Renal-Transplant Recipients and Sun Protection

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Background. The incidence of skin carcinomas in organ-transplant recipients is high. The main factors implicated in carcinogenesis are immune suppression and ultraviolet radiation. Only the second is avoidable. We have evaluated knowledge of and compliance with sun protection measures among renal-transplant recipients (RTR).
Methods. A survey by means of a questionnaire including questions about clinical data, knowledge of, and compliance with sun protection was given. The questionnaire was given to 520 consecutive RTR followed up in a single center, and 445 (86%) answered.
Results. Of the responders, 91% have been informed of the need for sun protection, in 80% of cases by dermatologists. Sixty-eight percent used more protective measures abroad than at home, 63% avoided going outside during the hottest midday hours, 63% used sunscreen regularly, but 46% used one or less tube of sunscreen a year. A hat was always worn in the sun by 35% and long sleeves by 36%. Women and fair-skinned individuals complied better with protective measures. A minority of patients knew that ultraviolet radiation carries a risk of skin cancer.
Conclusions. This survey shows that most RTR are aware of the need for sun protection, but only a minority take adequate protection measures. The better results observed in this study than in previous published investigations may be caused by the great involvement of dermatologists in the care of RTR in our institution. The results of this survey underline the need to inform RTR better about sun-protection measures and the importance of cooperation between transplant physicians and dermatologists.

Keywords: Sun protection, Organ transplantation, Skin cancer.

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The incidence of skin cancers is high among organ-transplant recipients. Half of them are affected by a cancer after transplantation. Squamous-cell and basal-cell carcinomas account for more than 90% of all these cancers. Squamous-cell carcinomas, the most common skin cancer in this population, occur 65 to 250 times more frequently than in the general population. The most important factors implicated in carcinogenesis are longstanding immune suppression and ultraviolet radiation. The possible role of additional factors has been reported or is under discussion (*1*).

Ultraviolet radiation remains the main avoidable risk factor for skin carcinomas. Sun protection includes avoiding exposure to the sun, using appropriate clothing, and applying sunscreen (*2*). Few authors have evaluated compliance with sun protection among transplant recipients (*3*, *4*). We therefore surveyed a large number of renal-transplant recipients (RTR) to evaluate compliance with advice about sun protection.

PATIENTS AND METHODS

From March to May 2003, an anonymous questionnaire consisting of 27 questions was given to 520 consecutive RTR who consulted at the Renal Transplantation Department of the Necker Hospital in Paris. The questions concerned (1) RTR age, sex, duration and number of transplantations, living conditions (with or without a garden), and skin phenotype and (2) 18 questions designed to review the advice given on sun protection, the measures taken against exposure to the sun (*3*), and patients' knowledge of the risks of this exposure. In a covering letter accompanying the questionnaire, we stressed the importance of sun protection in the field of organ transplantation and the need to evaluate patients' knowledge about this protection and their compliance with protection measures.

Of the 520 patients given the questionnaire, 445 (86%) answered. Responders' characteristics are given in Table 1 (*5*).

The impacts of sex, number of renal transplantations (one or more), living conditions (with or without garden), and skin phenotype on sun protection measures were evaluated using the chi-square test. The effects of age and duration of graft on the answers to the questionnaire were evaluated by the unpaired Student's *t* test.

RESULTS

Most of the 445 (91%) responders remembered that they have been informed, on several occasions (mean: at least 3) of the need for sun protection and 78% of how to reduce sun exposure. This information had been given by dermatologists to 80% of patients and by transplant physicians to 52% (Table 2). Sex, age, skin phenotype, living conditions, and duration of transplantation did not alter these frequencies.

Approximately two thirds (68%) of the patients used more protective measures abroad than at home, and less than two thirds (63%) avoided going outside during the hottest midday hours. The same proportion (63%) used a sunscreen regularly. In 69% of responders, it was a cream with a sun

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TABLE 1. Characteristics of 445 renal-transplant recipients who responded to a questionnaire on sun protection

Sex ratio (men/women)	1.6
Mean recipients age (yr)	48.2±12.3
Skin phenotype (%)[a]	
II	13.3
III–IV	75.3
V–VI	11.5
Living conditions (%)	
Apartment	60.7
Home (garden)	39.3
Mean time posttransplant (yr)	12.5±8.9
Number of renal transplantations (%)	
One	83.5
Two or more	16.5

[a] Skin phenotype are classified from I to VI, according to sun reactivity. Type I have no melanin pigmentation and are incapable of tanning. Type VI are blacks. Type III and IV are white people who can tan, type III sunburns but not type IV. White types are types II to IV (5).

protection factor (SPF) of 60 or more. Nearly half the patients used one or less sunscreen tube a year. Fewer than half always used appropriate clothing in the sun (hat or cap: 35%; long sleeves: 36%; and sunglasses: 48%). Women, fair-skinned individuals (skin phenotype I–II), and people who had a garden complied better with sun-protection measures than the other patients (Table 3).

Of the 445 patients, 75% stated that they know why they need protection against the sun. However, only 47% of these patients mentioned cancer, and 31% gave no reply (Table 2). The level of knowledge about sun risk was not altered by age, sex, or duration of graft.

Lastly, most patients (74%), regardless of their age, sex, graft duration, and degree of compliance with protective measures, said they would like more information about sun protection.

DISCUSSION

Although the prognosis for renal transplantation is improving, skin cancers are more frequent and more aggressive in these recipients than in general population and have therefore become important in recipient management (*1*). The absolute rate of deaths caused by skin carcinomas is low, but skin carcinomas are still responsible for high morbidity among transplant recipients because of multiple surgical excisions, amputations, etc. As recommended in Kasiske's guidelines for RTR surveillance, the dermatologic surveillance in the Renal Transplant Department of the Necker Hospital consists of a consultation with a dermatologist first at the time of transplantation and then yearly (*6*). Patients are informed about the risks to their skin and methods of sun avoidance and self examination, and a dermatologist conducts a thorough skin examination. In addition, at transplantation, detailed recommendations for sun protection are given to patients in a special Transplant Recipient Form.

Sunlight is the main avoidable risk factor for skin cancers in organ-transplant recipients. The present large-scale

TABLE 2. Evaluation of the effectiveness of information about sun protection among 445 renal-transplant recipients

Questions	Yes (%)
Have you ever been given advice on protecting your skin from sunlight exposure?	91.2
Have you ever been given advice on the means of reducing your exposure to sunlight?	77.8
On how many occasions?	
1	25.2
2	15.7
3 or more	59.1
Who gave you this advice?	
Dermatologist	79.8
Transplant physician	52.1
General practitioner	9.4
Others[a]	9.4
Do you know why you need to protect your skin against the sun? If yes, why?[b]	74.9
Risk of skin cancer	45.7
Skin fragility or sun sensitivity	17.2
"Because of treatments"	15.6
Miscellaneous[c]	8.9
No response	31.0
Would you like more information about sun protection?	74.2

[a] "Others" included the following: nurse (2.9%), family (2.2%), pharmacist (1.1%), media (1.1%), patients' association (0.4%), other patients (0.4%), and cancer specialist (0.2%).

[b] For this question, the answer was open.

[c] Miscellaneous included: sun-induced immune suppression (5.8%), graft rejection (1.1%), skin aging (0.9%), allergy (0.4%), mycoses (0.2%), and ozone layer (0.2%).

TABLE 3. Evaluation of renal-transplant recipients' (n=445) compliance with sun-protection measures and influence of patients characteristics on compliance[a]

		P value according to		
	Yes (%)	Sex[b]	Skin phenotype[c]	Living conditions[d]
Do you use more protective measures abroad than at home?	67.9	0.04 (M<F)	<0.0001	0.05 (G>A)
In the summer, do you avoid going outside and swimming on holiday between 11.00 a.m. and 3.00 p.m.?	62.9	0.001 (M<F)	0.009	—
Do you usually use a sun protection cream in the sun? If yes, what is its sun protection factor?	62.7	<0.0001 (M<F)	<0.0001	0.05 (G>A)
0–29	17.8	—	—	—
30–59	13.6			
≥60	68.6			
How many tubes do you use per year?				
1	46.0	0.008 (M>F)	—	—
2	31.3			
≥3	22.7			
Do you apply the cream to all sun exposed areas (or only on the face)?	81.3	—	—	—
Do you use it all year round (or only on holiday)?	13.4	—	—	—
If you wash your hands or swim, do you reapply the cream?	59.3	0.05 (M<F)	—	—
When in the sun				
Do you always wear a hat or a cap?	34.7	—	—	—
Do you always wear long sleeves?	36.0	—	0.03	—
Do you always use sunglasses?	48.2	0.006 (M<F)	<0.0001	—

[a] Determined by Chi-square analyses. Differences were considered significant if $P<0.05$. Patients' answers were not affected by age, duration, or number of transplantations. Non significant differences are shown by: —.
[b] Males (M) *versus* females (F).
[c] Patients with phenotypes I–II *versus* III–IV *versus* V–VI.
[d] Patients with a garden (G) *versus* those living in an apartment (A).

survey of sun protection, for which the response rate was high among RTR, shows that most patients are aware of the need for protection against the sun and of ways of reducing sun exposure. However, only a few adopt adequate sun-protection measures. Although most patients do not know why they should use protection, they do state that they wish to obtain more information about sun avoidance. Also, in this study, two groups of patients were identified who are less compliant about sun-protection measures: men and patients living in an apartment.

In two previous evaluations of RTR compliance with sun-avoidance measures in the United Kingdom, Seukeran et al. (*3*) and Butt and Roberts (*4*) reported a lower level of compliance than in the present survey. The present patients stated that dermatologists gave them advice in 80% of cases, against 17% in Seukeran's study (*3*). The higher involvement of skin specialists in our group probably increased the impact of the sun-protection message. In our study, the longer mean posttransplant period (7 years vs. 12) suggests that advice was given more frequently (mean: 3 times), even though the duration of the graft did not alter compliance with protection measures.

Sun protection includes avoiding the sun and the use of appropriate clothing and a sunscreen. The use of the latter is limited by cost, because sunscreens are expensive, and by cosmetic acceptability. For example, there is no spray formulation for sunscreens with SPF greater than 60 in France. In addition, even though there is substantial evidence that ultraviolet protection does reduce the risk of carcinomas and probably also of melanoma, doubts are repeatedly raised concerning the true efficacy of sunscreens in preventing cutaneous malignancy (*7*). In particular, it has been shown that the level of SPF stated on sunscreen products is usually not achieved, mainly because the products are applied inadequately (*8*, *9*). It has also been demonstrated that sunscreens used during sunbathing tend to increase the duration of exposure to doses of ultraviolet radiation below the sunburn threshold (*10*). Last, it has been suggested that sunscreens may encourage prolonged sun exposure because they delay sunburn. Thus, it is not only necessary to increase the use of high-SPF sunscreens in transplant recipients but also to stress the need for patients to reduce exposure to sunlight and wear protective clothing, whether or not they use a sunscreen (*11*).

Education about sun protection includes providing clear oral and written advice (*2*). It is important to insist on this education at all posttransplant follow-up visits. Because patient management during the year after transplantation focuses on graft rejection and the prevention of infection, it appears important to educate transplant recipients better about sun protection after this "acute" period. Last, our study suggests that the considerable involvement of dermatologists in this education may increase compliance with sun-protec-

tion measures in transplant recipients and underlines the need for cooperation between transplant physicians and dermatologists.

REFERENCES

1. Euvrard S, Kanitakis J, Claudy A. Skin cancers after organ transplantation. *N Engl J Med* 2003; 348: 1681.
2. Leccia MT, Béani JC, Amblard P. Photoprotection. In: Euvrad S, Kanitakis J, Claudy A, eds. Skin diseases after organ transplantation. *Paris, John Libbey Eurotext* 1998, p. 159.
3. Seukeran DC, Newstead CG, Cunliffe WJ. The compliance of renal transplant recipients with advice about sun protection measures. *Br J Dermatol* 1998; 138: 301.
4. Butt A, Roberts DL. Renal transplant recipients and protection from sun: need for education. *Lancet* 1997; 349: 179.
5. Fitzpatrick TB. The validity and practicality of sun-reactive skin types I through VI. *Arch Dermatol* 1988; 124: 869.
6. Kasiske BL, Vazquez MA, Harmon WE, et al. Recommendations for the outpatient surveillance of renal transplant recipients. *J Am Soc Nephrol* 2000; 11: S1.
7. Dummer R, Maier T. UV protection and skin cancer. Recent results. *Cancer Res* 2002; 160: 7.
8. Stokes R, Diffey B. How well are sunscreen users protected? *Photodermatol Photoimmunol Photomed* 1997; 13: 186.
9. Bech-Thomsen N, Wulf HC. Sunbathers' application of sunscreen is probably inadequate to obtain the sun protection factor assigned to the preparation. *Photodermatol Photoimmunol Photomed* 1992; 9: 242.
10. Autier P, Dore JF, Reis AC, et al. Sunscreen use and intentional exposure to ultraviolet A and B radiation: a double blind randomized trial using personal dosimeters. *Br J Cancer* 2000; 83: 1243.
11. Bagot M, Revuz J. High-risk behaviour. *Lancet* 2000; 355: 155.