Indoor Tanning Increases Melanoma Risk, Even in the Absence of a Sunburn

Recent data have shown that indoor tanning, even if not associated with burning, is a risk factor for developing melanoma (J Natl Cancer Inst. 2014;106:dju112).

People commonly say they use indoor tanning facilities to avoid sunburn, thinking that by not burning they are at a lower risk of developing skin cancer. Because this claim has not been substantiated, researchers set out to analyze whether indoor tanning was a risk factor independent of burning.

Study author Rachel Vogel, MD, a research fellow at the University of Minnesota Masonic Cancer Center in Minneapolis, and colleagues used data from the Skin Health Study conducted at their institution to gauge the risk factor of skin cancer associated with indoor tanning.

They found cases of cutaneous invasive melanoma diagnosed between 2004 and 2007 among patients aged 25 to 59 years via the Minnesota state cancer registry. A group of control subjects from the state’s list of driver’s license holders was selected by frequency matching to obtain the same age and sex distribution as the case patients. From the potential participants, 1167 patients and 1101 controls completed a questionnaire and telephone interview. Information regarding sun exposure, indoor tanning, sunscreen use, education, income, and family history was collected during the interviews.

To obtain information regarding the participants’ lifetime sunburns, investigators asked whether participants had a history of painful sunburn for over a day and added the number of such sunburns up for 2 time periods: before age 18 years and after. To obtain participants’ indoor sunburn history, individuals were asked how many times they had experienced a burn, if ever, from indoor tanning. Each participant was given a risk score for melanoma based on hair and eye color, as well as tanning ability. Participants with any history of a burn from indoor tanning were excluded.

The analytics sample included 1857 participants after it was restricted only to those who tanned indoors but never burned, and those who never tanned indoors. Multiple logistic regression models were used to calculate the association between melanoma and indoor tanning, stratified by the number of lifetime sunburns.

Among cases and controls, 57% said they had been sunburned 5 or more times over their life. Only approximately 5% reported never burning from the sun. Across all outdoor sunburn frequency categories, individuals who tanned indoors without burning had a higher risk of melanoma than those who did not tan indoors at all. Specifically, among participants who reported no lifetime sunburns, the odds of being an indoor tanner were nearly 4 times higher in those who were diagnosed with melanoma compared with control subjects without melanoma after adjusting for confounders (odds ratio, 3.87; P = .002).

The researchers also noted a decreased use of indoor tanning among those individuals who reported more lifetime sunburns. Furthermore, among patients who reported no outdoor sunburns, patients with melanoma started tanning at a younger age and reported the highest number of years and sessions of indoor tanning compared with control subjects in any other sunburn group.

J. Leonard Lichtenfeld, MD, deputy chief medical officer of the American Cancer Society in Atlanta, Georgia, says this is an intriguing part of the data. “The group of patients without the major risk factor for melanoma of outdoor sunburns had the highest use of indoor tanning, and coincidentally, highest odds ratio of developing melanoma,” he points out.

“Bottom line, tanning indoors in a manner that does not result in burns substantially increases the risk of melanoma, making tanning booths dangerous,” says DeAnn Lazovich, PhD, corresponding author and associate professor and program coleader of prevention and etiology of the Masonic Cancer Center at the University of Minnesota in Minneapolis.
Limitations and Implications
The authors of the study state that the main limitation was the small sample size after stratification. In addition, being a survey/interview-based case-control study, there is the potential for recall bias among participants.

The researchers stated that indoor tanning without burning still increases the risk of melanoma because tanning is a response to DNA damage from ultraviolet (UV) radiation and burning is not necessary for this damage to occur. In addition, tanning without burning may allow for more exposure to UV radiation. This may happen with indoor tanning because although sunlight contains UVA and UVB radiation, with UVB causing burning, indoor tanning delivers a predominance of UVA radiation, thus delivering potentially more radiation without burning (Photochem Photobiol Sci. 2011;10:1129-1136).

It is conceivable that the results were confounded by individuals at a higher risk of melanoma based on inherited characteristics being more likely to use indoor tanning to avoid sunburns. This may have made it appear as though indoor tanning was the risk factor, but the data examining all subjects across sunburn categories do not support this conclusion.

Dr. Lazovich says researchers must use data from this study and other similar ones to try to convince people, young women in particular, to avoid indoor tanning. “Whereas the incidence of all other major cancers is thankfully declining, melanoma is one of the few preventable cancers that is continuing to increase in incidence,” she notes. “In addition, it is the second most common cancer among young non-Hispanic women, the demographic most likely to use indoor tanning.”

“As we follow this group of people using indoor tanning devices, will we see a significant increase in melanoma incidence and deaths?” asks Dr. Lichtenfeld. “We do not want to be missing the early signals of a more significant problem that will emerge over the next several decades. The results of this study and other recent epidemiologic data are pointing in that direction.”

The study authors contend that their study adds to the available literature regarding indoor tanning and establishes that indoor tanning exposure increases melanoma risk despite not causing a burn. Educating the public with this information is important, they add, and several recent factors may help to initiate more public awareness programs.

“A number of states are putting laws in place to prohibit minors from tanning indoors and this is causing some publicity,” says Dr Lazovich. “The CDC [Centers for Disease Control and Prevention] put out a call for research projects to develop messages for young adults regarding skin cancer prevention, and in July of 2014, the US Surgeons General’s Office issued a ‘call to action’ on skin cancer. Hopefully, these will result in more public health initiatives to counter false impressions that indoor tanning is safer.”

“The speed of the legislation to regulate indoor tanning use in people under the age of 18 has been impressive, with at least 41 states and the District of Columbia having some regulation and 8 states banning it outright,” adds Dr. Lichtenfeld. “There is momentum to put restrictions on indoor tanning; however, its use remains high, so our message that it is dangerous is not resonating as clearly as we would like.”

doi: 10.3322/caac.21248