Indoor Tanning Amongst Young Adults: Time to Stop Sleeping on the Banning of Sunbeds

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Abbreviations

DNA	Deoxyribonucleic acid
NIH	National Institute of Health
SPF	Sun protection factor
IARC	International Agency for Research on Cancer
POM-C	Pro-opiomelanocortin
TAN Act	Tanning Accountability and Notification Act
UV	Ultraviolet
UVR	Ultraviolet radiation
WHO	World Health Organization

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INTRODUCTION

Since the industrial revolution, "a tan" has been a status symbol of wealth and leisure in many countries. Tanning beds expose the skin to ultraviolet radiation (UVR) sufficient to cause keratinocyte DNA damage and to induce production of melanin—a pigment that absorbs ultraviolet (UV) light. Tanning salons have served as a quick, convenient and inexpensive way to attain this "healthy, wealthy look." As such, indoor tanning has become a big business in the United States, with over 50,000 indoor tanning facilities generating annual revenues of over $5 billion USD.

The association between tanning and skin cancer (both melanoma and non-melanoma) in adulthood has been well established, especially amongst individuals with early childhood and adolescent exposure. Increasingly, tanning is being outlawed for minors, with the California legislature leading the way in January 2012. Similar to smoking cessation counseling and therapy, adult medicine physicians have a unique opportunity to discourage tanning bed use, acting to prevent irreparable DNA damage to the skin prior to the development of skin cancers.

In this comment, we provide an update on the epidemiology of tanning bed use and its association with skin cancers, the opioid-like effects of tanning, pending tanning-related legislation and special interests, and close with clinical pearls for addressing this issue with patients.

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INDOOR TANNING AS A CARCINOGEN

Skin cancer is the most common malignancy in the United States. On average, one in five Americans will develop skin cancer in their lifetime. Over 3.5 million cases are diagnosed annually, 123,590 (53,360 noninvasive or in situ and 70,230 invasive) of which are melanoma. Although melanoma accounts for less than 5 % of skin cancers, it is responsible for over 75 % of all skin cancer deaths, and one American dies of melanoma every hour. Further, melanoma is the most common cancer among individuals 25–29 years old, and the second most common cancer among individuals 15–29 years old.

Any tan is an indication of DNA damage, and potentially contributes to the development of skin cancer. Indoor tanning bed use has been associated with increased risk of both melanoma and non-melanoma skin cancers (squamous cell and basal cell carcinoma). The U.S. National Institutes of Health (NIH) has declared tanning beds a human carcinogen, and the World Health Organization's (WHO) International Agency for Research on Cancer (IARC) includes tanning beds in its "Group 1" list of the most dangerous cancer-causing substances, which also includes plutonium and cigarettes. The IARC notes that tanning bed exposure early in life is most dangerous (use of a tanning bed before age 30 increases melanoma risk by 75 %) and using a tanning bed even once increases the risk of melanoma development. Further, the UVR exposure from tanning beds is far greater than that of natural sunlight, and the tan attained from tanning beds only has an SPF (sun protection factor) of about three.

INDOOR TANNING AND MINORS

Indoor tanning is a dangerous practice, especially for young adults. Of the 30 million annual indoor tanners in the U.S., up to 3 million are young adults. Amongst white American adolescents aged 13–19 years old, 24 % have used a tanning bed, with 37 % of young women using a tanning bed at least once. Young adults who use indoor tanning beds before the age of 25 are two times as likely to develop squamous cell carcinoma, and 1.4 times as likely to develop basal cell carcinoma compared to those who have never used indoor tanning equipment. In contrast, those who have ever used a tanning bed are 1.7 times and 1.3 times more likely to develop squamous and basal cell carcinomas, respectively.

INDOOR TANNING DEPENDENCY

Tanning induces the production of endogenous opioids, and can be addictive. Teenagers who frequently tan indoors self-report difficulty in quitting tanning and 53 % of frequent tanners evaluated in one study met official criteria for a UVR-associated substance-related disorder.[1] Another study demonstrated withdrawal-like symptoms in 50 % of frequent tanners when given the opioid antagonist naltrexone.[2] Physiologically, UVR induces expression of p53, stimulating the pro-opiomelanocortin (POMC) promoter to produce α-melanocyte-stimulation hormone, which promotes melanogenesis and causes pigmentation, and β-endorphin, an endogenous opioid that might account for the so-called "tanner's high." Thus, UVR exposure during indoor tanning acts as a reinforcing stimulus associated with endorphin release, potentially contributing to the development of "tanorexia" or tanning dependency. This dependency might also explain why use of tanning beds is not significantly different amongst adolescents with a family history of melanoma. Frequent indoor tanning amongst female teenagers is also associated with cigarette smoking, binge drinking, use of recreational drugs, excessive dieting, use of vomiting or laxatives to control weight, and having friends who place importance on being thin and trying to look like females in the media. One study found that tanning bed use was more prevalent amongst teenagers who identified with the "popular crowd" versus those that identified with the "brain crowd," which was protective against indoor tanning.[3]

NEW INDOOR TANNING LEGISLATION

Reducing indoor tanning amongst minors and young adults has downstream consequences for reducing skin cancer amongst adults. In January 2012, California became the first U.S. state to completely prohibit indoor tanning for minors. New York, New Jersey, Vermont, Rhode Island, and Chicago have recently passed similar legislation, although no federal laws have been passed. Furthermore, the U.S. Affordable Care Act instituted a 10 % excise tax on all indoor tanning services that has already gone into effect.

The WHO, American Medical Association, American Academy of Pediatrics, and American Academy of Dermatology all support legislation banning the use of tanning beds by minors. Across the globe, tanning restrictions for minors have been far more progressive. The United Kingdom, Germany, Austria, Portugal, Belgium, France, several Australian states and several Canadian provinces have all banned indoor tanning for minors. Brazil and New South Wales in Australia have completely banned indoor tanning for all ages and South Australia will do the same by 2015.

Legislation alone many not be sufficient to reduce tanning bed use. In 2007, the U.S. Congress passed the Tanning Accountability and Notification Act (TAN Act, H.R. 945), modifying the previously outdated 1979 warning label on indoor tanning beds to include the phrase "Ultraviolet radiation can cause skin cancer," although this did not significantly curb use. Further, while the majority of U.S. states do have laws limiting the use of tanning beds by minors, most of them are not strictly enforced. One study demonstrated that 81 % of tanning salons allowed 15-year-old girls to tan illegally without parental consent,[4] while another showed that 95 % of indoor tanners exceeded Food and Drug Administration (FDA)-recommended exposure limits.[5]

Still, the Indoor Tanning Association continues to advertise the benefits of tanning, while denouncing its dangers and criticizing legislation that aims to limit indoor use. Recently, the owners of 1,400 tanning salons across the country formed the American Suntanning Association lobbyist group to further combat statewide tanning bed bans, and challenge the WHO classification of tanning beds as a "Group 1" cancer-causing substance with numerous health risks.

ROLE OF THE PRIMARY CARE PHYSICIAN

Primary care physicians (PCPs) already impact on their patients' perception of lifestyle habits, from healthier diets

Table 1. Screening Questions to Evaluate for Indoor Tanning Bed Use

• Do you use tanning beds? How often?
• Do you frequently lie out in the sun? How often?
• How many times have you gone tanning in the past week?
• Do you get a sense of happiness or joy after tanning bed exposure?
• Do you feel a sense of sadness if you miss your tanning session?
• Do you like to get a "burn" before the summer so that you can tan?
• Have you ever felt guilty about tanning?
• Have others ever told you that you need to "cut down" on tanning?

to tobacco cessation. The U.S. Preventive Services Task Force recommends counseling fair-skinned children, adolescents, and young adults aged 10–24 years about minimizing UVR exposure to reduce the risk of skin cancer (Grade B Recommendation).

Thus, PCPs are in a unique position to counsel adolescents and young adults against indoor tanning bed usage and to screen for tanning addiction, as these patients rarely interact with the healthcare system outside of their PCP.

Screening questions about indoor tanning bed use can be incorporated into the history-taking process, or into the patient-intake paperwork used by each office. The CAGE questionnaire, adjusted to direct questions at tanning bed use, can be used to screen for tanning dependency (Table 1), and the Stages of Change model for addiction may also be helpful. Alternative options can also be suggested to achieve the look of tanned skin, including self-tanning creams and sprays. For an endorphin boost, exercise remains a healthy alternative.

CONCLUSION

In concert with public policy measures, physicians can partner with patients and their families to curb indoor tanning use, and potentially reduce the subsequent incidence of skin cancer amongst these vulnerable patients.

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REFERENCES

1. **Warthan MM, Uchida T, Wagner RF Jr.** UV light tanning as a type of substance-related disorder. Arch Dermatol. 2005;141(8):963–6.
2. **Kaur M, Ligouri A, Lang W, et al.** Induction of withdrawal-like symptoms in a small randomized, controlled trial of opioid blockade in frequent tanners. J Am Acad Dermatol. 2006;54(4):709–11.
3. **Stapleton J, Turrisi R, Hillhouse J.** Peer crowd identification and indoor artificial UV tanning behavioral tendencies. J Health Psychol. 2008;13(7):940–5.
4. **Forster JL, Lazovich D, Hickle A, et al.** Compliance with restrictions on sale of indoor tanning sessions to youth in Minnesota and Massachusetts. J Am Acad Dermatol. 2006;55:962–7.
5. **Hornung RL, Magee KH, Lee WJ, et al.** Tanning facility use: are we exceeding food and drug administration limits? J Am Acad Dermatol. 2003;49:655–61.