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The Truth about Tanning

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Welcome to Yale Cancer Center Answers with Dr. Francine Foss and Dr. Lynn Wilson. Dr. Foss is a Professor of Medical Oncology and Dermatology, specializing in the treatment of lymphomas. Dr. Wilson is a Professor of Therapeutic Radiology and an expert in the use of radiation to treat lung cancers and cutaneous lymphomas. If you would like to join the conversation, you can contact the doctors directly. The address is canceranswers@yale.edu and the phone number is 1-888-234-4YCC. This week, Francine welcomes Dr. Susan Mayne, Dr. Leah Ferrucci, and Dr. David Leffell. Dr. Leffell is David P. Smith Professor of Dermatology and Professor of Otolaryngology and Plastic Surgery and Section Chief of Dermatologic Surgery, and Cutaneous Oncology at Yale School of Medicine. Dr. Ferrucci is a Post-Doc at the Yale School of Public Health, and Dr. Mayne is a Professor of Epidemiology, Associate Director of Populations Sciences and Division Head of Chronic Disease in Epidemiology. Here is Francine Foss.

Foss We have a mixed group of people here to talk with us today and I want to briefly introduce David who is a clinician and takes care of patients primarily with skin cancer and then the other members of the team are actually in the field of epidemiology. Epidemiology may not be as familiar to our listeners as what we do as medical physicians, so Susan, could you briefly tell us a little bit about what an epidemiologist is and the role you play in human diseases, particularly in the context of our patients?

Mayne Epidemiologists are oftentimes referred to as disease detectives, and that is, our real job is to try to figure out why people get diseases and why people might not be getting these diseases. So, we do lots of different study designs, we generally interview lots and lots of people about their lifestyles, and we track who goes on to get various cancers and things like that and then we compare our results to people who do not get those cancers. Sometimes we use self-reported data, sometimes we use biochemical samples, but in general our purpose is to look at what is causing cancer in human populations.

Foss David, as a researcher and a clinician, could you pipe in a little bit about the importance of what Susan and her group do?

Leffell It is critical. As a physician taking care of patients we really function on the retail level, if you will, and that we take care of patients one at a time, but it does not give us the opportunity to understand the big picture when it comes to, in this case, skin cancer. So what our colleagues in epidemiology do is marshal different strategies to look at whole populations and, as Susan mentioned, to detect certain patterns that can help us better understand the cause of the disease and if you understand the cause of the disease, you can be better positioned to treat it in a preventive fashion.

Foss David, we are here today to talk about this pivotal paper, this tanning study that was done. I would like to start off by having you tell our audience what the different types of skin cancer are.

Leffell There are three main types of skin cancer, basal cell cancer is the most common, and in fact is the

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most common cancer in humans' worldwide. It is caused by ultraviolet radiation from the sun in almost all cases. Squamous cell cancer is a cousin of basal cell cancer. It is also a skin cancer caused in most cases by ultraviolet radiation from the sun, and then the third type of skin cancer, one that your listeners are familiar with I am sure, is melanoma, and melanoma in many cases is caused by the sun, but not in all cases. Today, we are going to talking about basal cell cancer.

Foss You mentioned a couple of things that are risk factors for developing skin cancer, you mentioned ultraviolet light exposure. Are there other risk factors as well that our audience should be aware of?

Leffell Certainly light colored hair, and grey, green, or blue eye color, a family history of skin cancer, occupational history, and these are things that Leah and Susan can talk more about because they played a critical role in the research that's being discussed. I think that in general people that tend to burn in the sun before they tan are at greatest risk.

Foss Susan, did you want to elaborate on any of those risk factors and some of the work that you have done?

Mayne The only thing I would say is it is true that people who have the fairest skin are at the greatest risk, but in our study that we will be talking about shortly, we had people without fair skin who were still getting basal cell carcinoma, so it is certainly true that they are at higher risk, but I do not think people should be misled into thinking that because they have skin that tans that they do not get basal cell carcinoma, because that was not the case in our study.

Foss And what about African American and other dark skinned populations? Are they at the same kind of risk?

Mayne Because they have darker skin they are at a much, much lower risk for skin cancer in general, but having said that, we even had a couple of individuals in our study who were African American that had basal cell carcinoma. And these people obviously had other genetic backgrounds. They were not one hundred percent African American, but it still can happen and that is our message that people should not necessarily feel that they are not at risk because they have darker skin.

Leffell I think Susan makes a very important point, here in Connecticut there are many people that are of Mediterranean ancestry and they think that if they have Italian background or other darker skinned, olive skinned background, they get a free pass. We know from our clinical experience that is not the case at all, you can get enough ultraviolet exposure from sun or from artificial sources to overcome any built in protection your skin might provide.

Foss Are there any specific genetic factors David, that would predispose patients?

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- Leffell Back in 1996, a team that was led by Allen Bale here at Yale discovered the patched gene and the patched gene was the first gene identified as a cause of skin cancer.
- Foss How does a patient know whether they have this gene and if this is something we should be screening for?
- Leffell Studies that we did subsequently showed that about 70% of the population that has basal cell cancer has a mutation in that gene, so to a certain degree this gene is more of a marker really for environmental impact which we understand quite well and it is not really one of the genes that we would test for.
- Foss Many people in the audience, and I am sure a lot of people that you see have these various skin lesions. How does a patient know if they have a cancer, when should they be worried and how do you make the diagnosis?
- Leffell Skin cancer can present in many different ways, but the classic appearance is a small bump that has a pearly quality to it with blood vessels running through it. I'd say that is a classic appearance, that is a textbook appearance, but then you can ask me how many times do we actually see the textbook appearance, not as often as you see a growth that bleeds, heals up, and comes back and that is probably the way in which patients most frequently identify the skin cancer, as a sore that does not heal.
- Foss And the diagnosis is made by a skin biopsy?
- Leffell The diagnosis can only made by a biopsy, which is a simple office procedure performed under local anesthetic.
- Foss Are most of the biopsies done in the dermatologist office? What can a patient expect when getting a biopsy say by a primary care doctor or by another type of a physician?
- Leffell Statistically the vast majority of skin cancers in this country are biopsied by a dermatologist, a smaller percent increasingly are biopsied by primary care physicians and health care providers and as long as the clinical diagnosis is correct, in other words as long as their decision to make a biopsy is warranted based on what they see on the patient, the procedure is simple and of very low risk.
- Foss So once the patient has a biopsy what is the next step?
- Leffell Let's say for example that the biopsy proves that it is a basal cell cancer, there are any number of treatments that can be performed to get an effective cure of the lesion and they range from a simple

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scraping and burning in the dermatologist's office to removal by excision to a specialized technique called the Moh's surgery technique, which is reserved for facial lesions and complicated lesions.

Foss Can you tell us a little bit about what actually led up to your current research in this area?

Mayne We got interested in this after talking to some of our dermatologists and in terms of trends, we track melanoma trends nationally and we have seen this increase in melanoma nationally especially in young people and especially in young women, and in speaking to our dermatologic colleagues like Dr. Leffell, they were also reporting increases in basal cell carcinomas occurring in their practices especially in young women. Whereas in the past basal cell carcinomas really were not that common in young people, they were seeing more and more cases. So along with the trends in melanoma we started to wonder why these cancers may be going up. When you see rapid changes in incidence of a cancer, you start thinking there must be some change in an environmental factor, genetic factors do not change that rapidly. So something environmental had to be changing. As Dr. Leffell indicated, we know that UV light is the primary cause of skin cancer, so that led us to wonder what might be changing in terms of UV exposures. We know that indoor tanning has become much more common in recent years, so we were seeing parallel increases in use of indoor tanning and increases in basal cell carcinoma. So, we decided to ask the question, are the people who are getting these skin cancers at younger ages the same people who are engaging in indoor tanning? And that is what really got us interested in this particular project.

Foss David, can you talk a little bit about this whole issue of indoor tanning, you probably have a lot of patients who you have told not to do this. Is this a fairly common practice nowadays and are there certain groups of patients that are at higher risk, I think you mentioned the lighter skinned patients?

Leffell It is hard to know what the denominator is because the patients that I see are the ones that have had unhappy outcomes from their tanning parlor use, but my observation, and that of my colleagues, started probably seven to eight years ago. We were starting to see more and more women, primarily in their 20s which was unheard of when I was in medical school twenty years ago, and it was clear that something was happening and what was notable is the reaction that these patients had. You would think that a 23-year-old with a basal cell cancer on their face would be especially concerned, but almost to a person they would say, I know I did this to myself, and there was recognition, at least at that point, that using tanning parlors was unsafe and here we now see the results of that activity.

Foss So just to clarify, the amount of sun and ultraviolet exposure that you get in the tanning booth, say compared to if you are out all summer on a boat year after year, for instance, or if you are one of these beach lovers, is the tanning booth really more dangerous than what you would normally be exposed to?

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Ferrucci It is hard to determine, but some studies have looked at the emission spectrum, the UV spectrum, that tanning beds emit, and tanning beds use this UV radiation to produce the tan. UVA and UVB are the primary types of UV radiation that reach us from the sun and in tanning beds we see both of those types of UV. UV radiation as a whole is a known human carcinogen, as classified by the World Health Organization, and when we look at the UV emission from many tanning devices it is often equivalent or exceeds that of the mid-day sun in a country in Southern Europe, such as Italy or Greece. So, it is equivalent to that strong midday sun, which you would not have that much exposure to, and then when we look at the type of UV that is being used within the tanning beds, we see that the UV intensity for UVA of tanning beds is almost 10 to 15 times higher than that of the midday sun. So when the World Health Organization reviewed indoor tanning they said this type of repeated exposure to high doses of UVA was a new phenomenon and so that may be in part why they see this different type of risk with indoor tanning.

Foss Do we know if there are any so called, safe doses of tanning in these tanning booths?

Mayne I think we can talk about the results of our study and kind of highlight that, but I would say with regard to melanoma what they find is that ever indoor tanning increases the risk of melanoma and as we will talk about when we get to the results of our studies, ever indoor tanning also significantly increases your risk of basal cell carcinomas, so based upon that I would say that there is not necessarily a safe dose.

Leffell It is important to recognize that theories of cancer historically included the belief that it took 30 years or so for a cancer to develop once you initiated the cancer with one of the carcinogens or environmental factors, but here we are seeing people that were aged 15, 16, 17, coming in at the age of 23, 24 with cancer, so it also has huge implications for the understanding of the biology of carcinogenesis, or the causing of cancer, and Susan and Leah's work has really allowed us to focus on an important aspect of the aid relationship.

Foss David, I would like to talk a little bit more about that study specially when we come back, but we need to break now for a medical minute.

*Medical
Minute*

The American Cancer Society estimated that lifetime risk of developing colorectal cancer is about one in twenty, and that risk is slightly lower in women than in man. Early detection is the key. When detected early, colorectal cancer is easily treated and highly curable. Men and women over the age of 50 should have regular colonoscopy to screen for this disease. Each day more patients are surviving the disease due to increased access to advanced therapies and specialized care. New treatment options and surgical techniques are giving colorectal cancer survivors more help than they ever had before. Clinical trials are currently underway at federally designated comprehensive cancer centers like the one at Yale to test innovative new treatments for colorectal cancer. New options include Chinese herbal medicine being used in combination with

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chemotherapy to reduce side effects of treatment and help cancer drugs work more effectively. This has been a Medical Minute, more information is available at yalecancercenter.org. You are listening to the WNPR Health Forum on the Connecticut Public Broadcasting Network.

Foss Welcome back to Yale Cancer Center Answers. This is Dr. Francine Foss and I am joined today by my panel of guests, Dr. Susan Mayne, Dr. Leah Ferrucci, and Dr. David Leffell, and we are discussing the issue of tanning and the risks of developing skin cancer from tanning. Could you open up the discussion, Susan, by talking to us in more detail about the particular study that you did and what the results of that study were?

Mayne For our study, we did what is called a case control study, and in a case control study, what we do is we first interview people who have been diagnosed with a particular disease. In this case, it was skin cancer before the age of 40, and we ask them about many different lifestyle factors and exposures, and for this particular study, obviously, we asked a lot of questions about indoor tanning and outdoor tanning and sunbathing and things like that. At the same time, we also interviewed a group of what we call control subjects, and these were people who were selected to match the cases on age and gender to represent similar age and gender distribution. But these were people who are also under the age of 40 and who have not developed the disease that you are interested in, in this case, not having developed skin cancer, and so they are used as a comparison group. We know that tanning is common in young people and we wanted to find out if our cases that had develop skin cancer, had engaged in tanning more frequently than our controls. So, these types of epidemiologic studies are typically large studies. For this study we interviewed a total of 376 people who had early onset skin cancer, basal cell carcinoma, before the age of 40, and we interviewed 390 control subjects and these were all young people, they were all Connecticut residents and we did in home interviews. I took approximately an hour so to ask them all the questions that we needed in order to collect the data for this study and we tried to interview every person that we could find who was diagnosed with basal cell carcinoma under the age of 40 in Connecticut and it turned out that 70% of our cases were female and this is again what our clinicians have been noting, this excessive amount of cancers occurring in young women and that is what we found in our study; 70% of the cases that we interviewed were young women. In terms of what we found, the primary exposure we were really interested in studying in this particular project was indoor tanning and beginning with ever indoor tanning what we observed is that people who ever tanned indoors had a statistically significant, about 70% increased risk of developing basal cell carcinoma. That was a fairly striking risk, previous studies that had looked at indoor tanning tend to focusing on older populations who really did not tan much indoors, but in a younger population, where you have a much higher prevalence of exposure, that was a fairly dramatic risk estimate, 70% statistically significant increase in the risk of skin cancer.

Foss Leah, can you comment on what you think is going on with the younger people. Do you think that there is an increased risk if you are younger and exposed to ultraviolet light as opposed to say if you are older?

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- Ferrucci There is some evidence to suggest that earlier age at initiation of this intense UV exposure may increase the risk, but it has not been consistent throughout and it was a little bit hard for us to determine that in our study population, because most of our indoor tanners had done so at a very early age. We did not have much of a range to be able to examine that much, but age could very well be an important risk factor in terms of the initiation of the exposure.
- Foss And do you know what the age was, the average age when these women started tanning?
- Leah In our population, 95% of indoor tanners started tanning before the age of 25 and 50% have reported their first use of indoor tanning at age 17 or under.
- Foss And do you know how long the average time was that they went to the tanning booth, was it months or years?
- Ferrucci We actually asked several different questions about that. We asked the frequency, the number of sessions that they had, we asked about hours and we asked about the number of years that they had used. I am not sure that I have the median right in front of me though.
- Mayne Sessions is one way to capture the exposures and we had people reporting anywhere from one session, that they had been one time in their life, up to people reporting they have been 2500 times. Because this was a population under the age of 40, we had some people who were in their lateral 30s that began tanning in their teens and had been tanning for 20 years. That was obviously the extreme, but we did have people with that much exposure and again, on the converse, we had people with very limited exposure including people who developed cancer in our study.
- Foss In your control group, I am wondering if you ask the question as to whether folks use sunscreen and whether that entered into your analysis at all?
- Ferrucci We did ask about sunscreen and also specifically sunscreen on the particular body site where the individuals had the lesion. So, we were able to control for sunscreen use in this analysis, but it really was not the focus of this particular project as of yet, but we will be looking at those data a bit more in the future.
- Mayne And I think that is because when people are engaging in indoor tanning they are trying to produce the tans. So they are not applying sunscreen before indoor tanning. It is certainly relevant for outdoor UV and we do have all the data collected on whether they use sunscreen and how much outdoor UV they were getting.
- Foss David, do you notice any change in the distribution of these basal cell cancers in these folks that are going to the tanning booth? Obviously you would suspect in older people, they are more on the face and the hands, which get more sunlight.

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- Leffell What is interesting is a large number are not on the head and neck, where the majority of skin cancers normally occur, which is an argument for an artificial induction or creation of the skin cancers. The ones that we see at Yale generally are patients who had skin cancers on the face because they are being referred for specialized treatment. But, I think that one of the important points to remember for further on the discussion is that 50% figure, people age 17 and younger getting exposure in tanning parlors.
- Mayne And I can followup a little bit on that. We have pathology reports, so we look to see where these tumors were developing in all of the study subjects in our project, and what we observed was a pretty dramatic number that were occurring in the trunk and the extremities, especially in the trunk area, and we looked at the relationship between indoor tanning and those cancers, it was much stronger than what we observe between basal cell carcinomas that are occurring on the face. So, our data did suggest that indoor tanning was a stronger risk factor for tumors that were occurring on the trunk, and I think that adds credibility to the findings because that is what we would expect to see and in fact that is what we observed.
- Foss And David, those skin cancers that occurred on the back and on the truck, might not be as easy for a person to pick up, I would imagine.
- Leffell That and they are also more often than not what we call superficial basal cell cancer, and can be mistaken for a rash or a patch of eczema or something like that, that is just the way it appears and the other types of basal cell cancers have other appearances. I think that the distribution on trunk and extremities as Susan suggests is very telling, and confirms the validity of the study, but it also tells us that we have to focus our educational efforts in terms of this population.
- Foss There is obviously a huge public health impact from this study and Susan, I wondered if you wanted to discuss that and tell us what is next.
- Mayne In terms of what is next, I think our findings really add to the evidence that already was out there linking indoor tanning to melanoma, but the literature just was not that consistent for basal cell carcinoma, largely because, as I mentioned previously, studies have focused on people who are older. When focusing on young people our data were quite telling in terms of linking indoor tanning with this risk. From a public health point of view, as Leah indicated, the average age that our subjects engaged in indoor tanning was before the age of 17 or younger. So, people are starting this behavior very young. We know it is carcinogenic and our study has linked it to basal cell carcinoma. It has also been linked to melanoma. Many organizations, including the World Health Organization, The American Cancer Society, and other organizations have basically said, this is carcinogenic, we need to stop this behavior. Some places have taken the step of banning indoor tanning from young people in the United States, California was the first one to do that starting January of this year, but note that in many other countries indoor tanning is banned in

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young people. For example, England has taken that stand, and Brazil has banned indoor tanning completely. So, the United States stands a little bit behind some of these countries in terms of legislation for indoor tanning.

Foss David, can you talk about what is being done within the dermatologic community to address this issue?

Leffell Over the past several years in Connecticut a variety of interested parties have pushed for legislation to at least get parental consent for these children, and I emphasize the word children, to use tanning parlors. Susan mentioned California went all the way and banned it. I think that in Connecticut our experience has been that every time legislation arises that reflects good common sense, good public health measures, there are political interests to block it. I cannot understand why anyone would be opposed to legal legislative measures that protect the health of our children. I do not imagine these groups to be the same ones to suggest that we should be able to sell cigarettes to 16 year olds, but it is a political reality. This February, it is a short term in the state house, but I believe an effort is being made once again to put forward legislation to require parental consent for the use of tanning parlors in people 17 and younger.

Foss I have a high school student taking health class and it is interesting that they learned about alcohol and they learned about smoking, but they really do not learn about this.

Leffell You are right, and I think that what we are seeing is the time from the insult, or exposure to ultraviolet radiation and the tanning parlor, to the time you actually develop the disease is really quite short and its impact can be significant. So, this is a chance for the people of Connecticut to do the right thing, to come together, to pass a simple law that will make sure that children who are not always in the best position to make decisions about their health, have assistance and protection from doing things that Susan and her team and others have proven is harmful and dangerous.

Foss If somebody in the audience wanted to get involved in this cause, is there an advocacy group that you would recommend or is there a website that they could go to, to get more information about this?

Mayne I think the legislation is being handled on a state by state and nation by nation basis. So, I would look to their local environment and see what is happening there. Many many places in Canada are now very active in trying to introduce legislation for indoor tanning, as I said it is regulated currently on a state by state level. There is a lot of good information on the web that people could access, and there is also a lot of bad information on the web and some of the myths of indoor tanning, and in response to our study, I will say that some of the myths continue to be put forth largely by the indoor tanning association, and I think we should try to correct a few of those. One that I have heard in response to our study is, well it is okay to use indoor tanning as long as you do not burn, and in our study we interview people and ask them whether they did burn from indoor

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tanning and while many people did get burned from indoor tanning, many people did not. And what we found is even in the absence of burning, indoor tanning was associated with a significant increase in the risk of skin cancer. So, our data clearly argues against that, and that has been put forth by the indoor tanning association. The other thing that I have heard in response to our study is, well this must be uncontrolled home tanning, where people are not taking care and they are getting burned in their basements, and that is not what our data indicates. We ask people where they engaged in indoor tanning and the vast-vast majority of those are done in commercial tanning facilities, and so the risks that we are seeing are reflecting what is happening in these young people in commercial tanning facilities, and that is a myth that I think we need to correct.

Dr. Susan Mayne is Professor of Epidemiology, Associate Director of Populations Sciences and Division Head of Chronic Disease in Epidemiology at Yale Cancer Center. Dr. Leah Ferrucci is a Post-Doc at the Yale School of Public Health, and Dr. David Leffell was David P. Smith Professor of Dermatology and Professor of Otolaryngology and Plastic Surgery and Section Chief of Dermatologic Surgery, and Cutaneous Oncology at Yale School of Medicine. If you have questions or would like to add your comments, visit yalecancercenter.org, where you can also get the podcast and find written transcripts of past programs. You are listening to the WNPR Health Forum on the Connecticut Public Broadcasting Network.