCC and 2.7% for NMSC from 1986 through 1995, which is less than that reported from some other populations with an average increase of 3% to 6%. The incidence of BCC increased more rapidly during the first 20 years (about 6% annually) than in the last 10 years of the study period. This was probably largely because of underdiagnosis and underreporting of cases in the early years of registration. The incidence rates from
the last 10 years are more likely to represent the true incidence of BCC in Finland. Basal cell skin carcinomas are often multiple within the same anatomical region. The current method of registration, however, records only 1 tumor at the same subsite within 20 years. Therefore, the incidence rate of BCC represents the number of patients rather than the actual number of tumors.

The proportion of NMSC in the head and neck was similar to that in other populations. The incidence of BCC in the same area, however, was lower than in some other countries. This can be partly explained by the coding rules of the Finnish Cancer Registry, which may lead to underestimation of the proportion of tumors in regions where recurrent or multiple tumors are common. A high number of BCC lesions were also registered at unspecified sites. The main reason for this is the increasing proportion of computerized cancer reports from pathology laboratories. The computer files do not necessarily include subsite information, and the Finnish Cancer Registry does not ask the treating hospital for missing details for BCC cases, as it asks for all other malignant neoplasms.

There was some evidence of a relationship between NMSC and latitude, but not with the place of residence in either urban or rural communities. Occupation and NMSC did not appear to be associated, which is in agreement with the previous reports. There was no clear north-south gradient for BCC, but the incidence rate was higher in urban than in rural regions. Farmers, forestry workers, and fisherman also showed low SIRs for BCC. Occupations with a high level of education or compulsory health controls, such as air pilots and engine drivers, and medical care occupations had an increased risk of BCC, which could be a consequence of greater alertness and more frequent consultation for skin lesions. On the other hand, persons in rural occupations are less likely to consult a physician because of their skin tumors. The lower risk of BCC in rural areas and occupations might also reflect the behavior patterns in relation to sunbathing. Basal cell skin carcinoma in Finland is twice as common in the highest social class as in the lowest. The occupation-specific SIRs in this study also suggest that BCC is more frequent in higher socioeconomic classes, whereas no obvious differences were seen for NMSC.

The mortality rates of BCC and NMSC were very low and showed a decreasing trend throughout the study period. The patients who died were mostly old. Nonmelanoma skin cancers accounted for 0.4% of cancer deaths in men and 0.5% of cancer deaths in women in 1995. Mortality statistics have generally suffered from misclassification. The Finnish Cancer Registry draws the information on cancer deaths from death certificates, which are compared with information on the tumors already registered. Additional data are requested from physicians in uncertain cases. The mortality rates in Finland are therefore reliable.

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