

Basal Cell Carcinoma: New Concerns About Incidence, Gender and Indoor Tanning

In This Issue

The incidence of basal cell carcinoma (BCC) has increased dramatically in recent decades and has been called an epidemic by experts and researchers around the world. In the U.S., it is difficult to track statistics on BCC, the most common skin cancer, as it is not reported to cancer registries. The estimated numbers are staggering, however, with about 4.3 million cases each year in the U.S.

Even in countries that do report BCCs, some researchers feel that their incidence may be underreported, especially in patients who have had more than one. In addition, patients may not take these cancers seriously or follow through promptly on recommended treatments, assuming that the health risk that BCCs pose is minimal.

The vast majority of BCCs are associated with exposure to ultraviolet (UV) radiation from the sun. UVB rays (from 290 to 320 nm on the electromagnetic spectrum) cause sunburn and damage to DNA in skin cells. UVA rays (the slightly longer wavelengths from 320 to 400 nm) cause tanning and premature signs of aging, and also contribute to skin cancer. Indoor tanning, which uses intense, artificial forms of UVA and UVB radiation, is linked to as many as 245,000 BCCs each year in the U.S. In fact, any history of indoor tanning raises the risk of developing BCC before age 40 by 69 percent.

For decades The Skin Cancer Foundation has worked to educate the public about the dangers of sun exposure and indoor tanning as well as the seriousness of all types of skin cancer. One of the reasons the Foundation created *Carcinomas & Keratoses* is to provide tools for medical professionals to talk to their patients about the *nonmelanoma* skin cancers such as BCC and why they should take them seriously.



Born and raised in Iceland, dermatology resident Jónas Aðalsteinsson, MD, has a unique perspective on BCC research. He graduated from medical school at the University of Iceland before becoming a research fellow in the Mount Sinai Department of Dermatology in New York City in 2017. [His study](#) was published in the February 2020 *British Journal of Dermatology*.

Dr. Aðalsteinsson talked with Désirée Ratner, MD, our *C&K* editor-in-chief who is also an author of the study, and Julie Bain, The Skin Cancer Foundation's senior director of science & education, to share insights on incidence, gender differences and the association between BCC and indoor tanning in a population with a long time frame of well-reported data.

The Feature

The Public Health Burden of Basal Cell Carcinoma (BCC) Is Underestimated — and Increasing

Julie Bain: What motivated you to look into incidence rates and trends in BCC in your home country?

Jónas Aðalsteinsson, MD: My mentor Dr. Jonathan Ungar, an assistant professor of dermatology at Mount Sinai, and I thought it might be a good idea to start up a project that would look at skin cancers in Iceland. A lot of national cancer databases throughout the world don't record basal cell carcinoma as a part of their database, but Iceland is an exception.

The Icelandic Cancer Registry has recorded every case of BCC since 1981. We knew that the documentation there was excellent and would be a valuable addition to the literature. It's a small country where it's easy to obtain all that information without a loss of follow-up. I knew that Dr. Ratner was a go-to expert on the topic, so I contacted her and asked if she was willing to participate in such a project.

Désirée Ratner, MD: Jónas came to me and suggested that we look at the Icelandic database and see what we would find. We weren't looking for any particular outcomes but hoped that whatever trends emerged might help us to understand BCC in new ways.

JB: What did you learn from this study?

JA: To start with, we saw a dramatic increase in BCC incidence between 1981 and 2017, and about a three- to four-fold increase in BCC during that time period among women, especially young women. This is actually the first whole population study showing a significantly higher BCC incidence in women than in men. If you look, for example, at the southern United States and especially in Australia, men tend to have almost double the risk for BCC, but we're seeing the opposite in Iceland.

Secondly, many BCCs in Iceland were reported on the trunk and legs, which means that there was an increased incidence in anatomic areas not usually exposed to natural UV radiation. Reykjavík, Iceland's capital, has a high proportion of cloudy days and the lowest overall ultraviolet index (UVI) of all capitals in the world. It's cold there, so people don't walk around in light clothing. We're usually covered from head to toe.

Still, we were seeing large numbers of these cancers, especially on the legs and trunk of young women. This trend is unlikely to be solely the result of outdoor tanning behavior in Iceland. While we did not start out looking for an association between BCC incidence and the use of

tanning beds, not much else could explain the trends that we saw and why they were seen mainly in women.

Studies have shown that 70 percent of women and 35 percent of men in Iceland have used a tanning bed in their lifetime. About 50 percent of teenage girls there have used tanning beds, compared with 25 to 30 percent of teenage boys. I remember when I was in high school, most of my friends were using tanning beds, which is very concerning because it appears that such exposure at a young age might exponentially increase BCC risk at a later age.

Other factors that might explain the elevated BCC risk in this population are increased travel abroad and also greater skin cancer awareness. But those factors cannot explain away the anatomical distribution of these tumors and the gender differences. So we think that tanning beds are likely to have played a significant part.

JB: Why does it seem like there is a lack of awareness about the risk of BCC and nonmelanoma skin cancers in general with indoor tanning? Perhaps because more mainstream media stories are written about young women who used tanning beds and then developed dangerous melanoma?

DR: I think it's because people get so many more nonmelanoma skin cancers than melanomas, and these lesions don't frighten or motivate people the same way because their metastatic potential is much lower than that of melanoma. While we know that most BCCs are caused by the sun, indoor tanning and other radiation exposures can also play a significant role. They're just not talked about as much.

With my own patients, if I ask someone who has developed a skin cancer before the age of 35, probably 60 to 70 percent of the time they'll admit to tanning bed use in addition to significant sun exposure. Most of the young women whom I've treated for melanomas, and by young I mean women in their 20s or 30s, typically went to tanning beds in high school. They know they shouldn't be doing that now. And after they get their first skin cancer, they definitely get the message that they have to be monitored very closely going forward.

JB: Is it possible that BCCs develop more slowly after tanning bed use than melanomas do?

JA: These two types of tumors seems to differ in their response to tanning beds. A [2010 study](#) in the Icelandic population demonstrated a rapid increase in truncal melanoma incidence in women after 1992. This was attributed, at least in part, to the use of tanning beds. In that same study, there was a large decrease in melanoma incidence after 2001, which was attributed to population-wide attitudinal efforts *against* the use of tanning beds. Before this drop was noted, there had been a huge decrease in Iceland in the number of tanning salons.

Unfortunately, we're not seeing the same trends with BCC, whose incidence just keeps going up. UVA exposure from tanning beds could perhaps be having a more immediate effect on increasing melanoma risk, as you mentioned, and it's possible that those effects might be less significant two to three years after exposure. However, this may not be true for BCC. Perhaps tanning exposure has a more prolonged latency in its effect on later BCC development.

DR: Mechanistically, we don't know how to explain this yet. However, a [June 2020 study](#) at the University of Washington School of Medicine in Seattle identified a type of UV-induced DNA

lesion that may promote mutations that lead to skin cancer. When these UV-induced lesions arise, they stimulate a response called the ATR pathway, which regulates DNA repair in damaged cells, allowing them to survive. When these cells survive, their UV-induced mutations continue to accumulate, probably leading to skin cancer. At some point I think we'll know which photoproducts specifically predispose to melanoma as opposed to nonmelanoma skin cancer. We're not there yet, but this will be very interesting research to watch.

JB: Many tanning salons claim their tanning beds use UVA light to tan skin without burning. Yet a [report in 2016](#) looked at Twitter and found 15,000 tweets about burns from indoor tanning. Doesn't that suggest that tanning beds emit some UVB radiation, which mainly causes sunburn, as well?

JA: Yes, some tanning devices use UVB, but in many cases we don't know the exact percentages. I would like to emphasize that it's important for patients to realize that indoor tanning is different from tanning outside. Both are bad. But we're seeing evidence that indoor tanning may be worse. It seems that the UVA percentage and intensity is a lot higher in tanning beds as compared to that from sunlight, and that is probably what is making them much more unsafe — and may be the driving factor behind increasing rates of nonmelanoma skin cancer.

DR: I think the problem is the concentration of UV that you get in a tanning bed. In day to day life, you don't get that much concentrated UV in a short period of time, but tanning beds radiate short bursts of highly concentrated UV — which is probably what's leading to accelerated skin aging as well as increased skin cancer risk.

JA: I think it's also important to counsel patients about the ocular risks of tanning, like keratitis, cataracts and possibly ocular melanoma. Because I think many patients are not using the protective eye covering they get at tanning salons.

JB: How can dermatologists use social media more effectively to reach young people on the dangers of tanning?

JA: I have shared one campaign video made to raise skin cancer awareness on social media, and I think it probably had some impact on people that I know. With social media what it is today, I think it is a necessary tool and we should be using it much more to reach out, especially on Instagram. I definitely think there is potential there.

JB: How do you convince patients that BCC can be a big deal?

DR: Patients who have what seems to be a small nonmelanoma skin cancer on their nose or forehead often ask me, "What if I just leave it alone?" I answer that what they don't realize is if you leave them for long enough, these lesions become very large and eat right through the tissue. They can become so invasive that I have to take off whole noses, whole ears and whole eyelids. I tell patients that BCCs are potentially very destructive tumors, but when they are treated early, they are more of a nuisance than anything else.

JB: How many of your patients who have had skin cancers still desire to be tan?

DR: It doesn't happen as much as it used to. I see probably a couple of people a month with a pathological desire to be tanned. I definitely see fewer younger people now who feel that way. Most people are embarrassed if they come in with a sunburn or a deep tan these days, because they're aware of the association with sun damage.

JB: Does the message that avoiding any kind of tanning and using daily sun protection comes with antiaging benefits motivate patients, too?

JA: I think so, especially with young women. I feel like they care about that more than the young men do. I also think younger individuals who have a relative or somebody they know who has gone through the process of having a BCC or cutaneous squamous cell carcinoma (cSCC) and has had to undergo one or multiple surgeries have witnessed the potential morbidity firsthand. For those who have no history of skin cancer or relatives with skin cancer, it might be much more difficult to convince them to adopt UV-protective behavior.

Editor's View



Désirée Ratner, MD

Editor-in-Chief, *Carcinomas & Keratoses*

Why We Must Continue to Raise Awareness About Nonmelanoma Skin Cancers

We've all been experiencing the ramifications of the worldwide pandemic over the past several months. While many of us were unable to see patients, or did telehealth from home, The Skin Cancer

Foundation staff continued its mission remotely, working to educate the public and the medical community about the ongoing epidemic of skin cancer. In the United States alone, the most recent estimate is that more than 5.4 million cases of nonmelanoma skin cancer were treated in a single year in over 3.3 million people — and that was in 2012. There are indications, however, that the worldwide incidence may be even greater than previously projected.

For one thing, we know that people diagnosed for the first time with a BCC or cSCC have a better than 50:50 chance of developing another one. A [2015 study](#) in *JAMA Dermatology* from UCSF showed that about 60 percent of people developing one keratinocyte carcinoma will be diagnosed with a second within 10 years. Those diagnosed with a second one, or any other multiple, have a 61.5 percent chance of developing another within the following *two* years. While the implications of these odds are staggering, most cancer registries do not include BCC or cSCC in their data, which is yet another problem.

Also in 2012, another [JAMA Derm study](#) analyzed four European population-based cancer registries that did routinely record BCCs to determine the degree of skin cancer underreporting, which occurs because these registries only collect information on first histologically confirmed primary BCCs, but not subsequent lesions. Patients with multiple BCCs at the time of diagnosis, or tumors treated without obtaining a biopsy first, therefore remain uncounted. The authors found at least 30 percent more patients with histologically confirmed BCC than were officially

accounted for and estimated that 40 to 100 percent more BCCs were diagnosed per calendar year than were formally registered. This study concluded that BCC incidence rates in these registries should be multiplied by 1.3 to provide a conservative estimate of the total number of BCCs diagnosed in a given year. Again, it can be inferred that the worldwide health-care burden of BCC is greater than we believe it to be.

These statistics set the stage for this latest issue of *Carcinomas & Keratoses*, which focuses on the epidemiology of skin cancer. While it is tempting to assume that increased skin cancer rates result only from sun exposure, other sources of radiation now play a significant role. Dr. Jónas Aðalsteinsson, who is interviewed in this issue, analyzed skin cancer rates in Iceland and found that its rising BCC incidence, particularly in women, could not be attributed to sun exposure alone, as Iceland is a country with limited UV radiation. The most likely explanation was that tanning bed use, as well as increasing travel abroad, accounted for the jump. Given that tanning beds can now be found around the world, BCC is poised to become an even more significant public health problem. The database in Iceland also registers cases of cSCC, another ongoing research area for Dr. Aðalsteinsson and his group. Although their analysis is not yet complete, it seems likely that cSCC incidence in Iceland will show an increase as well.

These troubling data underscore the need for The Skin Cancer Foundation's continued efforts to educate the public and the medical community about the risks of tanning beds and the link between UV radiation and skin cancer. We must also focus our educational efforts to ensure that patients with a history of tanning bed use, who may be at even higher risk for skin cancer than patients with a history of excessive sun exposure, receive close follow-up to detect new skin cancers as early as possible and maximize their chance of cure.

With that in mind, I hope that you enjoy this issue. More importantly, I hope that you remain safe and healthy, and that you also get a much-needed chance to relax over the summer.

Takeaway for Your Patients

- In the U.S. and many other countries, basal cell carcinoma (BCC), the most common type of skin cancer, is not reported to cancer registries. This makes it difficult to track the statistics.
- The estimated numbers of BCC are staggering, with at least 4.3 million cases each year in the U.S.
- Even in countries that do report BCCs, some researchers feel that their incidence may be underreported, especially in patients who have had more than one.
- Research suggests that BCC incidence rates should be multiplied by 1.3 to provide a conservative estimate of the total number of BCCs diagnosed in a given year.
- Indoor tanning may be even more dangerous than tanning outside. The UVA percentage and intensity in tanning beds may be the driving factor behind increasing rates of nonmelanoma skin cancer.
- Patients may not take BCCs seriously or follow through promptly on recommended treatments, assuming that the health risk that they pose is minimal.

Additional Resources

See SkinCancer.org for our thorough, patient-friendly information on basal cell carcinoma (BCC): <https://www.skincancer.org/skin-cancer-information/basal-cell-carcinoma/>

Learn more on the prevalence of indoor tanning:
<https://jamanetwork.com/journals/jamadermatology/fullarticle/1818976>

Read more about the new research on a UV skin cancer trigger:
<https://www.dermatologytimes.com/view/scientists-identify-uv-skin-cancer-trigger>

Teens, Tweets, and Tanning Beds: Rethinking the Use of Social Media for Skin Cancer Prevention:
<https://pubmed.ncbi.nlm.nih.gov/28818251/>