The current pulse of indoor tanning practices in the US is difficult to take. Although we have reason to be encouraged by the continued legislative efforts within individual states to curb indoor tanning among minors, indoor tanning remains a popular practice even as skin cancer rates continue to rise. Many clinicians, researchers, and healthcare providers agree that, going forward, patients should receive the utmost quality of care regarding sun protection and UV prevention. That is why it is important to keep abreast of the latest trends on all fronts—from research to legislative efforts. Ahead, I will review the current literature and discuss the types of ultraviolet (UV) radiation utilized by indoor tanning beds, the inherent dangers of indoor tanning (i.e., the risk of basal cell carcinoma [BCC], squamous cell carcinoma [SCC], and melanoma skin cancers), and the latest regarding legislation to ban indoor tanning bed use for adolescents nationwide.

**UV AND INDOOR TANNING: FACTS AND TRENDS**
Cutaneous light reactions are caused by UV radiation (UVR) of wavelengths between 280nm to 480nm; this represents UVA, UVB, and UVC light wavelengths. UVB rays can cause DNA damage and mutations, whereas UVA rays can indirectly cause oxidative damage and stress and penetrates deeper into the skin. In addition, overexposure to UVA and UVB radiation prompts melanocytes to produce increased melanin and can damage the DNA of the skin cells. UVA oxidizes the existing melanin, which causes immediate pigment darkening. On the other hand, UVB rays inflict inflammation, which releases new melanin, and further tanning lasts longer than the UVA-triggered tanning.

Chronic effects of prolonged UV exposure include photoaging and photocarcinogenesis. However, other side effects include solar elastosis, which is thickening of the skin along with yellowing and wrinkling in the sun-exposed area; solar lentigo, a light or dark brown evenly colored or reticulated macule; ephelide (freckle), light-to-medium brown macule, which is less than 6mm in diameter; and poikiloderma, referring to red or brown patches on the lateral neck with telangiectasia and mild atrophy of the skin.

Photocarcinogenesis, associated with chronic exposure to UVR, is extremely hazardous and contributes to the development of actinic keratoses (AKs), SCC, BCC, and melanoma, due...
to the strong association with tumor suppressor gene p53.\textsuperscript{2} Both UVA and UVB rays signal DNA damage and ultimately lead to skin cancer.\textsuperscript{6} Thus, the World Health Organization (WHO) has classified UVR as a human carcinogen.\textsuperscript{5}

**Tanning Beds.** I will examine more closely the risks associated with tanning and individual skin cancers, but first it is important to establish some history and trends regarding indoor tanning. First introduced in the 1970s,\textsuperscript{3} tanning salons have come to be so prominent that they are more widespread than McDonalds or Starbucks. In fact, over 30 million people use tanning beds in the US annually,\textsuperscript{7} and slightly more than one million people use them per day.\textsuperscript{6} Those who log the most time using indoor tanning beds are high school and college-age individuals who also have greater outdoor sun exposure and also live in areas of higher UV indices.\textsuperscript{3} This is consistent with findings from the National Health Interview Survey, which suggest that indoor tanning is most common in young adults, particularly amongst young women.\textsuperscript{8}

Various published accounts reveal a direct correlation between tanning bed usage and skin cancers.\textsuperscript{3} Zhang, et al. found that the risk of skin cancers, especially BCC, has a stronger association with patients with a younger age of exposure. Another study found that artificial UV light may be a significant contributor to a risk of skin cancer among those with substantial tanning bed exposure.\textsuperscript{9} SCC is more sensitive to UV exposure over an entire lifetime than to exposure at early ages.\textsuperscript{3} Development of SCC is strongly linked to UVR exposure in comparison to BCC, especially with chronic sun exposure.\textsuperscript{1} Chronic sun exposure leads to premalignant lesions confined to the epidermis, such as AKs, which develop into SCC if not treated.\textsuperscript{1} Frequent monitoring of patients, including full skin examination and counseling about daily sun protection is crucial, given that prognosis for advanced cutaneous malignancies remains poor.\textsuperscript{1}

**Tanning and Melanoma Risk**

Perhaps more concerning than the correlation and risks of indoor tanning and SCCs and BCCs is the association between UV exposure (including indoor tanning) and melanoma. Approximately 10,000 deaths related to melanoma occurred in 2011.\textsuperscript{10} Melanoma is the most common cancer diagnosed among 25- to 29-year-olds, and roughly one in 58 Americans will develop melanoma during their life.\textsuperscript{7,10}

UV light is the only modifiable risk factor for melanoma. As such, it increases the relative risk of melanoma by 1.8 times.\textsuperscript{6} In 2007, the International Agency for Research on Cancer performed a meta-analysis that demonstrated a seven percent increased risk of melanoma with the use of tanning beds before the age of 30 years.\textsuperscript{6} In 2009, the International Agency for Research on Cancer concluded that indoor tanning beds, like radiation and cigarette smoke, are carcinogenic to humans.\textsuperscript{11} Epidemiologists have found an alarming 20 percent increase in melanoma risk among tanning bed users.\textsuperscript{11} Moreover, tanning bed usage prior to age 35 increases melanoma risk by 87 percent, compared to never using tanning beds,\textsuperscript{11} while the risk for developing melanoma increases over time from the first tanning bed exposure. This implies that there will be an increase in the number and percentage of past and present indoor tanning bed users developing melanoma. Another study suggests a dose-response relationship between indoor tanning and melanoma; specifically, an increased frequency of indoor tanning correlated with higher risk association with melanoma risk.\textsuperscript{12} These results are consistent with findings from another study, in which melanoma risk directly increased with years used, hours, and sessions of indoor tanning.\textsuperscript{7}

Recent research has uncovered greater detail regarding the relationship of indoor tanning to skin cancer, as well as information about users of tanning beds. For example, women aged 18 to 39 years are now eight times more likely to be diagnosed with melanoma due to use of indoor tanning beds. It’s also worth noting that women tanners are also 2.5 times more likely to develop SCC and 1.5 times more likely to develop BCC than non-tanners.\textsuperscript{6} Coupled with the staggering statistic that 33 percent of teenage girls reported using tanning beds, with 12 to 13 years being a common age of onset in the United States,\textsuperscript{13} these data would indicate that young women should be a major focal point of education and awareness efforts to curb tanning.

In summary, the evidence that indoor tanning usage is a risk factor for melanoma is overwhelming, lending credence to the WHO report suggesting that indoor tanning is carcinogenic in humans and should be avoided to reduce the risk of melanoma. Due to the alarming correlation between indoor tanning bed use and skin cancer, cumulative risks and future consequences need to be addressed in the community, especially among young adolescents and women, which I will address later in this article. These findings confirm evidence to support cautioning the public against future use of tanning beds and enacting federal and state legislation to ban tanning bed usage for those under the age of 18.

**Current Legislation and Laws**

After years of escalating evidence, the link between UV exposure of all types and skin cancer is clear.\textsuperscript{14} This consensus dramatically impacted the current legislative trends and the passage of several bills to ban underage tanning.\textsuperscript{5} In 2011, the state of California passed legislation to ban minors from artificial tanning use, which was seen as a huge step in the campaign to restrict tanning bed usage among young persons.\textsuperscript{14} The California tanning ban legislation faced strong
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resistance and opposition from tanning salons and businesses, but the tide swung in the bill’s favor when, in 2010, the Federal Trade Commission sued the Indoor Tanning Association over its claims about the health benefits of UV light related to vitamin D. Since the passage of the California law, several other states have attempted to follow California’s model to bring about more legislation to restrict indoor tanning. 

A greater push will be required to ensure higher standards of sun safety and UV protection. Healthcare providers are seeing more young people with skin cancers, which is why educating teenagers and young adults about skin cancer and UV light is essential. There is broad support for legislation to ban or limit indoor tanning beds among minors, due to the strong correlation between UV exposure via tanning beds before 35 years of age and malignant melanoma and cutaneous SCC. However, passing legislation on both the state and federal levels has remained a challenge due to a number of factors, which include strong lobbying efforts by the tanning bed industry, proceedings after the bill was filed, and obtaining support from health organizations. But clinicians and educators should keep up the effort, because effective tanning bed legislation can be enacted and may reduce youth exposure to UV light and reduce rates of cutaneous SCC and melanoma.

Restricting youths from tanning facilities is imperative in order to delay the progression of skin cancer in young adults. As of 2005, legislation has been implemented in 21 states, restricting adolescents from tanning facilities. This initiative highlights the importance of a national legislation on safety and regulation of protecting human life. Due to research in the United States by the American Medical Association and the American Academy of Dermatology, organizations such as the WHO have advised restricting indoor tanning for youth under the age of 18 years. This acknowledgment has paved the way for increasing support to restrict access to indoor tanning. In the United States, Wisconsin, Illinois, and Texas were the first three states to implement indoor tanning age restrictions for youth at varying ages in 2003. In February 2012, California became the first state to restrict indoor tanning to all minors. As of September 2012, the number of states that have legislation restricting access to indoor tanning in the US has risen to 33. More recently, New Jersey passed legislation to restrict indoor tanning for those under the age of 17, suggesting that the future may be bright for anti-tanning and UV protection efforts.

Some states with legislation in place that doesn’t outright ban tanning require some form of parental consent in order for minors to use a tanning bed. Researchers found that about 87 percent of the tanning bed facilities required parental consent, and 14 percent required a parent to be present. In addition, researchers found that facilities in states with a youth access law were significantly more likely to require parental consent and parental accompaniment that those in states without a youth access law for indoor tanning facilities.

Given the high rates of indoor tanning by adolescent females, parents function as vital gatekeepers, even though many parents are allowing their teens to tan and are providing written consent or accompaniment. The role of healthcare providers is thus essential in both educating patients and advocating for legislative efforts to restrict tanning for those under 18. Bans may reduce youth access in a direct way and forcefully educate parents about the real dangers of indoor tanning. Moreover, prohibiting adolescents’ access to indoor tanning stops the behavior before it can become a habit that may continue into adulthood. Thus, the ban is critical to prevent skin cancer. With melanoma and skin cancer rates increasing, laws and regulations are essential for banning the adolescent population from indoor tanning bed use. Implementation of laws and regulations for this public health matter is therefore a good way of reducing future healthcare costs for the United States.

**TAKING A STAND**

UVR is carcinogenic in humans. An increased risk of melanoma skin cancer is seen with first use at an early age, which is most likely a marker for cumulative exposure. The association between melanoma skin cancer and sun exposure is multifaceted, since it depends on whether the exposure is constant or discontinuous. It is too early to measure the impact of tanning bans on the skin cancer and melanoma incidence rate. Due to the popularity of tanning salons, further research on the health effects of artificial tanning products that utilize UVA and UVB radiation needs to be performed.

Individuals who desire a tan should consider spray tans, which offer a safe, cost-efficient alternative for those who want to achieve a tanned look. Approximately 40 percent of people who used sunless tanning products and sunbathed reported they decreased their sunbathing time and tanning bed sessions. Interventions could be implemented to
decrease youth indoor tanning, promoting public health announcements, implementation of a tanning bed usage tax, restricting marketing directed toward adolescents, and mandating tanning bed education to users. More recently, in 2010, the US implemented a 10 percent tax on tanning services; however, the higher cost was not a major deterrent to tanning customers. Restriction policies will have a substantial impact on decreased indoor tanning among the adolescent population.

The current body of research provides strong evidence that indoor tanning bed use is a risk factor for melanoma and skin cancer. The conclusions we can draw based on the current research are vast, starting with the statement that indoor tanning is a human carcinogen and should be avoided to reduce the risk of melanoma and skin cancer. It is therefore within the healthcare provider’s parameters to inform children, teenagers, and adults about the risks of skin cancer associated with indoor tanning. We must vigilantly monitor current and past tanning bed users for skin cancer, counsel patients on the dangers of indoor tanning, and lobby states for restrictions on indoor tanning bed use. Finally, greater collaboration between legislation and medicine needs to be implemented to help achieve better outcomes for the improvement of the individual’s health.

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