

## Knowledge about Ultraviolet Radiation Hazards and Tanning Behavior of Cosmetology and Medical Students

Dear Editor,

Ultraviolet (UV) radiation is a well-known physical hazard responsible for photoaging, photoallergic, and phototoxic reactions as well as carcinogenesis, including life-threatening melanomas (1,2). Overexposure to both natural and artificial UV radiation is a public health concern. 30% of cancers diagnosed worldwide are skin cancers. Approximately three million non-melanoma skin cancers and 132 000 new cases of melanomas are diagnosed globally each year (3). Sunburns, especially in childhood, are a very important risk factor for melanomas. Several studies demonstrated a positive association between sunbed use and an increased incidence of malignant melanoma (4).

Current medical and cosmetology students will soon be knowledge providers about the risks of excessive exposure to UV radiation and prophylaxis of its consequences.

Our aim was to evaluate their knowledge about the side effects of ultraviolet radiation and tanning behaviors.

Details on the knowledge and habits of students were obtained during classes at the Poznan University of Medical Sciences. With approval from the Institutional Bioethical Committee, a 41-question anonymous survey was conducted in the spring of 2012 among 190 medical (1-6 year) and cosmetology students (1-5 year). The mean age of the study group was 22.3 years (standard deviation (SD) = 2.4 years), range 19-28 years. The survey was composed of closed and open-ended questions prepared by the authors.

The first part of the form included demographic data: gender, age, degree course, and school year. The students were also asked about their reaction to sunlight, sunburns in childhood, and personal and family

history of skin cancers or dysplastic nevus syndrome.

The factual section of the survey contained questions evaluating responder knowledge about sunbeds and risk of UV radiation as well as their personal tanning habits. The open-ended questions asked responders to provide definitions of: skin phototype, sun protection factor (SPF), and tanorexia. The students were additionally asked to mention possible side effects of solar radiation and contraindications to sunbeds and drugs, which may induce photosensitivity.

Statistical analysis was performed using The R Project for Statistical Computing.

Chi-squared test was used to compare both sun-risk knowledge and tanning behaviors between medical and cosmetology students.  $P < 0.05$  was considered statistically significant.

We distributed 220 questionnaires and received 190 (86%) eligible for evaluation.

Table 1 shows the study population. Gender distribution among groups was uneven, with significantly more male subjects in the medicine program group. We decided to include their answers in this study to provide an unbiased view of both of those programs. Where appropriate, we additionally provided comparisons between female subjects in both groups to prove that differences were not solely due to uneven gender distribution.

When we asked students to define skin phototype, cosmetology students more frequently gave a correct definition. In the group of students who stated they knew the definition of skin phototype, medical students were significantly more frequently wrong when we asked them to explain the term in their own words. Cosmetology students correctly an-

**Table 1.** Characteristics of the study population

		Medicine	Cosmetology	All
Number of participants		116	74	190
Gender	Male	39	0	39
	Female	77	74	151
Age	Min	19	19	19
	Mean	22,0	22,8	22,3
	Max	26	26	26
Student year	1	14	8	22
	2	25	13	38
	3	38	8	46
	4	4	29	33
	5	6	15	21
	6	28	0	28
Skin type	I	7	1	8
	II	37	23	60
	III	57	35	92
	IV	14	14	28

swered significantly more knowledge checking questions (Table 2).

When we asked students to list photosensitizing agents, students of the cosmetology program gave twice as many correct answers per respondent as students of the medicine program (see Table 3). Cosmetology students more frequently listed retinoids, while medical students listed tetracyclines as the main photosensitizing drug. The most common answer in the cosmetology group was the herb of *Hypericum perforatum*, although it is not considered a drug. Psoralens were identified by only 4 medical students as a possible cause of phototoxicity.

When students were asked to list adverse effects of sunbathing, we specifically looked for three responses (see Table 4). Cosmetology students listed those answers significantly more often than medical students.

Students of the cosmetology program gave significantly more correct answers when asked to list contraindications for sunbathing. While medical students reported mainly pregnancy (as a contraindication for most medical procedures), cosmetology students reported history of skin cancer as the most frequent answer (Table 5).

Cosmetology students (89.04%) stated they visited a tanning salon more often than medical students (46.55%) ( $P < 0.0001$ ). When we restricted this analysis to only female subjects there still was a significant difference ( $P = 0.0002$ ) between cosmetology and medical female students. Cosmetology students reported lower incidence of sunscreen use (83.78% vs. 97.39%;  $P = 0.0019$ ).

The age of the first tanning studio visit was also lower for cosmetology students (mean = 16.5 years)

**Table 2.** Knowledge checking questions

Number of students who:	Medical (%)	Cosmetology (%)	P-value
Reported they knew the definition of skin phototype	55 (47.41)	69 (93.24)	<0.0001
Gave correct definition of skin phototype	42 (63.71)	44 (59.46)	<0.0028
Knew that skin phototype restricts tanning times	96 (85.71)	67 (93.06)	0.0865
Thought tanning beds should be used no more than 15 minutes a year.	10 (8.62)	13 (21.62)	0.0300
Thought that sunglasses should be used during tanning in tanning beds	115 (99.14)	70 (94.56)	0.3215
Defined sun protection factor properly	73 (64.04)	66 (89.19)	0.0002
Knew what tanorexia means	55 (47.41)	63 (85.14)	<0.0001

**Table 3.** Answers to the question: What photosensitizing and phototoxic drugs do you know?

Most frequently reported agents	Medicine		Cosmetology	
Tetracyclines	37	33.33%	12	15.58%
Ketoprofen	0	0.00%	2	2.60%
Psoralens	4	3.60%	22	28.57%
Retinoids	10	9.01%	28	36.36%
Anticonceptive drugs	11	9.91%	16	20.78%
No. of correct answers per student	0.53		1.12	

than medical students (mean = 17.2 years), ( $P=0.0290$ ). Figure 1 illustrates the frequency of student tanning studio visits; the difference between groups was significant ( $P=0.0308$ ).

Skin cancers, dysplastic nevi syndrome, and pre-cancerous lesions were reported in the family history by 19 students (10.00%). 12 of those students (63.16%) were also tanning salons users. 85 students (44.74%) reported a history of a sunburn in their childhood and over half of them continue visiting tanning salons.

Some American (5) and French (6) studies assessed medical student knowledge and behaviors concerning sun risk and its prevention. The results of these studies indicated that medical school students did not have a satisfactory awareness about sun risk hazards. The French evaluation showed medical student knowledge was comparable to that of the French general population.

Studies evaluating Polish student knowledge (7-9) showed ignorance of the term Fitzpatrick's skin phototype. We emphasize this because patients with phototype 1 and 2 are more susceptible to the development of skin cancers (10) and ignorance in this matter may be dangerous.

UV rays may promote drug-induced photosensitivity reactions such as phototoxicity and photo-

allergy (1), with the most common causes being: non-steroidal anti-inflammatory agents (ketoprofen, ibuprofen, piroxicam, diclofenac), cardiovascular drugs (furosemid, amiodarone, thiazides), antibiotics (tetracyclines, ciprofloxacin, sulfonamides), psoralens, and oral contraceptives (11). Our study found deficient knowledge about drugs which may trigger photosensitivity reactions.

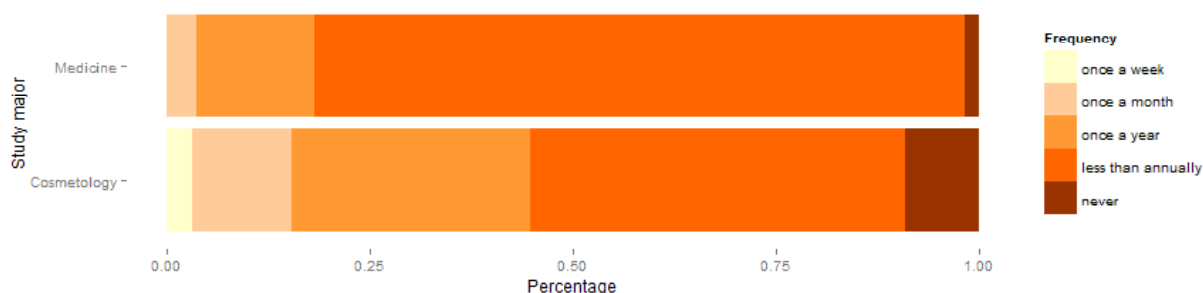
Cosmetology students reported significantly more risky tanning behavior but did better in knowledge checking questions, which may be explained by their personal interest in this subject or by educational focus due to their major. We suggest that better knowledge about sunbathing in general is due to increased interest in this matter (not solely due to formal education) and this interest derives from a positive attitude towards a tanned appearance. It has been proven that sunbathing shows signs of addictive behavior (12). Tanorexia as a term was more widely known among cosmetology students, which may illustrate that although students knew about the addictive properties of tanning, they were sure that this did not apply to them. Many studies showed that increased knowledge did not translate into safer tanning habits (13,14). Our study agrees with those findings.

**Table 4.** Answers to the question: What adverse effects of sunbathing do you know?

Most frequently reported answers	Medicine	%	Cosmetology	%
Skin aging	31	27.93%	41	53.25%
Sunburns	32	28.83%	26	33.77%
Skin cancer	85	76.58%	64	83.12%
No. of correct answers per student	1.28		1.77	

**Table 5.** Answers to the question: What contraindications for sunbathing do you know?

Most frequently reported answers	Medicine	%	Cosmetology	%
Pregnancy	33	29.73%	26	33.77%
Skin cancer	26	23.42%	31	40.26%
Use of photosensitizing drugs	8	7.21%	17	22.08%
Number of correct answers per student	0.58		1	



**Figure 1.** Frequency of student tanning studio visits.

Our study demonstrated that medical and cosmetology student knowledge about sunbeds and risk of UV radiation is deficient. However, cosmetology students demonstrated better knowledge than medical students. Future cosmetologists may be better information providers about sun risk and its prevention. On the other hand, students of the cosmetology faculty tended to tan more often and longer and engage in more risky behavior despite being aware of the hazards of tanning. They may be more likely to develop skin cancers in the future.

### References:

- Osmola-Mańkowska A, Silny W, Dańczak-Pazdrowska A, Olek-Hrab K, Mańkowski B, Osmola K, *et al.* The sun our friend or foe? *Ann Agric Environ Med* 2012;19:805-9.
- Gruber F, Peharda V, Kaštelan M, Brajac I. Occupational skin diseases caused by UV radiation. *Acta Dermatovenerol Croat* 2007;15:191-8.
- World Health Organization (WHO). Artificial tanning sunbeds. Risks and guidance. <http://www.who.int/uv/publications/sunbedpubl/en/> (accessed 2013.10.14).
- International Agency for Research on Cancer Working Group on artificial ultraviolet (UV) light and skin cancer. The association of use of sunbeds with cutaneous malignant melanoma and other skin cancers: A systematic review. *Int J Cancer* 2007;120:1116-22.
- Hymowitz MB, Hayes BB, Maury JJ, Geller AC. Evaluation of medical students's knowledge, attitudes, and personal practices of sun protection and skin self-examination. *Arch Dermatol* 2006;142:523-4.
- Isvy A, Beauchet A, Saiag P, Mahé E. *J Eur Acad Dermatol Venereol* 2013;27:247-51.
- Krajewska-Kułak E, Kowalewska B, Łukaszuk C, Bi-lemuk A, Lewko J, Rozwadowska E, *et al.* Evaluation of the first-year cosmetology and physiotherapy students knowledge on the solarium and solar radiation. *Dermatol Klin* 2010;12:99-105.
- Wołosik K, Knaś M, Waciewicz M, Maciejczyk MK, Pietrzykowska A. Evaluation of the cosmetology and pharmacy students' knowledge on ultraviolet exposure on human organism. *Dermatol Klin* 2012;14:117-21.
- Krajewska-Kułak E, Kułak W, Van Damme-Ostapowicz K, Lukaszuk C, Lewko J, Lankau A, *et al.* Evaluation of the students' knowledge about sunbed and solar radiation. *Prog Health Sci* 2012;2:28-32.
- Fitzpatrick TB. The validity and practicality of sun reactive skin types I through VI. *Arch Dermatol* 1988;124:869-71.
- Wolff K, Johnson RA. *Fitzpatrick's color atlas of clinical dermatology*. The McGraw-Hill Companies, New York, 2009.
- Heckman CJ, Egleston BL, Wilson DB, Ingersoll KS. A preliminary investigation of the predictors of tanning dependence. *Am J Health Behav* 2008;32:451-64.
- Knight JM, Kirinciach AN, Farmer ER, Hood AF. Awareness of the risk of tanning lamps does not influence behavior among college students. *Arch Dermatol* 2002;138:1311-5.
- Monfrecola G, Fabbrocini G, Posteraro G, Pini D. What do young people think about the dangers of sunbathing, skin cancer and sunbeds? A questionnaire survey among Italians. *Photodermatol Photoimmunol Photomed* 2000;16:15-8.

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