Not So Sunny

Thinking of getting a tan this summer? Not so fast! Tanning (and burning) can lead to skin cancer. Read on to learn the latest in treatment and prevention from the co-directors of UA’s Skin Cancer Institute.

When you come back from a vacation with a tan, your friends and coworkers often exclaim over how healthy and well rested you appear. What they should do is worry about you! For many years now, a tan has been seen as so desirable that people courted sun overexposure in search of that golden glow. But in case you’ve been under a rock for the last few decades, science has proven that ultraviolet (UV) radiation from the sun or indoor tanning devices can cause skin cancer. In the simplest of terms, the tanner or more sunburned you are, the more damage you have done to your skin. As a matter of fact, 95 percent of skin cancer cases can be correlated with UV exposure. That data is even stronger than the correlation between smoking and lung cancer!

Science, Stats and the Skin Cancer Institute

According to the 2014 Surgeon General’s Call to Action to Prevent Skin Cancer, “UV radiation is a type of electromagnetic radiation emitted by the sun and from some man-made lights, with wavelengths longer than X-rays but shorter than visible light. UV exposure can cause sunburn and stimulates melanocytes (cells in the skin) to create melanin, often resulting in a tan, both of which indicate overexposure and damage to the skin cells and their DNA. This damage can lead to cancer. The degree to which UV exposure increases a person’s risk of skin cancer depends on many factors, such as individual skin type, the amount and types of sun protection used, whether exposure is constant or intermittent, and the age at which the exposure occurs. By

BY ANNE KELLOGG
PORTRAITS BY TOM SPITZ
reducing intentional UV exposure and increasing sun protection, many skin cancer cases can be prevented.”

Each year in the United States, nearly 5 million people are treated for all skin cancers combined, with an annual cost estimated at $8.1 billion (with melanoma accounting for about $3.3 billion of that). Melanoma is responsible for the most deaths of all skin cancers, with nearly 9,000 people dying from it each year. Melanoma also is one of the most common types of cancer among U.S. adolescents and young adults. Sunburns in childhood are a clear risk factor for skin cancers later in life. Building healthy habits early, when children are more receptive, can lead to increased protective behaviors during adulthood.

In the early 2000s, Arizona was second only to Australia in the number of cases of non-melanoma skin cancer diagnosed each year. Dr. David S. Alberts, the former Arizona Cancer Center Director, had set a goal of establishing the University of Arizona and the Arizona Cancer Center as the number one academic institution in the fight against skin cancer.

In 2005, The University of Arizona Cancer Center received a $400,000 donation from the Bert W. Martin Foundation to help establish the Skin Cancer Institute. A second generous donation from the Martin Foundation provided more funding for the Institute’s activities.

In a statement released to the press when the Skin Cancer Institute was formally established, Dr. Alberts stated, “The long-term vision for the Skin Cancer Institute is to serve as the model for community-based skin cancer research and care in the United States.”

Along with Dr. Alberts and Dr. Harris, dermatologist researcher Clara Curiel, M.D., oncologist Lee Cranmer, MD, surgical oncologist James Warneke, M.D., behavioral scientist Lois Loescher, Ph.D., RN, and others worked to create a “one-stop shopping” model for their Multidisciplinary Cutaneous Oncology Program.

Today, the UA Cancer Center’s Skin Cancer Institute (SCI) houses experts in Patient Care, Research & Evaluation, Education and Community Outreach. These individuals are collaborating to help make skin cancers a thing of the past.

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— Clara Curiel, M.D., Co-Director, UA Cancer Center’s Skin Cancer Institute
The SCI’s co-directors each oversee two of the four departments — Dr. Clara Curiel’s role is to establish and foster research activities related to the skin cancer field across multiple disciplines, and across basic science and clinical projects.

Dr. Harris’ research interests focus on causes and prevention of cancer, with a primary emphasis on skin cancer prevention and environmental health disparities.

**Diagnosis and Treatment**
Clara Curiel-Lewandrowski, M.D., is a Professor and Vice-chair of Dermatology for the University of Arizona College of Medicine. She holds joint roles as the Director of the Multidisciplinary

**Cutaneous Oncology Program and Clinical Director for UA’s SCI. She also is the Director of the Pigmented Lesion Clinic, and a member of the University of Arizona Cancer Center.**

“When you think about it, out of all cancers, skin cancer is the one that truly can be prevented,” Dr. Curiel emphasizes. “It’s a no-brainer — with fair skin, you know if you go out there and burn a few times, you’re going to see that coming back to you. It’s completely predictable. When you take a closer look at the nucleus of skin cancer cells, you can find the UV ‘signatures’ on those cells in the DNA.

“Not only do you have to consider the impact of these cancers on the individual from the mortality and morbidity of treatment perspective, but also the morbidity and cost of the procedures to reach a diagnosis,” Dr. Curiel adds. “We are working on a systematic review to understand how many biopsies are currently performed to diagnose one melanoma. The results indicate that it can take an average of about 20 to 30! When screening patients for skin cancer, the medical provider needs to identify those lesions that appear suspicious. However, it is not a black-and-white situation. Depending on the type of skin cancer, lesions can present in many different ways, which is a challenge for accurate distinction from benign skin lesions.”

In searching for novel ways to find and diagnose skin cancers, Dr. Curiel has worked with other partners at the University of Arizona, especially the College of Optical Sciences (COs) and the Bio5 Institute.

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— Robin Harris, Ph.D., MPH, Co-Director, UA Cancer Center’s Skin Cancer Institute

Robin Harris, Ph.D. MPH
"A fascinating instrument initially developed at Wellman Laboratories of Photomedicine in Boston is the in vivo reflectance confocal microscope, which is literally a 'Live Microscope.' It can be placed on top of the skin to visualize all of the skin's layers, just like a live biopsy," Dr. Curiel says. "This technology has been out for a while, but now Dr. Kang — a collaborator in COS — has developed a mobile version of it, and we are working on making a pocket-size device to test in the clinic and eventually deploy it in the community.

"Another new technology is photacoacoustics — using sound and imaging together to visualize deeper structures in the skin and to provide potential biological information. We're hitting the skin cancer diagnosis challenge from all angles.

"Regarding skin cancer treatments, it is a fast-moving field with immunotherapy leading the current wave in innovation and effectiveness. In comparison to five years ago, it is remarkable how many new options we have available to treat advanced melanoma and other high-risk skin cancers. This breakthrough in immunotherapy has revolutionized the way we treat not only melanoma but other cancers such as lung, colon and renal cancers to name a few."

Immunotherapy refers to a treatment modality that typically can work through one of two mechanisms. It either can unmask the cancer cells and allow the immune system to recognize it as a target, or it can strengthen the immune system by recruiting additional immune cells into the fight against the cancer cells.

"Not long ago the standard of melanoma initial treatment was to remove the tumor and perhaps the adjacent lymph nodes if there were signs of metastases," Dr. Curiel continues. "The patient was then considered to be in remission — no evidence of disease. In order to decrease the chance of recurrence we then would use immunotherapy to prevent the disease from coming back, which we referred to as 'adjvant therapy.' While the immunotherapy drug we used for almost two decades, interferon, only provided a marginal benefit, it pointed us in the right direction to continue to investigate the role of immunotherapy in melanoma. Now we have in the market and in clinical trials extremely effective immunotherapeutic options for treatment of metastatic disease and in the adjuvant therapeutic setting. A recent release of the 2019 Cancer Fact Statistics indicates that the number of melanoma deaths is expected to decrease by 22 percent this year. This is a clear reflection of how effective the new immunotherapeutic and other targeted therapies are in treating melanoma.

"We envision immunotherapy to go even further. We can give the patient immunotherapy prior to the first surgery to see if we can awaken and/or strengthen the immune system before we remove the melanoma. If the tumor goes away, great! If not, we surgically remove it. Our new thinking is, 'How early in the disease can we administer immunotherapy?' It is a true paradigm shift that will significantly change the way we treat melanoma and other cancers. One question we have is whether it makes more sense to deliver immunotherapy systemically or directly into the tumor. The beauty of skin is you can go back as many times as you need to re-inject and measure the response because the skin is so accessible.

"The team at the Cutaneous Oncology Program at the Skin Cancer Institute has been engaged in the development and testing of several of the already FDA-approved immunotherapy and checkpoint inhibitors. Even more importantly, we continue to carry on cutting-edge translational research to identify innovative ways to treat skin cancer in a way that is highly effective, minimally invasive, and with an acceptable side-effect profile."

According to Dr. Curiel, one of the problems they have when trying to assess the incidence and prevalence of skin cancer is that, "Compared to other cancers, we don't really have a good understanding of how many skin cancers are diagnosed. Melanoma is the only one that is required to be reported to the state cancer registries, but it only accounts for around 4 percent of all skin cancers. In Australia, which once had the highest skin cancer numbers of any country, we've seen a decrease of skin cancer incidence rates. We attribute this to their vigorous education and prevention programs. It takes a long time to see the effects of those programs. In contrast, our more recent statistics in the U.S. estimate that the number of new melanoma cases diagnosed in 2019 will increase by 7.7 percent. This news highlights the discrepancy between prevention and treatment, with fewer people dying from melanoma but many more diagnosed with the disease. This is particularly troublesome because, as already mentioned, this is the one cancer we could effectively prevent if appropriate programmatic education is implemented."

**Education and Prevention**

Robin Harris, Ph.D., MPH, is Professor of Epidemiology in the Mel and Enid Zuckerman College of Public Health, member of the UA Cancer Center and co-director of the Skin Cancer Institute.

"I started at the University of Arizona in 1995 as a principal investigator on two projects, one of which was about risk factors associated with squamous cell carcinoma (SCC), which now is called a keratinocyte carcinoma," says Dr. Harris. "At one time, there was a registry to track skin cancers in Southeastern Arizona. For our study, we sent some people out to check in with dermatologists' offices in our region to determine how much nonmelanoma skin cancer there was, and recruit them into the study. One of the problems we discovered was that, in general, melanoma is a reportable disease in all cancer registries in the United States and throughout the world. However, the nonmelanoma cancers such as basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) were not reportable, so we didn't have a definitive view of the incidence. Even though they're not as lethal as melanoma, these cancers are a big driver of health care costs, to say nothing of how disfiguring and unpleasant they are to experience. We needed to figure out the severity of the problem."

Dr. Harris is quick to note how complicated the epidemiology of skin cancer rates in Arizona can be. First, factor ▶
in the snowbirds, who only live here part of the year. Then, in trying to create a statistical model, one has to consider the many different ethnicities of Arizonans, all of whom have different skin tones and therefore different responses to UV light.

Around 2012-13, I had a student get information from the Arizona Cancer Registry, and up until 2003, the melanoma incidence rate was a little higher than the rest of the United States, but in 2003 it dramatically dropped. We thought there could be two reasons: either Arizonans were taking better care of their skin, or that somehow the cases weren’t being reported — that something was going wrong with the way the data was being collected.

At that same time, local dermatologist Nancy Silvis, M.D., came to talk with Dr. Curiel and I, and said, “We’ve been seeing a lot of melanomas in our office, shouldn’t there be a registry?” I said, “There is a registry in the state of Arizona,” but still there was underreporting. We’d discovered a substantial problem.

“To help rectify this loss of data, the Skin Cancer Institute brought together local dermatologists and the Arizona Cancer Registry and formed the Arizona Melanoma Task Force. In 2012, a number of dermatologists in Tucson and Phoenix went back in their records for the year 2009 to see how many melanomas they’d had. They sent that data to the Arizona Cancer Registry to see if they also were listed there, but most were not.

“We discovered there was about a 72 percent underreporting of melanoma cases! The most invasive ones were reported, but not those in the earliest stages.

“We looked to see where the barriers to reporting were, and addressed each one with the Cancer Registry. The dermatopathologists suggested that messaging be placed on pathology reports, stating, ‘Melanoma is a reportable disease: here’s where you go to fill out the information.’

Getting the skin cancer prevention message out to younger generations can be challenging, so SCI developed a program in a UA class called SASS, which stands for Students are Sun Safe.

“We train undergrad and graduate students to go out and act as peer health educators. They will take a class on skin cancer, how to prevent it, and how to talk with community members. We’ve prepared a one-hour class for them to take into schools. They’ll do an interactive Power Point presentation with a series of hands-on activities about the sun. That’s been going on for about eight years, and has received very high marks. Each semester we go to 15 classrooms, reaching 500 or so kids. The UA students also go to community events and hand out messaging, especially at health fairs.”

The Skin Cancer Institute’s educational message on prevention of this disease can be summed up by the acronym ACE:

A = Avoid — stay out of the sun as much as possible between 10 a.m. and 4 p.m. when the sun is strongest. When you are outside, seek shade. Avoid tans and burns from the sun and tanning beds as well.

C = Cover Up — wear clothing to cover your skin, including long sleeves, pants, a hat with a wide brim (bell caps are not adequate!), and sunglasses. Apply sunscreen if you can’t do the other things — or in addition to the other methods.

E = Examine — check your skin for any new or changing spots because skin cancer is easier to treat if it’s detected early.

“We have a program called ‘Protect Your Skin,’ where we’re trying to get sunscreen dispensers and signage placed in facilities where a lot of time is spent outside. When we first started, the donor for the project also was a donor to the Arizona-Sonora Desert Museum, so we encouraged the museum to put up sunscreen stations. They are well-maintained and have gotten terrific feedback from their visitors. We’re trying to get more businesses and organizations in the community interested in putting up sunscreen stations. We’ve even got mobile versions that we can rent out” TL.