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Influence of Short-Term Anthralin-UV Radiation Therapy on Peripheral Blood T Cells and T Cell Subsets in Psoriatic Patients[1]

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= Abstract =Percentages and ratios of peripheral blood T lymphocytes and T cell subsets were sequentially measured by monoclonal antibodies in 15 psoriatic patients treated with anthralin-UV radiation. Time sequence was divided into 1) pre 2) between 1 and 24 hours post 3) 4 or 5 days post 4) 8 days post 5) 11 or 12 days post treatment. There was no significant difference between the results obtained prior to treatment and those obtained following short-term treatment.

Key words: ***T lymphocytes, T cell subsets, Monoclonal antibody, Psoriasis, Anthralin-UV radiation***

INTRODUCTION

Psoriasis is a common disorder which affects approximately 1-3% of general population. The underlying causes of psoriasis still remain unclear; however, a cell-mediated immune response has been suggested. Some authors (Fraki *et al.* 1979; Haftek *et al.* 1979; Kraemer *et al.* 1977; Moscicki *et al.* 1982) suspect that UV radiation can result in change of cell-mediated immune response. However, other authors (Harper *et al.* 1979) do not subscribe to that theory.

The purpose of this study was to explore the sequential effects of anthralin-UV radiation therapy on the number of peripheral blood T lymphocytes and T subsets in psoriatic patients for 2 week-period.

MATERIALS AND METHODS

Subjects (Table 1)

Fifteen psoriatic patients treated with anthralin-UV radiation between September 1983 and January 1984 were evaluated. The groups was composed of 8 females and 7 males. None of the patients had been treated with systemic steroids, methotrexate, or phototherapy for at least 3-4 months prior to the start of this study. The extent of disease was graded with respect to the total body surface area of the lesions: mild-less than 5%, moderate — 5-30%, and severe-more than 30%. Number of patients in each group were 3,5, and 7, respectively. The activity of disease was classified as: inactive-lesions stationary for more than 3 months, mildly active-lesions with peripherally spreading plaques and only occasional small papules, and markedly active-lesions with spreading small papules. There were 2,2, and 11 patients in each group, respectively.

Light source

Burdick UV-800 "hot quartz" lamp (Burdick Co. USA) was used for this study. Its emission spectrum is discontinuous, with the peak bands at 254, 263, 297, 303 and 366 nm.

Anthralin-UV radiation therapy

The minimal erythema dose was measured for each patient. Anthralin was applied and the entire body was irradiated with the lamp. The exposure dose was controlled by the method of Adrian *et al.* (Adrian *et al.* 1981); however, with some modification to maintain the erythema. Treatment was administered 3 times per week for 7 outpatients and 5 times per week for 8 inpatients.

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Quantitation of peripheral blood T cells and T subsets

OKT3, OKT4, and OKT8 monoclonal antibodies (Ortho Pharm. Co. USA) were used. Quantitation was performed by the same procedure that had been reported previously (Lee *et al.* 1985). Mononuclear cells were separated from blood of each psoriatic patient with Ficoll-Hypaque solution (S.G. = 1.077). OKT3, OKT4, and OKT8 monoclonal antibodies and then FITC conjugated rabbit anti-mouse globulin were tagged to nononuclear cell suspension. The percentages of lymphocytes reactive with each monoclonal antibody per 200 lymphocytes were measured under the American optical vertical fluorescence microscope. Blood was collected sequentially during treatment: 1) prior to treatment 2) between 1 and 24 hours post treatment 3) 4 or 5 days post treatment 4) 8 days post treatment 5) 11 or 12 days post treatment.

Table 1. Clinical information of 15 psoriatic patients

Serial No	Sex	Age	E*	A**	Tx/Week
1	M	60	mild	A0	3
2	M	52	mild	A2	3
3	F	37	mild	A2	3
4	F	53	mod	A1	3
5	F	36	mod	A2	5
6	F	45	mod	A2	3
7	F	62	mod	A2	5
8	M	30	mod	A2	5
9	M	31	sev	A0	5
10	M	25	sev	A1	5
11	M	30	sev	A2	3
12	M	46	sev	A2	3
13	F	17	sev	A2	5
14	F	36	sev	A2	5
15	F	44	sev	A2	5
Mean		40.3			
S.D.		13.0			

*E: Extent
mild: total surface involvement, less than 5%, mod-(moderate): total surfce involvement, 5-30%, sev(severe): total surface involvement, more than 30%

**A: Activity
A0: skin lesions stationary for more than 3 months, A1: peripherally spreading plaque lesions with only occasionaly small papules, A2: pin-point lesions and small papules spreading, positive Koebner phenomenon.

RESULTS

1. Between 1 and 24 hours post treatment (Table 2)

The percentages of lymphocytes reactive with OKT3 were 66-85%, mean($\bar{x}$) ± 1 SD, 76.1 ± 5.1%. Those reactive with OKT4 and OKT8 were 40-68($\bar{x}$ ± 1 SD: 50.7 ± 7.6)% and 15-41($\bar{x}$ ± 1 SD: 27.1 ± 7.1)%. The ratios of OKT4 positive cells to OKT8 positive cells were 1.1-3.7($\bar{x}$ ± 1 SD: 2.1 ± 0.8). Comparison with the results obtained from prior to treatment revealed no significant difference ($p>0.1$).

2. Four or 5 days post treatment (Table 2)

The percentages of OKT3, OKT4, and OKT8 positive cells were 69-87($\bar{x}$ ± 1 SD: 78.5 ± 5.4)%, 36-62($\bar{x}$ ± 1 SD: 49.5 ± 7.7)%, and 22-40($\bar{x}$ ± 1 SD: 29.2 ± 5.6)%, respectively. The ratios of OKT4 positive cells to OKT8 positive cells were 1.1-2.7($\bar{x}$ ± 1 SD: 1.8 ± 0.6). Comparison with the pretreatment results revealed no significant change ($p>0.05$).

3. Eight days post treatment (Table 2)

The percentages of OKT3, OKT4, and OKT8 positive cells, and ratios of OKT4 positive cells to OKT8 positive cells were 63-86($\bar{x}$ ± 1 SD: 76.9 ± 6.7)%, 37-59($\bar{x}$ ± 1 SD: 49.2 ± 6.4)%, 19-38($\bar{x}$

Table 2. Mean percentges and ratios of peripheral blood lymphocytes reactive with OKT3(T3), OKT4(T4), and OKT8(T8) monoclonal antibodies in psoriatic patients pre-and post-treatment

	Pre	Post			
		1-24h	4 or 5d	8d	11 or 12d
T3(%)	72.8±8.2	76.1±5.1	78.5±5.4	76.9±6.7	76.9±4.6
T4(%)	47.3±6.7	50.7±7.6	49.5±7.7	49.2±6.4	48.5±8.4
T8(%)	27.2±5.5	27.1±7.1	29.2統5.6	28.6±6.0	27.2±4.9
T4/T8	1.8±0.5	2.1±0.8	1.8±0.6	1.8±0.5	1.9±0.6

± 1 SD: 28.6 ± 6.0)%, and 1.0-2.8($\bar{x}$ ± 1 SD: 1.8 ± 0.5). Comparison of these post treatment results with pretreatment values revealed no significant difference ($p>0.1$).

4. Eleven or 12 days post treatment (Table 2)

The percentages of OKT3, OKT4, and OKT8 positive cells, and ratios of OKT4 positive cells to OKT8 positive cells were 70-83($\bar{x}$ ± 1 SD: 76.9 ± 4.6)%, 36-65($\bar{x}$ ± 1 SD: 48.5 ±8.4)%, 17-36($\bar{x}$ ± 1 SD: 27.2 ± 4.9)%, and 1.2-3.3($\bar{x}$ ± 1 SD: 1.9 ± 0.6). There was no significant difference between these values and pretreatment values ($p>0.1$).

DISCUSSION

The Burdick UV-800 "hot quartz" lamp primarily emits UVB, along with some UVC and UVA radiation. This study, utilizing the Burdick lamp, reveals that treatment with short-term anthralin-UV radiation and lesional improvement do not correlate with significant changes in the percentages and ratios of OKT3 positive T cells and OKT4 and OKT8 positive subsets. Reports (Fraki *et al.* 1979; Haftek *et al.* 1979; Harper *et al.* 1979; Kraemer *et al.* 1977; Moscicki *et al.* 1982) about the effects of photochemotherapy for psoriasis on T lymphocytes were usually studied by PUVA not UVB and reached different conclusions.

The effects of UV radiation on the viability and function of lymphocytes vary with its dose and wavelength (Evans *et al.* 1986; Morison *et al.* 1980; Parrish *et al.* 1978). In vitro exposure studies of toxicity revealed UVC most toxic, UVB less toxic, and UVA irradiation least toxic. The addition of psoralen greatly increases the toxicity of UVA irradiation (Kruger *et al.* 1978; Scherer *et al.* 1977). However, the effect of exposure on in vitro and in vivo lymphocytes was not same. The mechanism whereby radiation produces alterations on in vivo in peripheral blood lymphocytes is complex and unknown. A direct effect of radiation penetrating through blood and lymphatic channels of the skin and an indirect effect resulting from liberation of multiple mediators and photoproducts should be considered.

If the direct effect plays the main role, the effect of PUVA(or UVA) may be much greater than that of UVB radiation and the effect of UVC radiation could be neglected, since longer waves penetrate deeper into the skin and UVC does not reach into the dermis (Anderson *et al.* 1981). Recent studies (Hersey *et al.* 1983; Hersey *et al.* 1983) showed an increase in the OKT8 positive T cells and a decrease in the OKT4 positive T cells after solarium exposure. Solaria present higher dose of UVA radiation than dose of natural sunlight. If racial difference is taken into consideration, the effect of UVB and UVC radiation might be less in Orientals than Caucasians (Kaidbey *et al.* 1979). However, single wholebody exposure of PUVA and UVB in normal subjects showed a decrease in the proportion of circulating E-rosette-forming lymphocytes in both PUVA and UVB with the similar degree and duration (Morison *et al.* 1979; Morison *et al.* 1981). Many complex factors, to include mediators and photoproducts, have yet to be clarified.

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= 국문초록 =

단기간의 Anthralin-자외선 요법이 건선환자 말초혈액 내의 T세포 및 T세포아형에 미치는 영향

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본 연구는 anthralin-자외선요법이 건선환자 말초혈액 내의 T세포 및 그 아형에 미치는 영향에 대해 알아보고자 시행하였다. 대상은 이 치료를 받고 있는 건선환자 15명으로, 각각 ① 치료전 ② 치료후 1시간에서 24시간 사이 ③ 치료 4일 또는 5일후 ④ 치료 8일후 ⑤ 치료 11일 또는 12일후에 말초혈액 내의 T세포 및 T아형을 단세포 항체를 이용하여 측정하였다. 결과에서 병변의 호전에 관계없이 치료전과 후의 T세포 및 그 아형에 유의한 차가 없었으므로, 건선환자에 있어서 이들은 단기간의 anthralin-자외선 요법에는 영향을 받지 않으리라 사료되었다.