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Welcome to Yale Cancer Answers with Dr. Howard Hochster, Dr. Anees Chagpar and Dr. Steven Gore. I am Bruce Barber. Yale Cancer Answers is our way of providing you with the most up-to-date information on cancer care by welcoming oncologists and specialists, who are on the forefront of the battle to fight cancer. This week, it is a conversation about indoor tanning in teens with Dr. Leah Ferrucci. Dr. Ferrucci is a Research Scientist and Lecturer at the Yale School of Public Health and Dr. Chagpar is an Associate Professor in the Department of Surgery at the Yale School of Medicine and the Assistant Director for Global Oncology at Yale Comprehensive Cancer Center.

Chagpar Leah, let's start at the beginning which is to say, you know winter is coming up and all of us like to look good. We have had the summer months, you get that nice warm glow, what is wrong with indoor tanning.

Ferrucci Well, we have a few research studies that have been done to look at indoor tanning and really is to evaluate the risks. So the main problem is that indoor tanning is a source of UV which we know is a known carcinogen for skin cancer and I think the dangers that we have here is that people are starting to use indoor tanning much much earlier in their lives than we would see with someone sort of engaging with sun bathing activities. So what we started to see in lots of populations here is that skin cancer was increasing quite considerably in young woman and typically, when you think of skin cancer, it is often a disease of older age. So really there were some red flags put up there in terms of thinking about what is a new exposure that people might be having and sort of all the arrows were pointing to indoor tanning and this made sense because it was a source of UV, which again as I had said is a known carcinogen for skin cancer. So really what we wanted to start evaluating is what is the relationship between indoor tanning and skin cancer and so, now there have been numerous studies that have linked it to all forms of skin cancer so both melanoma and nonmelanoma skin cancer.

Chagpar So is it true, like, I mean a lot of people will spend time out in the sun and they will get a tan and you know, there is no ban on going out in the sun and yet there seems to have been a very big push for really looking at indoor tanning. Is the effect of indoor tanning worse than just being out in the sun or is it that is just more accessible or that younger people tend to prefer one modality over another or what is the issue there?

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Ferrucci I think it is a combination of those things. So we definitely see that this younger population is doing this behavior, this indoor tanning and as I mentioned before, it is unlikely that you would have really intense sun bathing among that younger age group and there is also the thought that the types of

UV are emitted by tanning beds are a little bit different from the sun, so we get more UVA than UVB from the indoor tanning beds than we do from the sun. So it is thought that could potentially be an issue as well. What we also see with indoor tanning it is very well marketed to teens. So they will go into a salon or you can even find this in gyms now as well and they will be enticed into signing up for programs where they basically have unlimited access to the tanning beds and so we found individuals that will go every single day. So if you think about that it is a bit different than someone who might sun bathe occasionally during the summers or when they are getting ready to go on a trip. So you know, it is a little bit tricky to understand - is it the indoor tanning itself or is it the fact that people might be getting much much more intense and higher exposures to UV. We do think it is probably the latter where they are just getting this very very frequent exposure and also getting it early in life. The other thing that we have tried to think about here is when people go outside they might be wearing some sunscreen or they might have protective clothing on or a hat, so that can help protect against some of the UV exposure when we are outside, but when people go indoor tanning, there is typically no protection used and often times, there are often even lotions that are promoted to try to sort of stimulate tanning to an even greater degree. So it could be that they are getting that more intense exposure as well just by the fact that they do not have any protection.

Chagpar And so, the risk with indoor tanning is higher than the same duration of exposure to direct sunlight, is that right?

Ferrucci So, I think unfortunately we don't really have those specific data because sun exposure is a bit difficult to quantify, right, it is hard to ask someone how often they really have been outside in the sun because we also get that just as a chronic exposure when we are walking in between places, when we go to our car. So I don't think we have those direct data right now, but it does seem as though when you look at someone who can report sort of sunburns early in life or have sun bathing exposures that seems like the indoor tanning confers a greater risk in this younger population as compared to the sun exposure.

Chagpar And so do we know what that risk is? Is there a certain amount of indoor tanning that is okay versus not okay? 00:05:14 into MP3: https://ysmwebsites.azureedge.net/cancer/2017-YCA-1105-Podcast-Ferrucci_320315_5_v1.mp3 Ferrucci So in the some of the studies that we have done in both nonmelanoma skin cancers and melanoma skin cancers, we have come up with a variable called ever indoor tanning, where we tried to say how you even done this behavior at all and when we look at that variable we are able to see that there is an increase risk just with this ever indoor tanning variable. Now, it is a little bit tricky because you are going to have high indoor tanners in that group as well as people who have tried it once, but even when we do with a sort of dose response, it does seem like even in this low exposure group which would include people who have only tried it once, there does appear to be an increased risk of skin cancer.

Chagpar And so when we are talking about the differences between indoor tanning and sunlight, one of the things you mentioned was that it may have a higher rate of UVA. Is UVA worse in terms of skin cancers than UVB?

Ferrucci So originally, it was thought that UVA did not play a role in skin cancer risk, but more and more the data seemed to indicate that it could be a potential carcinogen as well. So I am afraid there is not kind of concrete evidence of is one worse than the other, but right now, they are both implicated in skin cancer.

Chagpar And, I guess the other point that you had mentioned is really this idea of people getting access to tanning beds earlier in life. Tell me a little bit more about the correlation between early exposure to UV light and skin cancer - is that if you get it earlier in life that is worse than if you got it later in life?

Ferrucci So, again the data on this are that when we look at people who indoor tan under the age of 35, that is often the cutoff that we use when we have these types of epidemiologic studies, we do see that the risk is much higher in that group than if you had someone who had started indoor tanning later in life. Now, again it is a little bit hard to tease a part and could be that cumulative or frequency of the exposure, but it is also possible that if you are doing this damage very early on in life that the dangers for the skin cancer risks could be much greater because of that increased exposure early in life.

Chagpar Because, I know when we have had people on the show in the past who have talked about melanoma they certainly say that if you know if you get sunburns particularly in your teenage years that is worse.

Ferrucci Right and I think that this might follow along that same pathway in that you know this early intense exposure to UV from the indoor tanning at a young age could potentially increase your risk much greater than if you had it, say at 35 or 40.

Chagpar Right and there may be cumulative kind of dose effects on top of that because you know even if you go to a tanning salon when you are 12 or 13 or 15 or 16 and you have got the whole rest of your life when you are in the sun, those may be additive, is that right?.

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Ferrucci Exactly, so those individuals as you just mentioned may be getting that indoor tanning exposure but then they have you know many many years ahead of them where they are out in the sun, they might be sun bathing as well, we often see the behaviors go together. So it could just be that total dose of UV is much much higher in that population.

Chagpar And so because of this public health and epidemiologic evidence. Tell me about the kind of the genesis behind this ban and what the ban is, because a lot of people may or may not be aware, but there is such a thing?

Ferrucci Sure, so as public health officials and clinicians were seeing a lot of the research come out on indoor tanning and skin cancer. There was a big push to think about what are some of the policy level interventions that could be done to improve the public health for this issue. So these bans are restricted by age and they target minors primarily. The first indoor tanning ban that was passed for individuals who are under age 18 was in California and that came into effect in 2012. So California was really the leader in this, they had seen the data coming out on the increases in skin cancer and they saw the connections being drawn to indoor tanning, so they really made a move there and a lot of sort of policy makers and people who are trying to push this (the advocates), they really tried to draw some parallels to cigarettes, so this was a product that was being marketed that was now being us, basically research has known carcinogen and it was being marketed to teens, so the bans really made sense as a way to have this other level of intervention if it was going to be hard to target individuals one on one, we could at least have something in place that might restrict them overall. So that first ban as I said passed in 2012 and since then, there have been many many states across the US that have put in similar bans either for all minors under age 18 were some sort of permutation thereof. So in Connecticut, we were able to pass an indoor tanning ban for those under age 17 and that went into effect in October 2013. There are a few other states that also have laws in place that are set up as parental restriction laws and so this enables a minor to tan if they have a written permission from a parent or potentially a clinician.

Chagpar So in Connecticut if you have a child and you think it is okay for them to tan, but they are under 17, they are still not permitted to do so even with your consent?

Ferrucci That is correct, that is how the law is written at the moment. Another problem that we don't quite know about at the moment is how are these actually enforced, so you know there is a fine written into the law that says if they find that an indoor tanning salon or a gym is offering indoor tanning those under age 17, then there would be a fine and violation of that, but there is not real good information as to how that is actually being enforced in the real world. So it is possible that a minor might be able to tan in Connecticut.

Chagpar Has there been any data looking at that because I would think that just from strictly business perspective if you have a tanning salon very much like you said you know they are marketing to younger population, how do you really know that they are not turning a blind eye to people's age and really demanding to see ID before they allow people into the tanning salons?

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Ferrucci Yes. So there was some work that was done several years ago in individual states and then my research group, we decided to undertake a project this past year where we looked at the compliance with bans by having several

research assistants pose as minors over the telephone. So this was not the exact way in which someone would probably go into a salon in person, but it gave us a little bit of information about this. So we tried to contact a random sample of salons in the 14 states that had bans at the time that we conducted our research and we were really focusing on states that had bans for those under age 17 or under age 18 and so what we found when we did this sort of sampling of calls is that about 20% of indoor tanning businesses would say that they would allow the minor to tan, so we sort of deemed them noncompliant with the law in their particular state. So at least there is some indication that the majority of the salons for about 80% were compliant with the ban, but my guess is that you know we do see this noncompliance and it is possible too that over the phone will be definite than from in person, so there is still quite a bit that is unknown about the real enforcement of the fines as well as the compliance with the ban in sort of the real world setting.

Chagpar How did you that study, just out of curiosity, I mean would you phone say I am 16, can I tan?

Ferrucci So we modeled it after a study that was done in California which as I said was one of the first states with the ban and so in that study, they had come up with a script which we followed and it would say, you know, I am 16 or 17 and I would really like to tan, you know, am I able to use your facility or what sort of the way in which I can get access to your facility and so our research assistants were kind of trained to do the script where they would talk to the employee who answered the phone and really get an answer as to whether or not that person would let them into the salon or not.

Chagpar Hmm, interesting. So tell us a little more about have we seen any reduction now that these bans have been in place in terms of skin cancer development in these states?

Ferrucci Sure. I don't think we have the data quite yet on the skin cancer outcome. What we have though are data that look at the prevalence or the rates of indoor tanning in those particular states as well as just nation-wide. So you know, in 2009, we have data that looked at high school students and at that time, the most common group of indoor tanners were typically non-Hispanic white females. So in 2009 that group about 37% of them would have been indoor tanning and when we looked at that survey again in 2005, the data suggested now that it is only about 15%, so that is a pretty big reduction.

Chagpar Really great. Well, we are going to take a short break for a medical minute, but please stay tuned to learn more information about indoor tanning in teens with my guest Dr. Leah Ferrucci.

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ket targeted oncology medicines that address unmet needs. More information at astrazeneca-us.com. Genetic testing could be useful for people with certain types of cancers that seem to run in their families. Patients that are considered at risk for a familial or hereditary cancer received genetic counseling and testing, so informed medical decisions can be based on their own personal risk assessment. Resources for genetic counseling and testing are available at federally designated comprehensive cancer centers such as Yale Cancer Center and at Smilow Cancer Hospital. Smilow's genetics and prevention program is comprised of an interdisciplinary that includes geneticist, genetic counselors, physicians, and nurses who work together with a goal of providing cancer risk assessment and taking steps to prevent the development of cancer. More information is available at YaleCancerCenter.org. You are listening to WNPR Connecticut's Public Media Source for news and ideas.

Chagpar This is Dr. Anees Chagpar and I am joined tonight by my guest, Dr. Leah Ferrucci. We are talking about tanning in teens and the fact that in a number of states including Connecticut, there is now a ban on teens actually going to tanning salons and much of this came from data linking indoor tanning with skin cancer, so Leah a few questions for you. You know, you mentioned that indoor tanning was associated with both melanoma and nonmelanoma skin cancers. A lot of people really do not put a lot of stock in nonmelanoma skin cancers. Do we know the breakdown, how much of indoor tanning results in melanomas which are really bad and potentially deadly and how much of this is just like regular basal cell carcinomas or squamous cell carcinomas where it is a chip shot just to take it out, nobody really pays much attention to those so-called "cancers."

Ferrucci That is a great question Anees and I think you're right that sort of nonmelanoma skin cancers are often brushed aside, but what we really would like to focus in on that is if you start to have a nonmelanoma skin cancer early in life, you are going to need to be followed quite extensively by your dermatologist for many years to come and what we see in younger people who have the nonmelanoma skin cancers that they often have multiples of that, so many of those nonmelanoma skin cancers. We have had many women who were in our study where they had lesions on their face and that can be quite uncomfortable for them if they have a scar due to the removal. I think it is a little bit tricky to parse out exactly how many cancers for melanoma versus nonmelanoma are due to indoor tanning in part because nonmelanoma is not tracked in the same systems that we have for cancer statistics for melanoma. So due to the sheer volume of nonmelanoma skin cancers that are just not in the same statistical databases that we have. So unfortunately, I don't know that I can give you the exact sort of breakdown there, but I do think it is an important cancer that we need to still consider because of the fact that it can have this high medical cost going forward in life if you happen to have the disease early on.

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Chagpar Right and the other piece I guess is this whole idea of promotion of tanning salons and we talked a little bit of this and the whole marketing of tanning and I wonder whether you know it is actually marketed as a healthy kind of thing, you mentioned that, for example, tanning salons are often found in gyms. We promote going to the gym, we think physical activity is really good for you and yet, there are tanning salons in gyms. What is the perception of tanning salons as either something that is healthy or not healthy, I mean do people understand the risks associating with tanning?

Ferrucci I think in general people do not necessarily understand the risks. As you said that placement of tanning salons in gyms has really been a detriment that we have to fight against, so connecting it to that healthy activity of exercise has really placed it in some people's mind as "Oh, I go and work out and then I go get my tan and they are both great for me." So that is really a myth that we have try to separate out and I think that is coming across more and more as you see when we discussed some of the figures about the decreases in tanning in teens, I think that is starting to get out there. There is also some information where we have looked at how do they promote the tanning and sort of really tried to sell it to teens, and oftentimes, you will see salons telling people that it is great for vitamin D production, now that certainly is not going to outweigh the risks of skin cancer that you are going to get by having that indoor tanning and really the recommendation for vitamin D would be to get it either through your food sources or through a supplement if for some reason that is of concern for you. So that is another myth that we really have to bust as that you would not want to get that dose of UV, just to get vitamin D when in fact you might be increasing your risk of skin cancer. I think for the teens as well there is a big promotion in terms of sort of promoting their social desirability within your sort of peers. So tanning is often seen as being very popular, most celebrities are going to be tanned, that is kind of the desired look, so they really try to market that to teens. There is also sometimes promotion that the fact that tanning might be able to help people with acne, that is something where they really try to push that for teens and that is not proven. So this is just sort of promotion of information that is not going to be accurate to teens and yet that is really enticing to them.

Chagpar You know, it does seem to have very many of the same parallels that we had with smoking where back in the day, you know, people would say while smoking is really cool and it can help you to lose weight and we know that is (A) not true and (B) certainly detrimental to your health and there are no benefits to smoking that outweigh the cardiovascular and cancer risks associated with smoking and yet so much of that promotion was to teenagers and young adults and that too, you know, smoking is one of those things that once you started it really had an addictive kind of behavior, so that even after the data came out saying, you know, this is a known carcinogen, this is detrimental to your health in ten million ways in one, people just have such difficulty quitting. Have we

seen the same kind of addiction behavior with tanning or is tanning one of those things where you can go, you can try it, and you can get tan for an event and then not ever go back?

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Ferrucci So I do think we see that group of people who just try it once or twice for an event, as you said, and they will stop, but there is a segment that seems to develop a dependence on tanning or a tanning addiction and this is a group that we are really interested in studying and trying to understand a little bit more and one of the proposed mechanisms for dependence on UV is that as a byproduct of the UV exposure, the body can actually produce beta endorphin, so this is something that can make you feel good, so people often think of this with running highs from exercising, so there have been data that suggests that tanning may have that same response in certain individuals. So there is also some interesting work that is indicated this sort of tanning dependence where they have frequent indoor tanners try tanning beds that have UV lights and than those that have non-UV lights and the frequent indoor tanners basically choose the ones with UV, so they have this preference for the UV. So we do think that this tanning dependence may definitely be present in some individuals which definitely complicates the matter for thinking about how to help them reduce their exposure.

Chagpar So are there tanning beds that are non-UV?

Ferrucci So, these were sort of research ones where they call them sham tanning beds and they would just use different lights, so it would look similar, but it did not actually emit the UV.

Chagpar And so you would not really get a tan.

Ferrucci Exactly, so that could have been you know part of the information that they were getting but unfortunately, you know, in the real world, they all have UV as far as we know.

Chagpar So in that subset of patients, who really do get addicted and who do get this kind of UV high from these tanning beds. What can you do for them, I mean, in terms of smoking, there are all kinds of now smoking cessation programs, we have really tried to educate patients and give them patches or gums or medications or therapy or whatever they need to help them to quit. Are there similar interventions being developed for tanning addictions?

Ferrucci So I think is a new field, you know, we have really only started to describe addiction probably within the last 7 to 5 years and we were still really trying to define exactly who should be in this group, because some people who do it to say that they regulate mood but is that really a true addiction. We are still really trying to parse this group apart. I do think that there are some researches that are trying to focus in on what could be specific interventions or treatments that might work with them and my guess is that they are

going to really be trying to rely on the substance abuse literature and sort of therapies that are used within that population or even some of the smoking cessation interventions that are out there. I myself don't do this work, but I know a lot of —how psychologists are really interested in this area to try to parse apart, how could we actually intervene with this population. 00:24:05 into MP3: https://ysmwebsites.azureedge.net/cancer/2017-YCA-1105-Podcast-Ferrucci_320315_5_v1.mp3

Chagpar So if you are a parent or you are a young adult thinking about tanning. What advice would you give them in terms of really preventing, you know, even starting tanning?

Ferrucci Yeah, I think this is a really tricky question and in part it seems to be one where they just need the information. So as I said before a lot of the advertising and sort of public perception of indoor tanning is just that is okay or if it is being sold, maybe it is safer than the sun, I think people have that sort of conflation in their heads of "If it's a product I can buy, it must be okay." So I think for both parents and teens it is sort of that information gathering which we try to do a lot now with educational campaigns. There has been a bigger push more recently to try to get information out to the public on skin cancer and I do think one of the most important pieces is just trying to prevent them from even trying it. So if teens that could be if they really want to have that tanned look, a lot of the interventions that we work on now is trying to promote perhaps something like spray tanning if they really want to have that appearance of the tanned skin or can we find alternate activities that might be something like if they are seeking relaxation, perhaps we can move them toward something like yoga or massage if that is really the release that they are trying to get from the tanning. So I think there has to be this education component as well as offering alternatives to them.

Chagpar Do we know that spray tans are safe, I mean are the chemicals in spray tan is safer or is it that 5 years down the lane, we are going to be having the same conversation about spray tans?

Ferrucci There is some question about the chemicals, but mainly it is for the people who apply the chemical because they are in such high contact with it. So the chemical itself is approved for a topical application, but there is not that much information or sort of clearance on the sort of spraying of the chemicals, so if you are inhaling the chemical what could be the implications of that. There are some limited studies where they have looked at that and they have not seen anything very surprising in terms of risks but that is a potential concern, say if you were an individual who is administering spray tans, but most likely for individuals who are getting the tans, it is a safe alternative or at least much safer alternative. There are also lots of products now that are just, you apply to your skin with a lotion and so my guess is that that is kind of the way to move even if you have a little bit of concern about the spray tanning.

Chagpar And all of these bans seem to be really targeting minors, the teenagers,

but it seems to me that everything you have told me will equally apply when you are in your 20s or 30s or 40s, it is just that the duration may be little bit shorter. 00:26:47 into MP3: https://ysmwebsites.azureedge.net/cancer/2017-YCA-1105-Podcast-Ferrucci_320315_5_v1.mp3

Ferrucci Definitely. So it is interesting there are couple of countries in the world that have banned indoor tanning entirely, so those are Brazil and Australia as countries as a whole, have just banned indoor tanning for minors or adults. So that is kind of an interesting move that has been made and then also I think what is being done in the US, in particular, there is a movement within the FDA to try to get some additional information posted on tanning beds, so that adults can see the risks more clearly. There is also a propose in place through the FDA that there could potentially be a ban for all minors nationwide, so that we don't have this piecemeal sort of state level bans and then also as a part of that, they are hoping that there could be some sort of document that an adult would have to sign acknowledging the risks right up front. So that would put that information right in the individual's hand, which right now we feel like is not available to them.

Chagpar Because it is interesting the same kinds of things have been tried with cigarettes right, like putting the gross pictures of people with terrible head and neck cancers right on the package or increasing taxes, have people look at having an indoor tanning tax.

Ferrucci So it is part of the affordable care act, there was a 10% excise tax that was put on the businesses. So it is thought that this might have an impact on the number of indoor tanning businesses that we were around, so we do this within the last decade that it appears as though the number of businesses offering indoor tanning has declined and it is possible that it could have been due to the tax, it is also possible that just the decline in the popularity that we discussed before could be impacting businesses. So I think the tax has been considered, you know it will be interesting to see if that is going to be upheld or not.

Chagpar And so for the countries like Australia which have banned indoor tanning completely, do we find a lower rate of skin cancers there than we do in the US per 100,000 population?

Ferrucci So I think Australia is pretty interesting in that they have had really concerted efforts to lower skin cancer overall. So they are at a location in the world where they have very very intense sun exposure nearly year round, so they really had to tackle skin cancer at the whole population level and so I think you know we cannot quite compare because they have such better information for general skin cancer prevention as well as for sun exposure, so I don't know that we could tease apart just the indoor tanning piece.

Dr. Leah Ferrucci is a Research Scientist and Lecturer at the Yale School of Public Health. If you have questions, the address is canceranswers@yale.edu and past editions of the program are available in audio and written form at

YaleCancerCenter.org. I am Bruce Barber reminding you to tune in each week to learn more about the fight against cancer here on WNPR, Connecticut's Public Media Source for news and ideas.