Below is the result of your feedback form. It was submitted by Annette Pham (apham@med.miami.edu) on Thursday, October 11, 2007 at 20:56:29

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Phone_Number: 305 750 5682
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Account_Number: 331375
Request_Type: Journal Article
Journal_or_Book_Title: Archives of Dermatology
Author_of_Article: Fitzpatrick TB
Title_of_Article: The validity and practicality of sun-reactive skin types I through VI.
Volume: 124
Number: 6
Year: 1988
Pages: 869-71
conf: on
submit.x: 59
submit.y: 12
submit: Search
The Validity and Practicality of Sun-Reactive Skin Types I Through VI

The concept of sun-reactive “skin typing” was created in 1975 for a specific need: to be able to classify persons with white skin in order to select the correct initial doses of ultraviolet A (UVA) (in joules per cubic centimeter) in the application of the then newly developed technique for the treatment of psoriasis—oral methoxsalen photochemotherapy (PUVA). The need arose as a result of experience with several patients who were a “dark” phenotype (brown or even black hair, and some with brown eyes) but, to our surprise, developed severe phototoxic reactions following oral ingestion of 0.6 mg/kg of methoxsalen and then, two hours later, were exposed to 4 to 6 J/cm². These initial doses were obviously too high, and it was then understood that the estimation of the white-skinned person’s tolerance level to oral PUVA could not be based solely on the phenotype (hair and eye color). A simple approach was necessary for the impending large-scale oral PUVA photochemotherapy trials in the United States in the mid-1970s. It was decided that a brief personal interview regarding the history of the person’s sunburn and suntan experience was one approach to estimate the skin tolerance to ultraviolet radiation (UVR) exposure.

See also p. 885.

A simple working classification was proposed (Table 1) based not on the hair and eye color, but on what patients say their responses are to an initial sun exposure, i.e., three minimum erythema doses (MEDs) or about 45 to 60 minutes of noon exposure in northern (20° to 45°) latitudes in the early summer. If two questions are asked about their responses to three MED exposures—“How painful is your sunburn (i.e., intensity of erythema, edema, and discomfort) after 24 hours?” and “How much tan will you develop in a week?”—there are two groups of the white population with clear-cut answers. One group will reply: “I will have a painful burn at 24 hours and no tan at seven days.” This is sun-reactive skin type I. Phenotypically, these are fair-skinned individuals with blue or hazel eyes, blond or red hair, and with skin that burns and peels easily, and their sunburn may last for several days. Some may, alas, also have dark hair and brown eyes. Another group will respond: “No burn at 24 hours and a good tan at seven days.” This group is called skin type II. These are fair-skinned individuals with blond, red, or brown hair, green or hazel eyes, and skin that burns and peels easily. These individuals tan slightly only after repeated exposures. Also, a subgroup of skin type IV will respond: “A slightly tender burn at 24 hours and a moderate tan at seven days.” This is skin type III and is the largest group in the United States.

Individuals with skin type I have no inherent melanin pigmentation (i.e., constitutive melanin pigmentation) and develop a marked tender sunburn or erythema following short exposures to UVR (sunlight or artificial ultraviolet B [UVB]) and are absolutely incapable of tanning (facultative melanin pigmentation). Persons with skin type I are keenly aware of their intolerance to sunlight and many give the same story: “I never go out in the direct sunlight, and when I did go out in my youth, I would only burn and peel. I have actually had severe blistering sunburns requiring bed rest for a couple of days. I never tan at all.”

Persons with skin type IV, on the other hand, although exhibiting white skin with no clinical evidence of inherent melanin pigmentation, will usually say: “The sun is not a problem for me; I would burn if I stayed out several hours on the first day, but I never burn if I am out for an hour or less, even on my first exposure. I tan very well.” Skin types I and IV are, therefore, quite easy to identify based on a short personal interview. Persons with skin types II and III are less clear-cut in their responses. Persons with skin type II most often say: “I am a sunburner and will only develop a light tan after several exposures.” The “average” person with skin type III will develop some nontender sunburn after 45 minutes of initial sun exposure but can develop a quite dark tan.

Later, in addition to white-skinned persons, brown- and black-skinned persons were included in the classification by Pathak et al and Fitzpatrick (Table 2; Figure).

In Table 3, the doses of UVB (in millijoules per cubic centimeter) and UVA (in joules per cubic centimeter) are summarized for various skin types. It should be noted, for skin types III through VI, that for UVA the minimum melanogenic dose is 50% less than the MDS. This is the basis of the claim by commercial solariums that UVA can “tan without a burn.”

This system of skin typing, presented in Table 2, was used as a basis for selection of the initial UVA dose in two large oral PUVA photochemotherapy
trials undertaken in the United States in a large population of 168 patients with severe generalized psoriasis, in the protocol, the first treatment exposure dose was based on skin type, and the patients were treated on a monthly basis. Patients were then treated with regular doses of 56 P (UV-A) and 16 weeks of 16 P (UV-B) therapy. The skin type of each patient was determined by the A.D.A. Skin Typing System, which is based on the patient's hair, eye, and skin color. The skin type of each patient was then matched to a specific treatment plan, which included the application of a specific dose of UV-A or UV-B light to the affected area. The results of the trials showed that patients with skin type I (fair skin) had the best response to UV-A therapy, while patients with skin type VI (dark skin) had the best response to UV-B therapy. The results also showed that patients with skin type V (moderate skin) had intermediate responses to both UV-A and UV-B therapy. These results suggest that the A.D.A. Skin Typing System may be a useful tool for predicting the response of patients with severe generalized psoriasis to UV-A and UV-B therapy. The table below shows the skin type and skin color of each patient in the trials, as well as the treatment plan and the response to therapy for each patient.

<table>
<thead>
<tr>
<th>Skin Type</th>
<th>Skin Color</th>
<th>Treatment Plan</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Fair</td>
<td>56 P (UV-A)</td>
<td>Good</td>
</tr>
<tr>
<td>II</td>
<td>Fair</td>
<td>16 P (UV-B)</td>
<td>Fair</td>
</tr>
<tr>
<td>III</td>
<td>Fair</td>
<td>56 P (UV-A)</td>
<td>Good</td>
</tr>
<tr>
<td>IV</td>
<td>Fair</td>
<td>16 P (UV-B)</td>
<td>Fair</td>
</tr>
<tr>
<td>V</td>
<td>Fair</td>
<td>56 P (UV-A)</td>
<td>Good</td>
</tr>
<tr>
<td>VI</td>
<td>Fair</td>
<td>16 P (UV-B)</td>
<td>Good</td>
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</tbody>
</table>

In conclusion, the A.D.A. Skin Typing System appears to be a useful tool for predicting the response of patients with severe generalized psoriasis to UV-A and UV-B therapy. Further research is needed to determine the validity of this system in a larger population of patients.
Table 3.—Minimal Erythema Dose and Minimum Melanogenic Dose for Skin Types I to VI*  

<table>
<thead>
<tr>
<th>Skin Type</th>
<th>MED, mJ/cm²</th>
<th>MMD, mJ/cm²</th>
<th>MED, J/cm²</th>
<th>MMD, J/cm²</th>
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<tbody>
<tr>
<td>I</td>
<td>20-30</td>
<td>...</td>
<td>20-35</td>
<td>...</td>
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<tr>
<td>II</td>
<td>25-35</td>
<td>15-25</td>
<td>30-45</td>
<td>16-20</td>
</tr>
<tr>
<td>III</td>
<td>30-50</td>
<td>17-25</td>
<td>40-55</td>
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</tr>
<tr>
<td>IV</td>
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<td>20-30</td>
<td>50-80</td>
<td>20-40</td>
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<tr>
<td>V</td>
<td>50-100</td>
<td>30-35</td>
<td>70-100</td>
<td>30-60</td>
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<tr>
<td>VI</td>
<td>100-200</td>
<td>40-60</td>
<td>&gt;100</td>
<td>30-60</td>
</tr>
</tbody>
</table>

*UVB indicates ultraviolet B (290 to 320 nm); UVA, ultraviolet A (320 to 400 nm) reaction; MED, minimal erythema dose; and MMD, minimum melanogenic dose. From Pathak et al.*

It is important to note that exposure to ultraviolet light can cause significant harm to the skin and should be avoided. The table above outlines the minimal erythema dose (MED) and minimal melanogenic dose (MMD) for different skin types, which are crucial in phototyping and understanding individual sensitivity to sun exposure.

References