

NOTE

Determination of UVA Protection Factor with SPEX SkinSkán

Akira Kawada^{1*}, Hiroko Kameyam¹, Yoshiko Sangen¹, Yoshinori Aragane¹, Tadashi Tezuka¹, and Ikuko Hamagami²

¹Department of Dermatology, Kinki University School of Medicine, Osaka, Japan

²Atago Bussan Co. Ltd., Tokyo, Japan

SPEX SkinSkán is a newly developed spectrofluorometer that can calculate transmission of UVA on the surface of human skin as a non-invasive method. We have investigated UVA protection factors of Japanese over-the-counter sunscreens using SPEX SkinSkán. This non-invasive method is useful to know UVA protection of sunscreens in vivo.

key words: sunscreen, UVA, protection

INTRODUCTION

SPEX SkinSkán is a newly developed spectrofluorometer that can calculate transmission of UVA on the surface of human skin as a non-invasive method¹⁻³. We have investigated of UVA protection factors (PFA) of Japanese over-the-counter sunscreens using SPEX SkinSkán.

MATERIALS AND METHODS

Subjects were 10 healthy Japanese who were all J-II in Japanese skin type classification (Sato and Kawada, 1986) [4-6]. J-I subject easily burns and tans minimally, J-II burns moderately and tans moderately, and J-III burns minimally and tans markedly and long-lastingly after 3-MED exposure (about 1 hour) of sunlight at noon of summer days. Tested site was the flexor site of forearm. Firstly, transmission of nine over-the-counter sunscreens in the range of UVA was determined using SPEX SkinSkán. Second, protection factors of UVA were calculated. Applied area was 5×5 cm in size on the flexor site of the unexposed forearm. Application dose was 2 µg/cm² for cream or 2 · 1/cm² for lotion.

SPEX SkinSkán (Jobin-Yvon Inc, New Jersey) is an *in vivo* fiber-optic spectrofluorometer designed specifically for skin-fluorescence measurements. It has a quartz fiber bundle that selectively delivers UV radiation to the subject and collects the resulting fluorescence. There's need for sample preparation, cuvettes, or adaptations. This spectrometer designs the fluorescence signal from strong scattered backgrounds. Wavelength scanning is fast that minimizes the time of measurement and exposure to excitation light.

RESULTS

An average PFA value for each product was calculated for each subject. The PFA values calculated for each subject were averaged. UVA-PFs were 5.3, 6.5, 5.3, 4.9, 6.8, 4.0, 4.7, 5.9, and 3.2 for Products No. 1 (SPF 50+, PA+++), 2 (SPF 50+, PA+++), 3 (SPF 50+, PA+++), 4 (SPF 50, PA+++), 5 (SPF 40, PA+++), 6 (SPF 40, PA++), 7 (SPF 35, PA++), 8 (SPF 30, PA++), and 9 (SPF 30, PA++), respectively.

DISCUSSION

The measurement method used in this study was an *in vivo* non-invasive method of determination of UVA sunscreen effectiveness. It took about two minutes for each measurement that was very short. This method may be more accurate and reproducible than other *in vivo* methods. Moreover, each continuous spectrum can be seen with application and without application of sunscreens that show more precise features of UVA absorption of sunscreens.

UVA-PF is a measure for UVA protection of sunscreens proposed by Japan Cosmetic Industry Association. Most sunscreens sold in Japan have a label of PA determined by UVA-PF. We also compared UVA-PF and PFA. There were differences between UVA-PF and PFA. UVA-PF is calculated by determination of immediate tanning that is also induced by visible light of sunlight. Then, PFA may be more appropriate than UVA-PF as a measure of protective activity of sunscreens against UVA.

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*To whom correspondence should be addressed.

E-mail : kawada@med.kindai.ac.jp

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