



# Common Misconceptions about Tanning Bed Use

## Debunking the Industry's Myths

**Indoor Tanning Industry:** *"The relationship between UV radiation and skin cancer is not straight-forward and questions still exist as to how UV radiation interacts with the skin."*

**Fact:** Significant amounts of research link UV radiation to an increased risk for skin cancer. The International Agency for Research on Cancer (IARC) reaffirmed the carcinogenicity of UV radiation by examining 19 separate informative studies, all of which documented that using a sunbed, even once, was positively associated with melanoma.<sup>1</sup> Similar studies have shown increased risk for other skin cancers (basal and squamous cell carcinomas) that resulted from using an indoor tanning bed as little as one time.<sup>2</sup>

Several other major studies further document the link between artificial UV tanning and melanoma, including a survey and two case-control studies in the U.S., a case-control study in Australia, the prospective US Nurse's Health Study, and the confirmation of previous results of the Norwegian-Swedish cohort study.

**Indoor Tanning Industry:** *"While associative survey-studies suggest a correlation between UV radiation from indoor tanning and melanoma, no direct experimental evidence exists to show a causative connection. Even American Academy of Dermatology spokesperson Dr. James Spencer admits, "We don't have direct experimental evidence" connecting indoor tanning and melanoma."*

**Fact:** Simply, it is unethical to knowingly expose human subjects to identified carcinogens, such as UV radiation, even for the purpose of obtaining direct experimental evidence. As such, many studies seeking information on the effects of exposures to known harms use a case-control design.

A case-control design compares two groups of people: those with the disease or condition under study (cases) and a very similar group of people who do not have the disease or condition (controls).

Researchers then study the medical and lifestyle histories of the people in each group to learn what factors may be associated with the disease or condition.<sup>3</sup> Therefore, in a hypothetical case-control study designed to examine the effects of artificial UV radiation on human subjects, 'cases' would be individuals who tan indoors while 'controls' would be similar individuals who do not.

Case-control studies that use large sample sizes and attempt to control for a wide-range of variables are among the strongest and most reputable. The studies most frequently cited to demonstrate the association between indoor tanning and the development of melanoma use sample sizes up to 100,000 people or more. These studies all demonstrate a causative effect of UV radiation on the development of skin cancer.

In order to further examine the effects of known harms, researchers frequently substitute animals, such as mice, for human subjects. These studies are organized experiments, producing results in a controlled

<sup>1</sup> Ghissassi, et al. (2009). "A Review of Human Carcinogens – Part D: Radiation." The Lancet – Oncology; August 2009, Vol 10.

<sup>2</sup> Wehner, et al. (2012). "Indoor Tanning and non-melanoma skin cancer: systematic review and meta-analysis." British Medical Journal. October 2012

<sup>3</sup> National Cancer Institute. (2012) "Definition of case-control study." Accessed on June 11, 2012 at <http://www.cancer.gov/dictionary?cdrid=348989>

environment in which variables are limited. Under this format, multiple studies on animals demonstrate the association between artificial UV radiation and the documented harms related to UV exposure, specifically skin cancer and immunosuppression and pre-mature aging of the skin.<sup>4,5,6,7</sup>

**Indoor Tanning Industry:** *“Professional indoor tanning facilities are regulated and educate their patrons about the potential risks of UV overexposure. Consumers are required to read and sign consent forms that include warnings about potential eye damage, photoaging and skin cancer. Warning labels are found on every tanning device and almost always in other general areas. Professional tanning facilities require parental consent for teenagers who tan even though most states don't require this measure.”*

**Fact:** Although research on compliance with various indoor tanning regulations is limited, several studies suggest low compliance with posting regulations and appropriate warning labels.<sup>8,9,10</sup> For instance, in 2010, researchers in New York City assessing tanning facilities for compliance with state and federal regulations found that more than one-third, or 35%, of tanning machines observed did not have any warning signs posted.<sup>11</sup> One year prior, in 2009, a large telephone survey of 3,647 indoor tanning facilities in 116 U.S. cities revealed that, only 11% of all tanning establishments followed the Food and Drug Administration's recommendation that first-time tanners limit their exposure to three tanning sessions in the first week. In the same study, an alarming 71% of facilities told the undercover callers, who posed as fair-skinned, 15-year-old girls, they could tan seven days a week. Additionally, larger tanning facilities, or those with a greater number of tanning beds, are significantly less likely to follow the FDA frequency recommendations.<sup>12</sup>

In an informal study by the US House of Representatives Committee on Energy and Commerce – Minority Staff, investigators employed methods similar to the 2009 study to determine level of compliance and informative transparency. Of the 300 facilities, 90% stated that indoor tanning did not pose a health risk, 51% denied indoor tanning would increase a fair-skinned teenager's risk of developing skin cancer, and 78% claimed indoor tanning would actually be beneficial to the health of a fair-skinned teenager.<sup>13</sup>

<sup>4</sup> Roberts, L. and Beasley, D. (1997). “Sunscreen Lotions Prevent Ultraviolet Radiation-Induced Suppression of Antitumor Immune Responses.” *International Journal of Cancer*, 1997; 71

<sup>5</sup> Beasley, DG, et al. (1998). “Commercial sunscreen lotions prevent ultraviolet radiation-inducing depletion of Langerhans cells in Skh-1 and C3H mice.” *Photodermatology, Photoimmunology, and Photomedicine*, 1998; 14:3-4

<sup>6</sup> Ananthaswamy, H, et al. (1999). “Inhibition of Solar Simulator-Induced p53 Mutations and Protection Against Skin Cancer Development in Mice by Sunscreens.” *Journal of Investigative Dermatology*, 1999; 112.

<sup>7</sup> Fourtanier, A. (2000). “Improved Protection Against Solar-Simulated Radiation-Induced Immunosuppression by a Sunscreen with Enhanced Ultraviolet A Protection.” *Journal of Investigative Dermatology*, April 2000; 114:4.

<sup>8</sup> Heilig, et al. (2005). “A case for informed consent? Indoor UV tanning facility operator's provision of health risks information (United States).” *Cancer Causes Control*, 2005; 16:5.

<sup>9</sup> Mayer, JA. (2008). “Enforcement of state indoor tanning laws in the United States.” *Preventing Chronic Disease*, 2008; 5:4.

<sup>10</sup> Hester, EJ. (2005). “Compliance with federal and state legislation by indoor tanning facilities in San Diego.” *Journal of American Academy of Dermatology*, 2005; 141:8.

<sup>11</sup> Brouse, et al. (2011). “Warning Signs Observed in Tanning Salons in New York City: Implications for Skin Cancer Prevention.” *Preventing Chronic Disease*, 2011; 8:4.

<sup>12</sup> Pichon, L., et al. (2009). “Youth Access to Artificial UV Radiation Exposure.” *Archives of Dermatology*, Sept 2009; 145:9.

<sup>13</sup> US House of Representatives Committee on Energy and Commerce – Minority Staff. (2012). “False and Misleading Health Information Provided to Teens by the Indoor Tanning Industry – Investigative Report Prepared for Rep. Henry A Waxman and Rep. Diana DeGette.” Accessed on June 12, 2012 at

<http://democrats.energycommerce.house.gov/sites/default/files/documents/Tanning%20Investigation%20Report%202.1.12.pdf>

**Indoor Tanning Industry:** *“Tanning beds are a safer alternative to sunbathing outdoors because most tanning beds can be controlled and moderated by skin type and operate on a timer or via the control of a tanning bed operator.”*

**Fact:** Tanning beds deliver UVA radiation 5-15 times higher than what is delivered by the summer midday sun.<sup>14</sup> Furthermore, multiple studies demonstrate that indoor tanners receive sunburns or suffer other skin damage after indoor tanning sessions.<sup>15,16,17</sup>

**Indoor Tanning Industry:** *“Melanoma is more common in people who work indoors than in those who work outdoors, and those who work both indoors and outdoors get the fewest melanomas. Therefore, the relationship between melanoma and sunlight is not clear-cut. If it were, outside workers would have higher incidence of melanoma than those who work inside.”*

**Fact:** According to the Centers for Disease Control and Prevention, different patterns of sun exposure are associated with different types of skin cancer.<sup>18</sup> Continuous, chronic sun exposure, such as that observed among outdoor workers, is associated with squamous cell carcinoma.<sup>19</sup> Intermittent exposure, such as recreational exposure such as that observed among indoor tanners, is associated with melanoma and basal cell carcinoma.<sup>20,21</sup> Additionally, intermittent exposure is more likely to occur in concentrated bursts to skin that is more sun-sensitive, especially the stomach, chest, and back, than chronically sun-exposed skin.<sup>22</sup> This is just one explanation as to why incidence of melanoma is higher among people who work indoors.

Sunburn has typically been used as one indicator of high intermittent exposure to UV radiation, the form of sun exposure most strongly related to melanoma risk.<sup>23</sup> Additionally, the risk of developing melanoma increases with the number of sunburns an individual receives during all life-periods<sup>24</sup>, highlighting a cause for concern related to intermittent, concentrated UV exposure.

**Indoor Tanning Industry:** *“Indoor tanning supports the production of vitamin D which has a beneficial effect on human health. Furthermore, 77 percent of Americans are considered vitamin D deficient according to*

<sup>14</sup> Dore, J-F and Chigno, M-C. (2012). “Tanning salons and cancer.” *Photochemical and Photobiological Sciences*, 2012; 11:30.

<sup>15</sup> Cokkinides V, et al (2009). “Indoor tanning use among adolescents in the US, 1998 to 2004”. *Cancer* 2009;115:190-8.

<sup>16</sup> Boldeman C, et al. (1996). “Sunbed use in relation to phenotype, erythema, sunscreen use and skin diseases. A questionnaire survey among Swedish adolescents.” *Journal of Dermatology* 1996;135:712-6.

<sup>17</sup> Boldeman C, et al. (2001). “Tanning habits and sunburn in a Swedish population age 13-50 years”. *European Journal of Cancer* 2001;37:2441-8.

<sup>18</sup> Centers for Disease Control and Prevention (CDC). (2012). “Sunburn and Sun Protective Behaviors Among Adults Aged 18-29 Years – United States, 2000-2010.” *Morbidity and Mortality Weekly Report*, May 11, 2012; 61:8.

<sup>19</sup> Karagas, MR., et al. (2006). “Keratinocyte carcinomas (basal and squamous cell carcinomas of the skin).” *Cancer Epidemiology and Prevention, Third Edition*. New York, NY: Oxford University Press; 2006; 1230-50.

<sup>20</sup> Green, A., et al. (2011). “Reduced melanoma after regular sunscreen use: Randomized trial follow-up.” *Journal of Clinical Oncology*, 2011; 29.

<sup>21</sup> Dennis LK., et al. (2008). “Sunburns and risk of cutaneous melanoma, does age matter: a comprehensive meta-analysis.” *Annals of Epidemiology*, 2008 Aug; 18(8):614-627

<sup>22</sup> Nelemans, P., (1993). “Effect of Intermittent Exposure to Sunlight on Melanoma Risk Among Indoor Workers and Sun-Sensitive Individuals.” *Environmental Health Perspective*, 1993; 101.

<sup>23</sup> Linos, E. et al. (2009). “Increasing burden of melanoma in the United States.” *Journal of Investigative Dermatology*, 2009; 129.

<sup>24</sup> Dennis, L., et al. (2008). “Sunburns and risk of cutaneous melanoma, does age matter: A comprehensive meta-analysis.” *Annals of Epidemiology*, August 2008; 18:8.

*government data, and overzealous sun avoidance is the only plausible explanation for the 50 percent increase in that figure in the past 15 years.”*

**Fact:** While sunlight exposure is a source of vitamin D production for humans,<sup>25</sup> it is not the only source. Vitamin D can be found naturally in tuna, salmon, egg yolks, sardines, Swiss cheese, pork, mushrooms, and beef liver and has been added to fortified cereals, milk, yogurt and margarine.<sup>26</sup> Additionally, vitamin D supplements are available to support adequate dietary vitamin D intake.<sup>27</sup>

From UV radiation, the main source of vitamin D production is exposure to ultraviolet B (UVB).<sup>28</sup> Most commercial tanning devices primarily emit ultraviolet A (UVA), which is relatively ineffective in stimulating vitamin D synthesis and has been linked to premature aging of the skin and skin cancer.<sup>29</sup>

**Indoor Tanning Industry:** *A “base tan” obtained by using indoor tanning devices has a protective effect from excessive sun exposure.”*

**Fact:** The presence of a tan, in any form, signifies DNA damage to the skin<sup>30</sup> and evidence from multiple studies simply does not support a protective effect of the use of indoor tanning beds against damage to the skin from subsequent sun exposure.<sup>31</sup>

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<sup>25</sup> Ginde, A, et al. (2009). “Demographic Differences and Trends of Vitamin D Insufficiency in the US Population, 1988-2004.” *Archives of Internal Medicine*, March 2009; 169:6.

<sup>26</sup> National Institutes of Health – Office of Dietary Supplements. (2011). “Vitamin D – Health Professional Fact Sheet.” Accessed on June 12, 2012 at <http://ods.od.nih.gov/factsheets/vitamind-HealthProfessional/>

<sup>27</sup> National Institutes of Health – Office of Dietary Supplements. (2011). “Vitamin D – Health Professional Fact Sheet.” Accessed on June 12, 2012 at <http://ods.od.nih.gov/factsheets/vitamind-HealthProfessional/>

<sup>28</sup> Bonevski, B. et al. (2012). “Prescribing sunshine: A cross-sectional survey of 500 Australian general practitioners; practices and attitudes about vitamin D.” *International Journal of Cancer*, 2012; 130.

<sup>29</sup> Woo, DK and Eide, M.J. (2010). “Tanning beds, skin cancer, and vitamin D: An examination of the scientific evidence and public health implications.” *Dermatological Therapy* 2010, Jan-Feb (1) 61-71.

<sup>30</sup> Brady, et al. (2012). “Public Health and the Tanning Bed Controversy.” *Journal of Clinical Oncology*; May 2012, Vol 30, No 14.

<sup>31</sup> Dore, J-F and Cignol, M-C. (2012). “Tanning salons and skin cancer.” *Photochemical and Photobiological Sciences*, 2012; 11:30.