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Cancer incidence in a kidney-transplanted population

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E. Pukkala Finnish Cancer Registry, Finland Abstract The cancer incidence in all Finnish kidney-transplant recipients up to 1991 was studied. In 2090 patients 94 cancers were diagnosed, with a calculated incidence of 14.2% at 15 years' follow-up. The standardised incidence rate (SIR) compared with the entire Finnish population was 2.7, and it remained stable throughout the follow-up period. The SIR for skin cancer was 20, for thyroid cancer 11, and for kidney cancer, non Hodgkin lymphomas, cancer of the colon, bladder and female genital organs, 7, 6, 5, 4 and 3 respectively.

Key words Kidney transplantation Cancer incidence · Cancer risk Immunosuppression

Introduction

A successful renal transplantation grants the recipient a better quality of life and the society great savings in the total cost of treatment. The immunosuppressive regimen required has, however, been associated with a high incidence of cancer in these patients. In Finland, all kidney transplantations are performed in a single centre, and a thorough follow-up of the patients was made possible through the cooperation of their local hospitals. The nationwide Finnish Cancer Registry has been in function for over 4 decades, and its coverage is essentially complete as evidenced by clinical studies on national cancer incidence and treatment results [5]. We studied the incidence of cancer in this comprehensive countrywide kidney transplant recipient population.

Patients and methods

kidney transplants. The patient registry data were combined with data in the Finnish Cancer Registry files on cancers diagnosed by 31 December 1991. The number of cancer cases and corresponding expected numbers based on national cancer incidence figures were calculated according to patient sex, age, length of follow-up and type of immunosuppression. The analyses were made separately for total cancer and selected cancer types. Basalomas were analysed separately.

Standardised incidence ratios (SIR) were calculated as the ratio of the observed and expected number of cases, and 95% confidence intervals (CI) were estimated under the assumption that the observed number of cases followed a Poisson distribution.

Results

The length of follow-up varied from 0 to 27 years, with a total of 12055 patient-years. The mean age of patients at transplantation was 40.3 years.

A total of 94 cancers was found during the followup period 1964–1991, in contrast to the expected number of 34.7, with a SIR of 2.71 (CI 2.19–3.31, P < 0.001). A breakdown of the cancers by primary site is shown in Table 1. The highest SIR, 20, was found in the skin cancer group, which included two Kaposi

The patient cohort comprised all kidney-transplant recipients in Finland since 1964, when the study started, until 31 December 1991. These 2090 patients (1231 men and 859 women) had received 2509

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Table 1 Cancers among 2090 kidney transplant recipients in 1964–1991 by can- cer type, both sexes (SIR standardised incidence ratio, CI confidence interval) ^a Excluding basaloma and melanoma	Site	Observed	Expected	SIR	95% CI	Р
	All sites	94	34.7	2.71	2.19-3.31	< 0.001
	Skin ^a	12	0.6	20.1	10.4 -35.1	< 0.001
	Thyroid	7	0.6	10.9	4.39-22.5	< 0.001
	Kidney	9	1.3	6.72	3.07-12.8	< 0.001
	Non-Hodgkin lymphomas	7	1.2	5.82	2.34-12.0	< 0.001
	Colon	8	1.6	5.13	2.22-10.1	< 0.001
	Bladder	5	1.2	4.20	1.37-9.81	< 0.05
	Female genitals	8	2.6	3.04	1.31-5.98	< 0.05
	Hodgkin disease	1	0.3	3.00	0.08-16.7	NS
	Lung	7	5.7	1.23	0.49-2.53	NS
	Breast	6	5.0	1.21	0.44-2.62	NS
	Other	24	14.6	1.64	1.05-2.45	< 0.05



Fig. 1 Cancer incidence by time after kidney transplantation in Finland (1964-1991)

sarcomas. The SIR of thyroid cancer was 11. Cancers of the kidney, colon and female genital organs and non-Hodgkin lymphomas also had significantly elevated SIRs, 6.7, 5.1, 3.0, and 5.8, respectively. In all other groups, too, the SIR was higher than expected, though not statistically significantly so.

In the total material, the SIR remained very stable when the length of follow-up was taken into consideration. It was 2.86 during the first 2 years, 2.46 during the following 5 years, and 2.90 during follow-up longer than 7 years.

The incidence of cancer in this patient cohort, as calculated by the life-table method, increased nearly linearly with time and patient age from transplantation. It was 0.8% at 1 year, 3.2% at 5 years and 14.2% at 15 years (Fig. 1).

In the group of patients receiving cyclosporin A (CsA) as part of their immunosuppression regimen, the SIR was 2.22 (CI 1.32–3.51, P < 0.05), whereas in the mainly earlier group of patients without CsA, the SIR was 2.85 (CI 2.25–3.57, P < 0.001). The CsA patients had, however, a higher incidence of cancer in their first 2 years after transplantation (SIR 3.44, CI

1.78–6.00) than the other group (SIR 2.42, CI 1.21– 4.33). In the following 5-year period the SIR of CsA patients was 1.44 (CI 0.53-3.12) and that of patients without CsA 2.87 (CI 1.93-4.09).

Basalomas were diagnosed in 30 men and 6 women. The total SIR was 6.15 (CI 4.31-8.51, P < 0.001); in men the SIR was 9.03 (CI 6.09-12.89, P < 0.001) and in women, 2.37 (CI 0.87-5.16, NS).

Discussion

The increase in cancer incidence after transplantation has been demonstrated in several studies. The number of studies with a well-defined control population is, however, small. The Finnish population is stable, and as kidney transplantations are all performed in one centre, patient follow-up is accurate (as yet no patient has been lost to follow-up), and the Finnish Cancer Registry is known to have records of all cancer cases, the situation is ideal for a reliable evaluation of cancer risks after kidney transplantation.

The increase in cancer risk after transplantation appears to be at the same level as in many other studies. The increase in the SIR was similar in men and women, in early and late periods after transplantation and also between the two different immunosuppressive regimens.

The increase in squamous cell cancers was the highest one found but still did not reach the high levels that have been reported in studies from Australia and New Zealand [3, 6] or The Netherlands [4]. It was at the same level as in a Canadian study [2]. Basalomas, too, had a very high SIR, especially among men, but the figures may be affected by biases in diagnostic and registration practices.

The SIR in CsA-treated patients was slightly lower than in the earlier patient group. It appears also to be slightly lower than in a recent study from Germany [1]. Their follow-up period was quite short, however, so one should not draw far-reaching conclusions.

In conclusion, his study shows reliably a nearly threefold increase in cancer incidence in the kidney-

transplanted population. As the cancer incidence in this population approaches 15% at 15 years, these patients are in need of vigilant follow-up in order to diagnose their tumours at an early, curable stage.

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