

Efficacy of 308nm excimer light in the treatment of stable vitiligo

By Yin Rui, Deng Jun, Yang Xi-Chuan, Zhou Cun-Jian, Hao Fei, Lin lin, Xiao Yan, Department of Dermatology, Southwest Hospital, Third Military Medical University, Chongqing, 400038, China

[Abstract] **Objective** To evaluate the efficacy and safety of 308nm excimer light (made in China) phototherapy in the treatment of vitiligo. **Methods** Thirty patients with vitiligo were enrolled in the clinical trial with self-control. All subjects received 308nm excimer light phototherapy on a twice-weekly schedule for 3 month. **Results** Thirty patients were evaluated. The results in different locations were compared, the effective rate of experimental group in cephalofacial site, trunk and limbs were 95.0%, 75.0% and 66.7%, respectively. The comparison of results in different times and doses of phototherapy showed that the time and dose on time of obvious pigment regeneration were (10.22 ± 1.60) , (19.10 ± 2.38) , (37.74 ± 3.06) times and (7.50 ± 3.45) J/cm², (10.60 ± 1.01) J/cm², (18.56 ± 3.05) J/cm². **Conclusion** 308nm excimer light is effective in the treatment of vitiligo without obvious adverse effects.

[key words] vitiligo; 308nm excimer light; efficacy; safety

Vitiligo is a frequently found depigmentation disease of skin and mucosa with its causes and pathogenesis still not quite clear by now. At present, the recognized possibility is that it is an autoimmune disease mainly caused by T-lymphocyte. It has been proven that UVB has the function of restraining T cell in vitiligo lesion area, and enjoys a good effect to pigment recovery in the vitiligo lesion area^[1]. 308nm excimer light is a kind of medium wave UVB, which does not only induce T-lymphocyte apoptosis in the lesion area, but also reveals couple times of capability of causing T-lymphocyte apoptosis than that of the medium wave UVB, with a more powerful energy than that of the narrow-wave UVB. Therefore, it shows more advantages in treating vitiligo. It has been approved by domestic and foreign clinical application that 308nm excimer light can cure vitiligo within a short period and features a positive effect, fast therapeutic effect achieved, short course of treatment and less side effects^[2], especially revealing a wonderful therapeutic effect in curing facial and body vitiligo, and thus has become a new phototherapy to cure vitiligo. At present, there are various kinds of equipment being used clinically. During January to July of 2009, our hospital used China-made 308nm excimer UVB dermatological therapeutic apparatus to perform treatment on 30 vitiligo patients for verifying therapeutic effect and safety of 308nm excimer UVB dermatological therapeutic apparatus to cure vitiligo. The following is the result:

Cases and approaches

1.1 Cases: Collected 30 vitiligo patients at stable stage and who saw a doctor during January to July of 2009 in our hospital, and each of them is with a maximal lesion area of 20% by the body surface area. There were 12 male patients and 18 female patients at age ranging from 18 to 55 and an average age of 27.47. Lesion location: 20

DOI:10.3760/cma.j.issn.0412-4030.2011.08.023

1

Author affiliation: 518033 Chongqing, Dermatology Department of Southwest Hospital Affiliated of the Third Military Medical University

Corresponding author: Hao Fei, Email: haofei62@medmail.com.cn

cases at head and face, 4 cases at body and 6 cases at arms and legs.

1.2 Selection standard: Those approved by Ethics Committee of Hospital of the Third Military Medical University, diagnosed as vitiligo patient at outpatient department, and satisfying the following requirements: (1) State of illness stabilized for minimum 3 months; (2) no color recover sign for lesion; (3) with no autoimmune disease; no systematic or local treatment received with the last two months; (4) no record of allergic to any medicine; (5) no light sensitivity; (7) no porphyrinopathy; (8) non-pregnancy or beyond lactation period; (9) not patient with AIDS; (10) have not applying external use medicine like glucocorticoid within the last two weeks. All the patients are required to receive on his own and ensure to execute the research programme, and they all signed informed consent form before starting the treatment.

1.3 Approach:

1.3.1 Light source: Model GP908 308nm excimer UVB light therapeutic apparatus made by Shenzhen GSD Technology Co., Ltd. at wavelength of 308nm, power of 1.5 KW, dose range of 38 to 2800mj/cm² and facula area of 0 to 264cm².

1.3.2 Therapeutic method: Comparing with patients themselves, select symmetrical lesions or neighboring lesions similar with the patients as target lesions. The lesions are complete depigmentation with clear edge and with no obvious folliculus pill pigment island formed. Based on location of lesions and MED, it is to determine the initial dose^[3], with an interval of 72 hours between the two treatments and at a treatment period of 3 months. Before and after starting the treatment, a follow-up visit is required for each month, and special personnel are required to take pictures.

1.3.3 Therapeutic effect criteria^[4]: Recovery indicates all vitiligo disappeared, pigment basically recovered with no obvious difference with normal skin; excellence indicates vitiligo partially disappeared or reduced in size, got right, area of color recovered is $\geq 50\%$ by the lesion area; improvement indicates vitiligo partially disappeared or reduced in size, area of resuming normal color is $\geq 50\%$ by the lesion area; ineffectiveness indicates there is only flushing in vitiligo area but with no increase of pigment or pigment disappeared after appearing. Efficiency = [(Recovered cases + Excellent cases)/Qualified cases]x100%. Total effective rate [(Recovered cases + Efficient cases + Effective case)/Qualified cases]x100%.

1.4 Statistical process:

Statistics software in SPSS13.0 version was applied for statistical process. Experiment result was tested checked with chi-square test , and the test level $\alpha=0.05$.

Conclusion

2.1 Clinical therapeutic effect: Statistics performed based on lesion location, the result showed that remarkable differences existed among therapeutic effects for face and neck, body, arms and legs ($p=0.004$, $P<0.05$) . The best therapeutic effect was achieved from head and face, but the worst from the arms and legs (Refer to Table 1).

Table 1: Lesion therapeutic effect observation on treating different part of vitiligo with excimer light combined with tacalcito (5)

Location	Case	Recovery	Excellence	Effectiveness	Ineffectiveness	Total Rate	Effective
Face and neck	20	6 (30.0)	5 (25.0)	8 (40.0)	1 (5.0)		95.0%
Body	4	1 (25.0)	1 (25.0)	1 (25.0)	1 (25.0)		75.0%
Arms and legs	6	2 (33.3)	1 (16.7)	1 (16.7)	2 (33.3)		66.7%
Total	30	9 (30.0)	7 (23.3)	10 (33.3)	4 (13.3)		86.7%

Response of different locations of lesions to the treatment listed from fast speed to low speed in turn as face and neck, body and arms and legs. Excellent therapeutic effect (pigment recovered over 50%) achieved came to an average time respectively (10.22 ± 1.60) times, (19.10 ± 2.38) times and (37.74 ± 3.06) times. And all the three of them are of certain differences ($p=0.019$, $P<0.05$). Average accumulated irradiation doses for face and neck, body and arms and legs are respectively 7.50 ± 3.45 J/cm², 10.60 ± 1.01 J/cm², 18.56 ± 3.05 J/cm².

2.2 Adverse reaction

During treatment performed, 3 patients occurred erythema and blister after irradiation, and the adverse reaction disappeared after suspending the irradiation, and there were no serious adverse reactions found during further treatment.

Discussion

Vitiligo is a kind of disease of autoimmune pigment abnormality. There is no clinical therapy with special effect by now to cure it within a short period. Narrow-band ultraviolet B is deemed as the currently most effective and safe way as treatment. Comparing with traditional phototherapy of PUVA and UVB, it features obvious reduction of side effects, but troubled with long time of irradiation, large scope of irradiation covering normal skin, and no specialty for treatment. 308nm excimer light therapeutic system applies XeCl excimer gas capable to emit 308nm UVB with a wave length within UVB range, and it is the most bioactive wavelength among all UVB able to penetrate deep skin and to reach superficial layer of dermis. Because it is an incoherent single frequency light source with more powerful energy stronger than narrow-band UVB, it enjoys certain advantages clinically. Comparing with NB-UVB, the excimer light therapy to cure vitiligo features a faster and better therapeutic effect achieved^[5], and it shows better therapeutic effect to cure vitiligo with III~IV type of skin^[6].

For recent years, 308nm excimer light is successfully applied for curing vitiligo^[6-9]. However, all the

treatments are performed with imported equipment, and no verification for the same therapeutic effect and safety has been achieved. During this research, we have selected 30 patients with vitiligo to receive minimum 10 times of China-made 308nm excimer light irradiation. The result showed that all lesions achieved pigment recovery at various levels at a total effective rate of 86.7%. The best therapeutic effect was achieved from head and face with an average irradiation times of 10.22 ± 1.60 , accumulated irradiation dose of 7.50 ± 3.45 J/cm², and effective rate of 95%. The therapeutic effect from arms and legs were comparatively poor featuring more times of irradiation and large accumulated dose, and those are the same as what reported. During treatment, 3 patients occurred erythema and blister after irradiation, those are the frequently found adverse reactions during treating vitiligo with UVB. The adverse reaction disappeared after suspending the irradiation for a short period, and there were no serious adverse reactions found.

To sum up, this research shows that 308nm excimer light is effective for curing vitiligo at stable stage, especially the vitiligo at head and face, and the body. In addition, it features safe and free of serious adverse reactions, and thus worthy of clinical promotion. However, the clinical test selected comparatively not so many patients, thus more samples are needed to further verify its clinical therapeutic effect.

Reference

- [1] Ozawa M, Ferenczi K, Kikuchi T, et al. 312-nanometer ultraviolet B light (narrow-band UVB) induces apoptosis of T cells within psoriatic lesions [J]. *J Exp Med*, 1999, 189:711-718.
- [2] Grimes PE. New insights and new therapies in vitiligo [J]. *JAMA*, 2005, 293(6): 730-735.
- [3] Choi KH, Park JH, RO YS. Treatment of vitiligo with 308nm xenon-chloride excimer light: therapeutic efficacy of different initial doses according to treatment areas. *J Dermatol*, 2004, 31: 284-292.
- [4] Pigment Disease Group of Chinese Journal of Dermatovenereology of Integrated Traditional and Western Medicine, Vitiligo clinical classification and therapeutic effect criteria (Revised in 2003) Chinese Jornal of Dermatology, 2004, 37(7): 440
- [5] Hong SB, Park HH, Lee MH. Short- term effects of 308- nm xenon- chloride excimer light and narrow- band ultraviolet B in the treatment of vitiligo: a comparative study. *J Korean Med Sci*, 2005, 20(2): 273- 278.
- [6] Spencer JM, Nossa R, Ajmeri J. Treatment of vitiligo with the 308- nm excimer light: a pilot study. *J Am Acad Dermatol*, 2002, 46(5): 727- 731.
- [7] Leone G, Iacovelli P, Paro Vidolin A, et al. Monochromatic excimer light 308 nm in the treatment of vitiligo: a pilot study. *J Eur Acad Dermatol Venereol*, 2003, 17: 531- 537.
- [8] Diao Qingchun, Xue Mei, Sang Xiaochuan et al. Clinical therapeutic effect observation on treating vitiligo with 308nm excimer light. *Journal of Clinical Dermatology* 2007, 36(6): 398-399
- [9] Guo Jing, Xiang Leihong, Zheng Zhizhong et al. Clincal research on treating vitiligo with single frequency excimer light. *Chinese Journal of Dermatology*, 2006, 39(1): 32-34